NMR Console Nanobay

AVANCE Spectrometers

Service Manual

Version 003

NMR Spectroscopy

Innovation with Integrity

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Contact

Manufacturer:
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http://www.bruker-biospin.com

NMR Hotlines

Contact our NMR service centers.

Bruker BioSpin NMR provide dedicated hotlines and service centers, so that our specialists can respond as quickly as possible to all your service requests, applications questions, software or technical needs.

Please select the NMR service center or hotline you wish to contact from our list available at:
http://www.bruker-biospin.com/hotlines_nmr.html

1 About

1.1 This Manual

This manual is intended to be a reference guide for operators and service technicians. It provides detailed information about the user level maintenance and service and overall use of the Bruker device.

The figures shown in this manual are designed to be general and informative and may not represent the specific Bruker model, component or software/firmware version you are working with. Options and accessories may or may not be illustrated in each figure.

Carefully read all relevant chapters before working on the device!

This manual describes parts and procedures relevant to the device version it is delivered with. For older hardware, please refer to the manual supplied at the time.

User interface, system messages, and manuals require a good understanding of the English language.

Warnings and danger alerts are printed in English and partially in French.

1.2 Policy Statement

It is the policy of Bruker to improve products as new techniques and components become available. Bruker reserves the right to change specifications at any time.

Every effort has been made to avoid errors in text and figure presentation in this publication. In order to produce useful and appropriate documentation, we welcome your comments on this publication. Support engineers are advised to regularly check with Bruker for updated information.

Bruker is committed to providing customers with inventive, high quality products and services that are environmentally sound.

1.3 Symbols and Conventions

Safety instructions in this manual are marked with symbols. The safety instructions are introduced using indicative words which express the extent of the harzard.

In order to avoid accidents, personal injury or damage to property, always observe safety instructions and proceed with care.

DANGER

This combination of symbol and signal word indicates an immediately hazardous situation which could result in death or serious injury unless avoided. On the equipment, the symbol implies also a danger and alerts the user. It is necessary for the user to refer to the manual prior to the use of marked items.

Symbole dangereux:

Dans tout ce manuel, ce symbole indique les conseils ou les instructions dont le non-respect pourrait mener au comportement incorrect ou incalculable du système ou peut blesser l'utilisateur.
Sur l'équipement, le symbole indique également un danger et prévient l'utilisateur. Au préalable, l'utilisateur est tenu de lire le manuel avant l'utilisation des articles marqués.

HIGH VOLTAGE

Throughout this manual, this symbol indicates necessary actions which imply a risk of being injured by high voltages.
On the equipment, the symbol indicates dangerous voltages. Do not open a cover with this label!

Symbole haute tension:
Dans tout ce manuel, ce symbole indique les actions nécessaires qui impliquent un risque de blessure par des tensions élevées.
Sur l'équipement, le symbole indique des tensions dangereuses. N'ouvrez pas les couvercles avec cette étiquette !

WARNING

This combination of symbol and signal word indicates a potentially hazardous situation which could result in death or serious injury unless avoided.

Symbole avertissement:

Dans tout ce manuel, ce symbole indique les conseils ou les instructions dont le non-respect pourrait mener au comportement incorrect ou incalculable du système ou peut blesser l'utilisateur.
Sur l'équipement, le symbole indique également un danger et prévient l'utilisateur. Au préalable, l'utilisateur est tenu de lire le manuel avant l'utilisation des articles marqués.

⚠ CAUTION

This combination of symbol and signal word indicates a possibly hazardous situation which could result in minor or slight injury unless avoided.

Symbole précaution:

Cette combinaison de symboles et mentions d'avertissement indique une situation potentiellement dangereuse qui pourrait entraîner des blessures mineures ou légères, si elle n'est pas évitée.

NOTICE

This combination of symbol and signal word indicates a possibly hazardous situation which could result in damage to property or the environment unless avoided.

Ca indique une situation potentiellement dangereuse qui pourrait causer des dommages aux biens ou l'environnement, si elle n'est pas évitée.

i This symbol highlights useful tips and recommendations as well as information designed to ensure efficient and smooth operation.

Symbole information:
Conseil pour la bonne pratique en matière d'opération

1.3.1 Other symbols on devices

Table 1.1. Symbols used on the equipment or in this manual

	Hot device: On the equipment, the symbol indicates hot surfaces and alerts the user. Dispositif chaud: Sur l'équipement, le symbole indique les surfaces chaudes et prévient l'utilisateur
 or 	Electrostatic sensitive device: Observe precautions for handling. Dispositif sensible aux décharges électrostatique: Observez les précautions d'emploi
	Protective ground (earth) terminal: Used to identify any terminal which is connected to the external protective conductor for protection against electrical shock in case of fault. Borne de terre (Protection par la terre): Utilisé pour identifier toute borne qui est reliée au conducteur protecteur externe pour la protection contre les chocs électrique en cas de défaut.

2 Introduction

This service manual is intended to be used by trained Bruker service staff only. The manual is a service and installation guide for the Avance Nanobay system. Please refer to the individual probe and magnet manuals for service related information on these devices.

2.1 Concept

The Avance Nanobay is a reduced size variant of the MicroBay console for Avance III systems. With its basic infrastructure (fan cooling, mains power, ethernet switch, pneumatics and backplane), the Nanobay integrates also the functions of the AQS and BSMS chassis, which are both taken up in the system.

Functional units (IPSO, Receiver, Signal Generation, Power Amplifiers, Preamplifiers, Shim Boards, Lock, VT, etc.) are identical with the former MicroBay configuration. For extended applications, it is also possible to connect external preamplifiers.

Currently there are three generations of Nanobay systems available (see "Variants" on page 17).

Figure 2.1 Nanobay console

2.2 Use of this manual

In the Nanobay, the AQS and BSMS (respectively the related sub-units) are integrated into one system. However, there are still the two distinguishable sections for the AQS

and the BSMS. The IPSO can be considered as a separate subsystem as well.

Since the functional units are installed in a similar way as in the AQS and BSMS, this manual covers only the Nanobay specific information (considerations for safety, main frame, Nanobay specific configuration information, etc.). Detailed information about the functional units and their cooperation in the AQS and BSMS are described in the related manuals:

- IPSO section: **„IPSO AQS Unit for AVANCE III“**
- AQS section: **„AQS/3 with IPSO Systems“** and **„HPPR/2“** (preamplifiers) in the HPPR directory.
- BSMS section: **„BSMS/2 systems with ELCB“**
- Fundamental description of NMR lock: **„BSMS Lock“**
- Lift, Spin HE level and N2 level measurement: **„Sample and Level (SLCB)“** and **„BSMS/2 systems with ELCB“** (Nanobay V2)

2.3 Dimensions

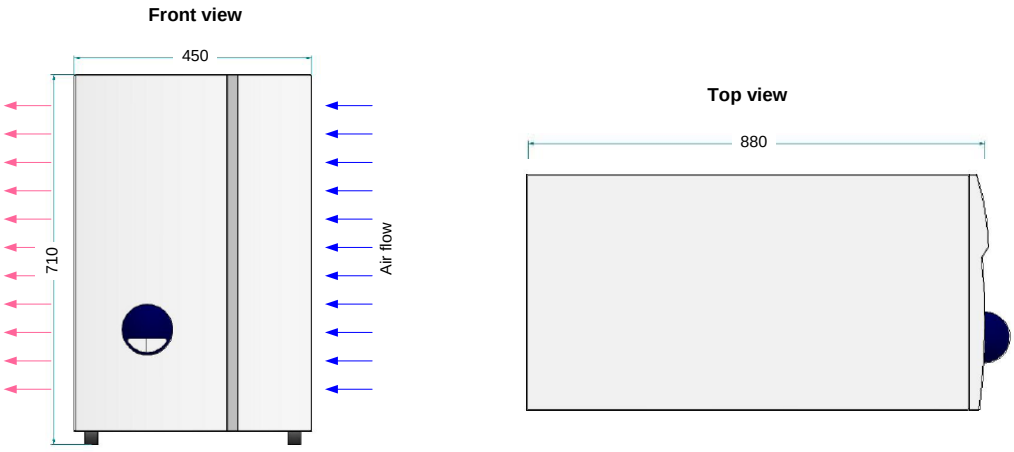


Figure 2.2 Dimensions of the Nanobay cabinet

The side panels can be easily removed by quick snap-in fastenings, which are described in chapter "Removing covering" on page 129.

2.4 Variants

Part Number	Description	Lock	VT System	Supported Shim System	RF	Power Supply
Z108356	AVANCE CONSOLE NB-E WIRED	L-RX / L-TX	BVT3200(A)	BOSS-1	SGU/2	PSB3
		L-TRX				PSB6
Z119572	AVANCE CONSOLE NB-E WIRED **V2**	L-TRX	BSVT	BOSS-1 BOSS-3	SGU/2	PSB6 ECL >=02.00
Z126037	AVANCE CONSOLE NB-E WIRED **V3**	L-TRX	BSVT	BOSS-1 BOSS-3	SGU/3	PSM family of supplies

Table 2.1. Differences between Nanobay versions

2.5 Limitation of Liability

All specifications and instructions in this manual have been compiled taking account of applicable standards and regulations, the current state of technology and the experience and insights we have gained over the years.

The manufacturer accepts no liability for damage due to:

- Failure to observe this manual
- Improper use
- Deployment of untrained personnel
- Unauthorized modifications
- Technical modifications
- Use of unauthorized spare parts

The actual scope of supply may differ from the explanations and depictions in this manual in the case of special designs, take-up of additional ordering options, or as a result of the latest technical modifications.

The undertakings agreed in the supply contract as well as the manufacturer's Terms and Conditions and Terms of Delivery and the legal regulations applicable at the time of conclusion of the contract shall apply.

2.6 Before You Begin

This service manual contains information and safety information that are necessary for the safe operation of the device.

Any user maintenance and repairs are to be accomplished using the information in this manual.

Consider all safety references!

Information for ordering spare parts is available in the spare parts section for from the Bruker Service Center (see contacts).

2.7 Minimum Qualifications for Operating Personnel

Type of Task	Personnel	Training and Experience
Transportation	No speical requirements.	No special.
Installation	Bruker certified personnel only.	Technically skilled, with a good knowledge of the application field.
Routine Use Daily Maintenance	Appropriately certified and experienced personnel, familiar with use of computers and automation in general	Laboratory technicians or equivalent. Training is usually done in-house.
Setup and optimization of program	Bruker certified personnel only.	Experienced laboratory technician. High degree of knowledge of the relevant application field.
Preventive Maintenance	Bruker certified personnel only.	Technically skilled with a basic understanding of the application.
Servicing	Bruker certified personnel only.	Background and experience in electronics/mechanics with computer knowledge.

Table 2.1 Overview Installation and Operation Requirements for Personnel

2.8 The Bruker Service

Our customer service division is available to provide technical information. See "Contact" on page 9 for contact details.

In addition, our employees are always interested in acquiring new information and experience gained from practical application; such information and experience may help improve our products.

2.9 Transport to Manufacturer

When the Avance Console Nanobay must be returned to the manufacturer for a major repair, use the original packaging for transportation.

Include a good description of the problem.

2.10 Manufacturer and Conformity

Manufacturer

The individual units of the Nanobay system are manufactured at different BRUKER production sites. The manufacturer can be identified by the part number prefix according to the following table.

Part No. Prefix	**Z . . . . . .**	**H . . . . . .**	**W . . . . . .**
Manufacturer Address	**Bruker BioSpin AG** Industriestr. 26 8117 Fällanden **Switzerland**	**Bruker BioSpin GmbH** Silberstreifen 4 76287 Rheinstetten **Germany**	**Bruker BioSpin S.A.** 34, rue de l'industrie 67166 Wissembourg Cédex **France**
Phone Fax	+41 (44) 825 91 11 +41 (44) 825 96 96	+49 (721) 5161 - 0 +49 (721) 5171 01	+33 (3) 88 73 68 00 +33 (3) 88 73 68 79
E-Mail	sales@bruker-biospin.ch	nmr@bruker-biospin.de	bruker@bruker.fr
Internet	www.bruker.com		

Table 2.2 Manufacturer Identification

Conformity

The Nanobay Console

- Z104671 AVANCE CONSOLE NB WIRED
- Z119572 AVANCE CONSOLE NB-E WIRED V2
- Z126037 AVANCE CONSOLE NB-E WIRED V3

are in conformance with IEC/EN 61010-1 and IEC/EN 61326-1.

Introduction

3 Safety

This section provides an overview of all the main safety aspects involved in ensuring optimal personnel protection and safe and smooth operation.

Non-compliance with the action guidelines and safety instructions contained in this manual may result in serious hazards.

3.1 Intended Use

The Nanobay system has been designed and constructed solely for the intended use described here. The Nanobay system is dedicated only for the specific NMR purpose of being used as the electronics system of the ***AVANCE*** ^{III} spectrometers of BRUKER.

Intended use also includes compliance with all specifications in this manual.

Any use which exceeds or differs from the intended use shall be considered improper use.

No claims of any kind for damage will be entertained if such claims result from improper use.

⚠ WARNING

Do not use the Nanobay system for a purpose other than the described “Intended Usage”.

N'employez pas le système Nanobay pour un but autre que celui prévu.

⚠ WARNING

Operation of the Nanobay chassis in a manner not consistent with ’Normal Operation’ as described and recommended in this document may expose the user to unsafe conditions and may result in damage to the instrument. Service calls that arise from a failure to observe these recommendations are NOT covered by the instrument warranty

L'utilisation du châssis Nanobay non conforme avec l’usage normal décrit et recommandé dans ce document peut exposer l'utilisateur à des conditions dangereuses et pourrait conduire à la destruction de l'instrument. Des interventions qui résultent d’une inobservance de ces recommandations ne sont pas couvertes par la garantie.

3.2 Owner‘s Responsibility

Owner

The term 'owner' refers to the person who himself operates the device for trade or commercial purposes, or who surrenders the device to a third party for use/application, and who bears the legal product liability for protecting the user, the personnel or third parties during the operation.

Owner‘s Obligations

The device is used in the industrial sector, universities and research laboratories. The owner of the device must therefore comply with statutory occupational safety requirements.

In addition to the safety instructions in this manual, the safety, accident prevention and environmental protection regulations governing the operating area of the device must be observed.

In this regard, the following requirements should be particularly observed:

- The owner must obtain information about the applicable occupational safety regulations, and - in the context of a risk assessment - must determine any additional dangers resulting from the specific working conditions at the usage location of the device. The owner must then implement this information in a set of operating instructions governing operation of the device.
- During the complete operating time of the device, the owner must assess whether the operating instructions issued comply with the current status of regulations, and must update the operating instructions if necessary.
- The owner must clearly lay down and specify responsibilities with respect to installation, operation, troubleshooting, maintenance and cleaning.
- The owner must ensure that all personnel dealing with the device have read and understood this manual. In addition, the owner must provide personnel with training and hazards information at regular intervals.
- The owner must provide the personnel with the necessary protective equipment.
- The owner must warrant that the Nanobay Console is operated by trained and authorised personnel as well as all other work, as transportation, mounting, start-up, the installation, maintenance, cleaning, service, repair and shutdown, that is carried out on the device.
- All personnel who work with, or in the close proximity of the Nanobay Console device, need to be informed of all safety issues and emergency procedures as outlined in this user manual.
- The owner must document the information about all safety issues and emergency procedures in a laboratory SOP (Standard Operating Procedure). Routine briefings and briefings for new personnel must take place.
- The owner must ensure that new personnel must be supervised by experienced personnel. It is highly recommended to implement a company training program for new personnel on all aspects of product safety and operation.

- The owner must ensure that personnel is regularly informed of the potential hazards within the laboratory. This is all personnel that work in the area, but in particular laboratory personnel and external personnel such as cleaning and service personnel.
- The owner is responsible for taking measures to avoid inherent risks in the handling of dangerous substances, preventing industrial disease, and providing medical first aid in emergencies.
- The owner is responsible for providing facilities according to the local regulations for the prevention of industrial accidents and generally accepted safety regulations according to the rules of occupational medicine.
- All substances needed for operating and cleaning the device samples, solvents, cleaning agents, gases, etc. have to be handled with care and disposed of appropriately. All hints and warnings on storage containers must be read and adhered to.
- The owner must ensure that the work area is sufficiently illuminated to avoid reading errors and faulty operation.
- The owner must ensure that the laboratory is equipped with an oxygen warning device, in case the device is operated with nitrogen.

Furthermore, the owner is responsible for ensuring that the device is always in a technically faultless condition. Therefore, the following applies:

- The owner must ensure that the maintenance intervals described in this manual are observed.
- The owner must ensure that all safety devices are regularly checked to ensure full functionality and completeness.

3.3 Personnel Requirements

3.3.1 Qualifications

Note: Only trained Bruker personnel are allowed to mount, retrofit, repair, adjust and dismantle the unit!

3.3.2 Unauthorized Persons

⚠ WARNING

Risk to life for unauthorized personnel due to hazards in the danger and working zone!

Unauthorized personnel who do not meet the requirements described in this manual will not be familiar with the dangers in the working zone. Therefore, unauthorized persons face the risk of serious injury or death.

- ▶ Unauthorized persons must be kept away from the danger and working zone.
- ▶ If in doubt, address the persons in question and ask them to leave the danger and working zone.
- ▶ Cease work while unauthorized persons are in the danger and working zone.

3.3.3 Instruction

The personnel must receive regular instruction from the owner. The instruction must be documented to facilitate improved verification.

Date	Name	Type of Instruction	Instruction Provided By	Signature

Table 3.1 Instruction

3.4 Personal Protective Equipment

Personal protective equipment is used to protect the personnel from dangers which could affect their safety or health while working. The personnel must wear personal protective equipment while carrying out the different operations at and with the device.

This equipment will be defined by the head of laboratory. Always comply with the instructions governing personal protective equipment posted in the work area.

3.5 Position of the Safety Devices

The mains switch on the Nanobay chassis back provides the EMERGENCY OFF function. Under normal conditions, this switch is used for both, power up and shut down of the system.

3.6 Important Safety Considerations

These safety instructions refer to the whole Nanobay system including its subunits.

HIGH VOLTAGE

Do not loosen, connect or touch any cable during lightning.

Do not use a cable that shows signs of damage or that have been stressed and could be damaged.

Do not open the power supply modules. There may be dangerous voltages present.

Ne détendez, ne reliez ou ne touchez aucun câble pendant un orage (foudre). N'employez pas un câble endommagé.

N'ouvrez pas les modules d'alimentation. Ils peuvent être sous tension.

⚠ WARNING

Heavy equipment:

At least four people are needed to lift the Nanobay cabinet. However, this is normally not necessary, since there are four wheels at the bottom of the cabinet.

Équipement lourd:
Au moins quatre personnes sont nécessaires pour soulever le coffret Nanobay.
Normalement ce n'est pas nécessaire, puisqu'il y a quatre roues sous le châssis .

The Nanobay system can be damaged by inappropriate usage. In this case, it is necessary to check the equipment by the service before it can be used again.

The user should inspect the equipment at regular intervals for correct operation. In case of any damage, wear or abnormal behavior, the user is expected to inform the service immediately.

DANGER

Do not use the equipment and inform the service staff, if you are in doubt about the correct state of any component.

N'utilisez pas l'équipement et informez le personnel de service, si vous suspectez un défaut .

In the unlikely case of one of the following, stop using the equipment, interrupt the current supply, disclose this circumstance to the service staff and ask for instructions:

- The power cord, power plug or power supply are cracked, brittle or damaged
- Signs of excessive heat appear
- There is evidence or suspicion that a liquid has intruded into any enclosure
- The power cord or the power supply have been in contact with any liquid
- The Nanobay system has been damaged in any way
- The equipment does not work correctly

DANGER

Do not try to service the equipment by yourself, unless you are specifically asked to do so and are given instructions by the service staff. In case of questions or problems, please contact your nearest BRUKER office or representative.

N'essayez pas d'entretenir l'équipement par vous-même, à moins que vous soyez invité à le faire ainsi et instruit par le personnel de service. En cas de questions ou de problèmes, prenez contact avec le plus proche représentant de BRUKER svp.

As a general rule, servicing must be performed by BRUKER qualified personnel. However, there are several Nanobay sub-assemblies that can be replaced or installed by the customer. These units are called „Field Exchangable Units“, see also chapter "Field Exchangeable Units" on page 28.

DANGER

Instructed operating personnel must not remove chassis covers except as described in this manual. Do not replace Nanobay units with mains switch turned on.

Le personnel de service ne doivent pas enlever les couvercles de châssis excepté comme décrit dans ce manuel. Ne remplacez pas les unités Nanobay tandis que l'interrupteur principal est mis en circuit

Before maintenance or repair always switch off and unplug the power cable. Under certain conditions dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.The Nanobay chassis has been designed to provide maximum safety for the User. Under normal operation, the Nanobay chassis requires **NO** user access to the inner components of the unit.

WARNING

All electrical connectors must be used as supplied by BRUKER. Do not substitute them by other types.

Seules les prises électriques fournies par BRUKER doivent être utilisées. Ne les substituez pas par d'autres types.

3.6.1 Field Exchangeable Units

The Nanobay system has many Field Exchangable Units located at the front and back of the chassis (mainframe). Basically all units in slide-in module style can be exchanged in the field. Types and position in the chassis are highly dependent on the configuration of the spectrometer.

Field Exchangable Units should only be replaced according to the configurations chapter in this manual. Make sure that the new units are inserted at their designated location in the chassis.

⚠ WARNING

Before a unit can be unplugged for exchange, the Nanobay must be completely switched off and the cables to the unit must be disconnected. ESD precautions must be observed for handling.

Avant qu'une unité puisse être débranchée pour l'échange, le Nanobay doit être complètement hors tension et le câble de réseau doit être débranché.
Il faut observer des précautions d'ESD pour la manipulation.

⚠ WARNING

Any EN61010 safety relevant items such as (but not limited to) the mains inlet module, mains wiring and main transformer in the chassis must not be removed from the chassis. Do not attempt to replace this unit in the field!
In case of failure replace the mainframe as a whole. An exchange of safety relevant units requires a mandatory safety retest as defined by the EN61010 Annex F, Routine Tests.

Aucun dispositif approprié de la sécurité EN61010 tel que (mais non limité) le module “systéme d'alimentation principal de forces”, le câblage des forces et le transformateur principal dans le châssis ne doivent pas être enlevé du châssis. N'essayez pas de remplacer cet dispositif chez le client!
Seulement remplacez l’unité entiére avec toutes les despositifes.

Un échange des dispositifes appropriées de sécurité demande une vérification de sécurité obligatoire comme défini par EN61010 l'annexe F, vérification individuels de série.

In case of the AQS IPSO unit, the replacement should be left to qualified service personnel.

3.7 Technically Qualified Personnel Only

⚠ WARNING

Service on electrical or other components should be performed only by a qualified Bruker Service Representative or similarly trained and authorized person. Always disconnect the mains power cord before servicing. Under certain conditions dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge the circuits before touching them.

L'installation et la maintenance ou le service des composants électriques doivent être faites seulement par le personnel qualifié de Bruker. Déconnectez toujours le câble d'alimentation secteur avant tout entretien. Dans certaines conditions l'installation peut rester sous tension même si le cable d'alimentation secteur est déconnecté. Pour éviter des dommages, toujours déconnectez l'alimentation et déchargez les circuits avant de toucher.

⚠ WARNING

Operating personnel must not remove chassis covers except as described in this manual. Do not replace Nanobay sub-assembly units without the mains switch turned OFF and the mains cord disconnected.

Le personnel de service ne doivent pas enlever les couvercles de châssis excepté comme décrit dans ce manuel. Ne remplacez pas les unités Nanobay tandis que l'interrupteur principal est mis en circuit.

⚠ WARNING

DO NOT attempt to make adjustments, replacements or repairs to the instrument except as described in the accompanying user documentation. Only a Bruker Service Representative or similarly trained and authorized person should be permitted to service the instrument.

N'essayez pas de dépanner, d'ajuster ou de remplacer l'instrument ou ses parties excepté ce qui est décrit dans la documentation de l'utilisateur.
Seulement un technicien de Bruker ou une personne qualifiée et autorisée sont autorisés à entretenir l'instrument.

3.8 Basic Dangers

The following section specifies residual risks which may result from using the device and have been established by means of a risk assessment.

In order to minimize health hazards and avoid dangerous situations, follow the safety instructions specified here as well as in the following chapters of this manual.

3.8.1 General Workplace Dangers

Dirt and Scattered Objects

⚠ CAUTION

Danger of injury from tripping over dirt and scattered objects!

Dirt and scattered objects may cause people to slip or trip. A fall may result in injuries.

- ▶ Always keep the work area clean.
- ▶ Remove objects which are no longer required from the work area and particularly- from the floor.
- ▶ Indicate unavoidable hazards using marking tape.

Software Error

NOTICE

Material damage due to a software error!

Samples or device may be damaged due to a software error causing malfunction of the control system. Users may also be shocked by abrupt malfunction or unexpected system start.

- ▶ Dummy samples must be used during installation and service.
- ▶ Personnel should be alerted to unexpected malfunctions.

Genuine Samples

NOTICE

Material damage due to the use of genuine samples during installation and maintenance!

Using genuine samples during installation and maintenance may result in material damage.

▶ Use only dummy samples during installation and maintenance.

3.8.2 Dangers from Gases Under Pressure

Pneumatics

⚠ WARNING

Danger of injury due to movements caused by stored pneumatic forces!

Pneumatically driven components may move unexpectedly due to stored residual forces, causing serious injuries.

▶ Work on the pneumatics system must only be carried out by trained pneumatics technicians.

▶ Before starting work on the pneumatics system, ensure that it has been completely depressurised. The pressure accumulator must be completely relieved.

Suffocation

⚠ WARNING

Accident hazard from asphyxiation!

A break in the pneumatic hose may result in the uncontrolled exit of nitrogen into the laboratory.

▶ An oxygen warning device should be present in the laboratory if the device is operated with nitrogen.

3.8.3 Environmental Protection

NOTICE

Danger to the environment from incorrect handling of pollutants!

Incorrect handling of pollutants, particularly incorrect waste disposal, may cause serious damage to the environment.

- ▶ Always observe the instructions below regarding handling and disposal of pollutants.
- ▶ Take the appropriate actions immediately if pollutants escape accidentally into the environment. If in doubt, inform the responsible municipal authorities about the damage and ask about the appropriate actions to be taken.

The following pollutants are used in context with the NMR console:

Helium inert gas

Helium inert gas may cause suffocation at high concentrations. Disposal of the empty gas cylinders must be performed by a specialist disposal company.

Nitrogen gas

Nitrogen gas may cause suffocation at high concentrations. Disposal of the empty gas cylinders must be performed by a specialist disposal company.

Coolants

When released, coolants develop decomposition products which are hazardous to the environment. Maximum care and caution are required when handling coolants. Always observe the safety data sheet issued by the manufacturer. Ensure that personnel handling coolants are regularly informed about potential dangers and are instructed in the safe handling of coolants.

Cleaning liquids

Cleaning liquids incorporating solvents contain toxic substances. They must not be allowed to escape into the environment. Disposal must be carried out by a specialist disposal company.

3.9 Spare Parts

Loss of guarantee
If non-approved spare parts are used the manufacturer's guarantee is invalidated

Purchase spare parts from authorised dealers or directly from the manufacturer. See "Contact" on page 9 for manufacturer's address.

4 Technical Data

4.1 General Information

Data	Version	Value	Unit
Shipping weight (including packaging, cables, accessory)	V1, V2	178	kg
	V3	155	kg
Console weight with subunits and internal wiring (typical configuration)	V1, V2	121	kg
	V3	98	kg
Length	all	880	mm
Width		450	mm
Height		710	mm

Table 4.1 Technical Data: General Information

4.2 Connection Values

Electrical

Data	Version	Value	Unit
Voltage		200-230	V
Maximum apparent power consumption		10	A
Typical power consumption[a]	V1, V2	750	W
	V3	640	W
Frequency		50/60	Hz

Table 4.2 Electrical Connection Values

a. all units on, no acquisition running, shim currents at intermediate values, VT running at approx. room temperature, 230VAC

Pneumatic

Please refer to the User Manual ***Site Planning for AVANCE Systems 300-750 MHz*** (UM) Z31276

4.3 Operating Conditions

Environment

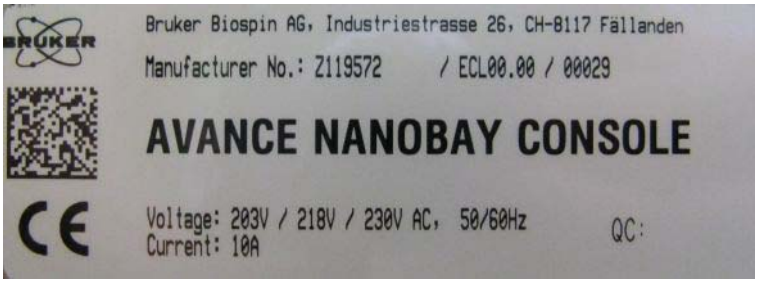
Data	Value	Unit
Temperature range (operation)	5 to 35	°C
Temperature range (storage)	5 to 40	°C
Permissible altitude (above see level)	< 2000	m
Relative humidity at 31 °C, maximum	< 80	%
Decreasing linear till relative humidity < 50% at 40 °C, maximum		

Table 4.3 Operating Environment

The Nanobay system is designed as a subsystem of the spectrometer. For further environmental conditions outside the cabinet please refer to the User Manual ***Site Planning for AVANCE Systems 300-750 MHz***, Bruker P/N Z31276

4.4 Rating Plate

Z119572 (V2)



Z126037 (V3)

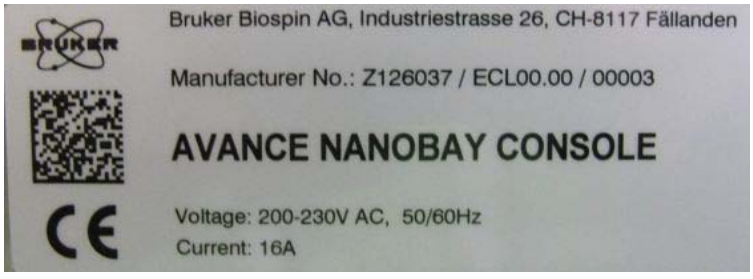


Figure 4.1 Rating plate

5 Nanobay Console Z108356 (V1)

5.1 Overview

The pictures below show the Nanobay cabinet with removed housing. In contrast with the other consoles (TwoBay, OneBay and MicroBay), the units of back and front side are reverse - the power supplies and BVT3200 are accessible from the front side, whereas the other units (IPSO, DRU, REF, etc.) are at the rear side of the console.

Figure 5.1 Front side (left) and back side (right) of a Nanobay

5.2 Configuration of a Nanobay V1

The diagram below shows the three sections with the corresponding sub-units. Most of them are uniform, only the preamplifiers and the Lock RF board L-TRX are proton frequency specific.

Since the L-TRX provides an integrated, compact 2H amplifier for gradient shimming, the high power AQS 2H-TX is optional (depending on the applications).

In former configurations, there are two separate Lock RF boards (LTX and LRX) installed instead of the new L-TRX.

Note: The former Lock RF boards LTX and LRX require the former power supply board PSB3 instead of the new PSB6. Make sure that the correct power supply is installed!

At the bottom, there is a free space, which can be used for a future 19F option. In the mean time, while there is no appropriate 19F option for the new L-TRX available, configurations for 19F lock have to be equiped with the former LTX / LRX boards.

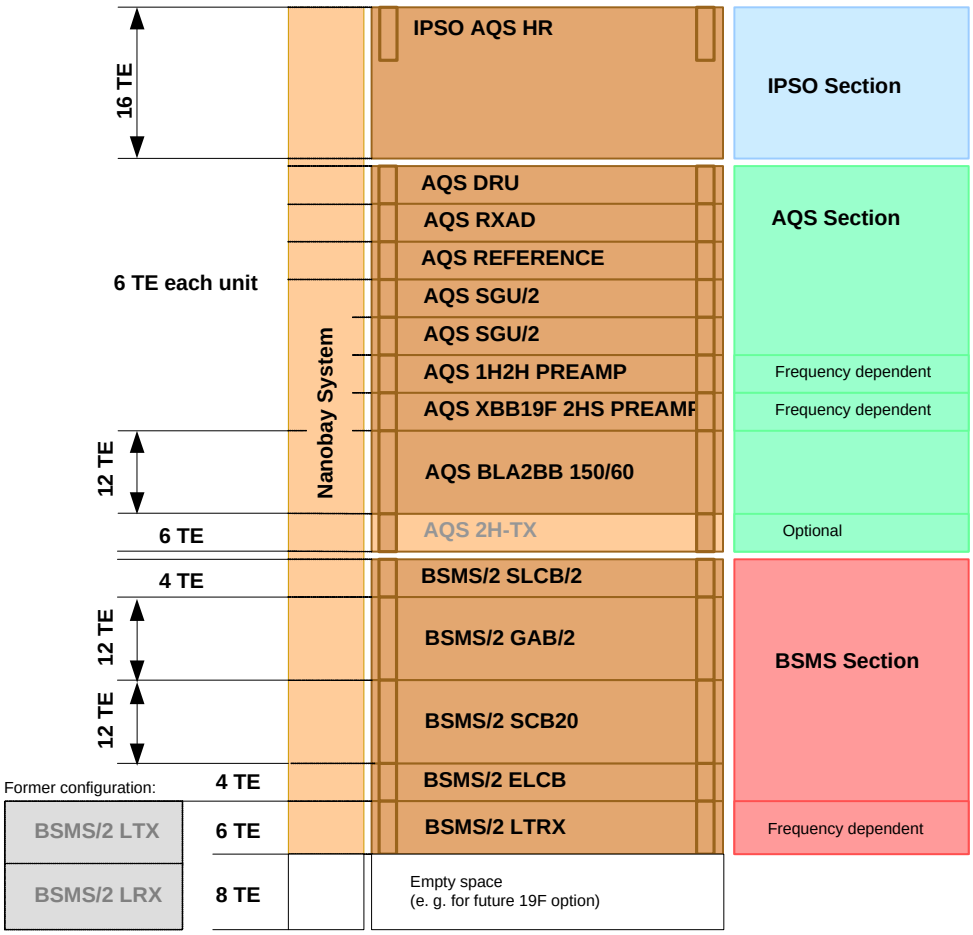


Figure 5.2 Configuration of a Nanobay, view from back side

Also the opposite side (front side with power supplies) can be divided into the three sections (IPSO, AQS and BSMS), but there are some relations between the sections (power supply).

- The 12V of the IPSO power supply is used also for the fan tray and for the Ethernet switch.
- The TX-P28V power is provided for all amplifiers, the BLA2BB, the (optional) 2H-TX and the L-TRX, which is part of the BSMS section.

Note: New configurations with L-TRX have the INES PSB6 installed, whereas former configurations with LTX and LRX are equiped with the INES PSB3.

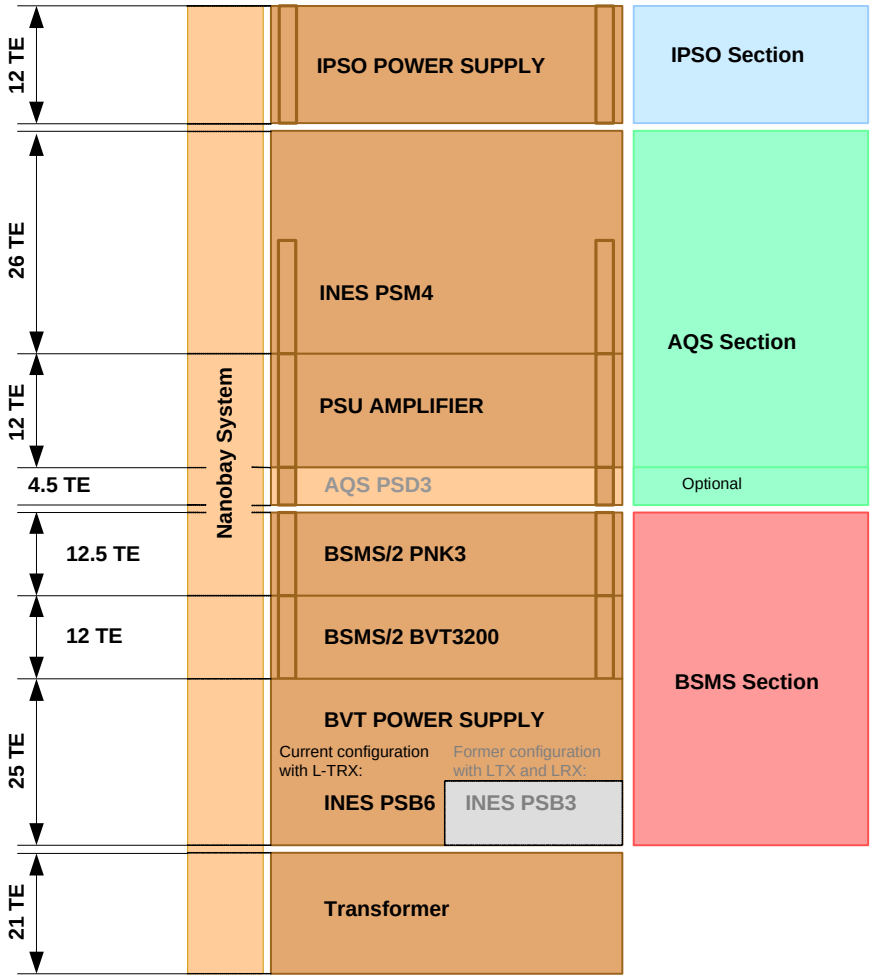


Figure 5.3 Configuration of a Nanobay, view from front side

5.3 AC Wiring

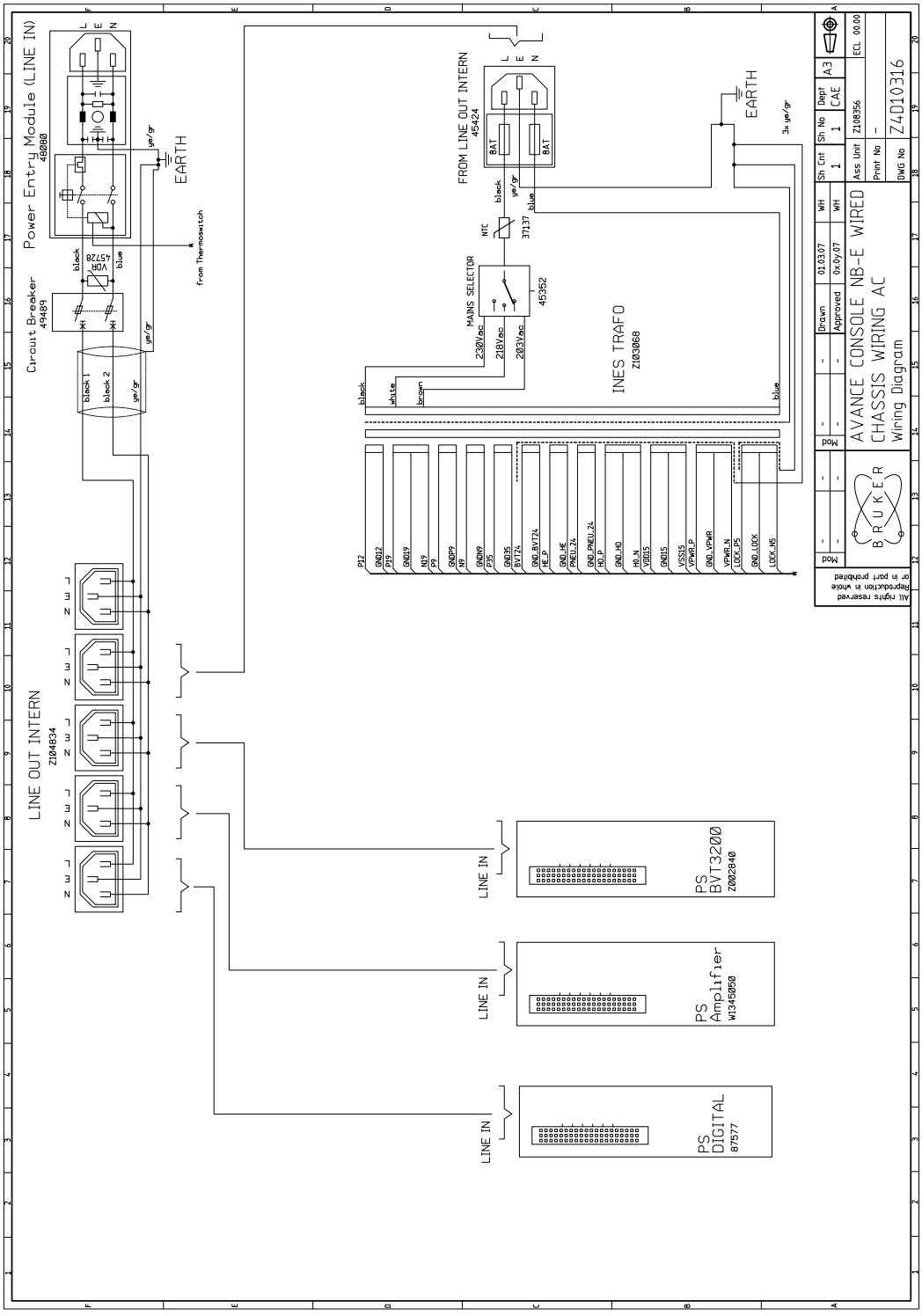


Figure 5.4 Nanobay internal AC wiring, overview

The diagram above shows the AC wiring inside the Nanobay console.

- The mains power is connected to the entry module with power switch (automatical shut down when there is no input voltage), including filters.
- A circuit breaker provides fast overcurrent shut down (< 8 ms)
- A thermal safety relay switches off the console when the hot spot temperature exceeds a specific limit (the sensor is mounted on the PSM4 heat sink).
- All AC power supplies (PS DIGITAL for IPSO, PS AMPLIFIER and PS BVT3200) and also the transformer unit are connected to the internal line connectors, which are all protected by the mechanisms above mentioned.
- The transformer (part of INES TRAFO UNIT) is additionally protected by two fuses, and there is a NTC for limiting the inrush current during power up.
- There is a power range switch for adaptation to the local mains voltage (see next chapter "Mains Selector Setting" on page 42).

Note: After shut down, the Nanobay should stay at least 30 seconds off before it is powered up again.

Figure 5.5 Mains power connector, circuit breaker and power switch

In case of over current the circuit breaker shuts down the mains power. It is then in the lower position and needs to be pushed to the upper position again before the Nanobay console can be switched on.

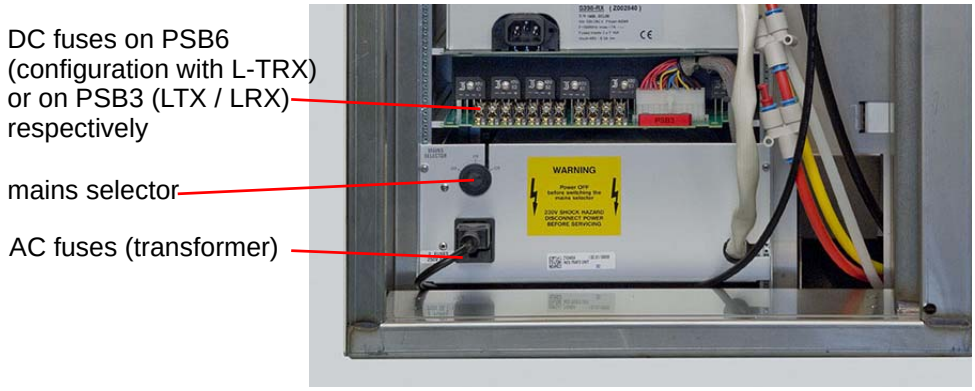


Figure 5.6 Mains selector at the front side (power supply side)

5.3.1 Mains Selector Setting

Prior to the first power-up of the Nanobay console, it must be ensured that the mains selector switch is in the correct position (see "" on page 41).

The Nanobay is safe to operate at all settings within an input voltage range of 208..230V~ ±10% according to IEC/EN 61010-1. However because the size of the linear power supply modules is designed for minimal power dissipation, the transformer input voltage should be matched to the mains voltage at the installation site. The input voltage ranges for optimal performance are as follows:

Input voltage range	Mains selector setting	Note
183 .. 223 V~	**203**	
197 .. 240 V~	**218**	
207 .. 253 V~	**230**	= factory preset

Table 5.1 Mains selector settings for optimal performance

5.3.2 Mains Selector Setting for 100-120V~ Mains Supply

In countries with 100-120V~ mains supply such as USA, Canada or Japan combined line voltages may be used.

- Connect the mains input between two phases of the mains supply to obtain a nominal input voltage of 200..208V~
- Set the selector switch to **203**

Alternatively an external step-up voltage converter with an output voltage of 208..230V~ may be used.

The diagram "Nanobay internal AC wiring with fan tray and linear power supplies" on page 43 shows in detail the power supply wiring, including the connection of the two linear power supplies PSM4 and PSB6 (L-TRX) or PSB3 (LTX / LRX) respectively to the transformer.

For powering the fans, the power supply (+12V) from the IPSO power supply is used (shared), and there is a fan supervision built in on the backplane.

Also the Ethernet switch is powered by the +12V IPSO power supply.

The thermal shut down requires +12V from the IPSO power supply as well (control signal for the mains relay).

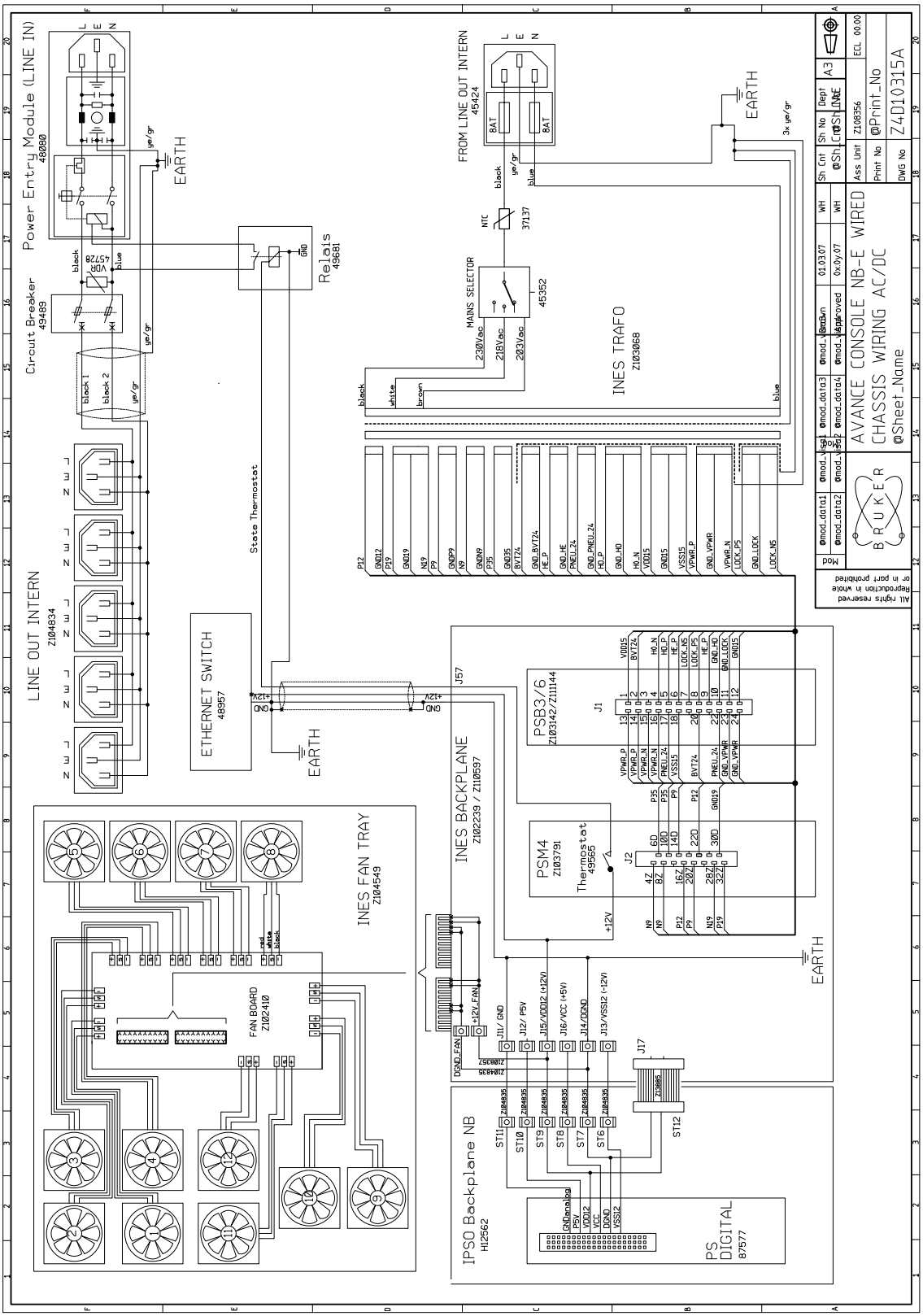


Figure 5.7 Nanobay internal AC wiring with fan tray and linear power supplies

5.4 DC Wiring

Each of the three sections (IPSO, AQS and BSMS) can be considered separately for the DC wiring. The IPSO is supplied by a dedicated power supply, which is at the opposite side (front side).

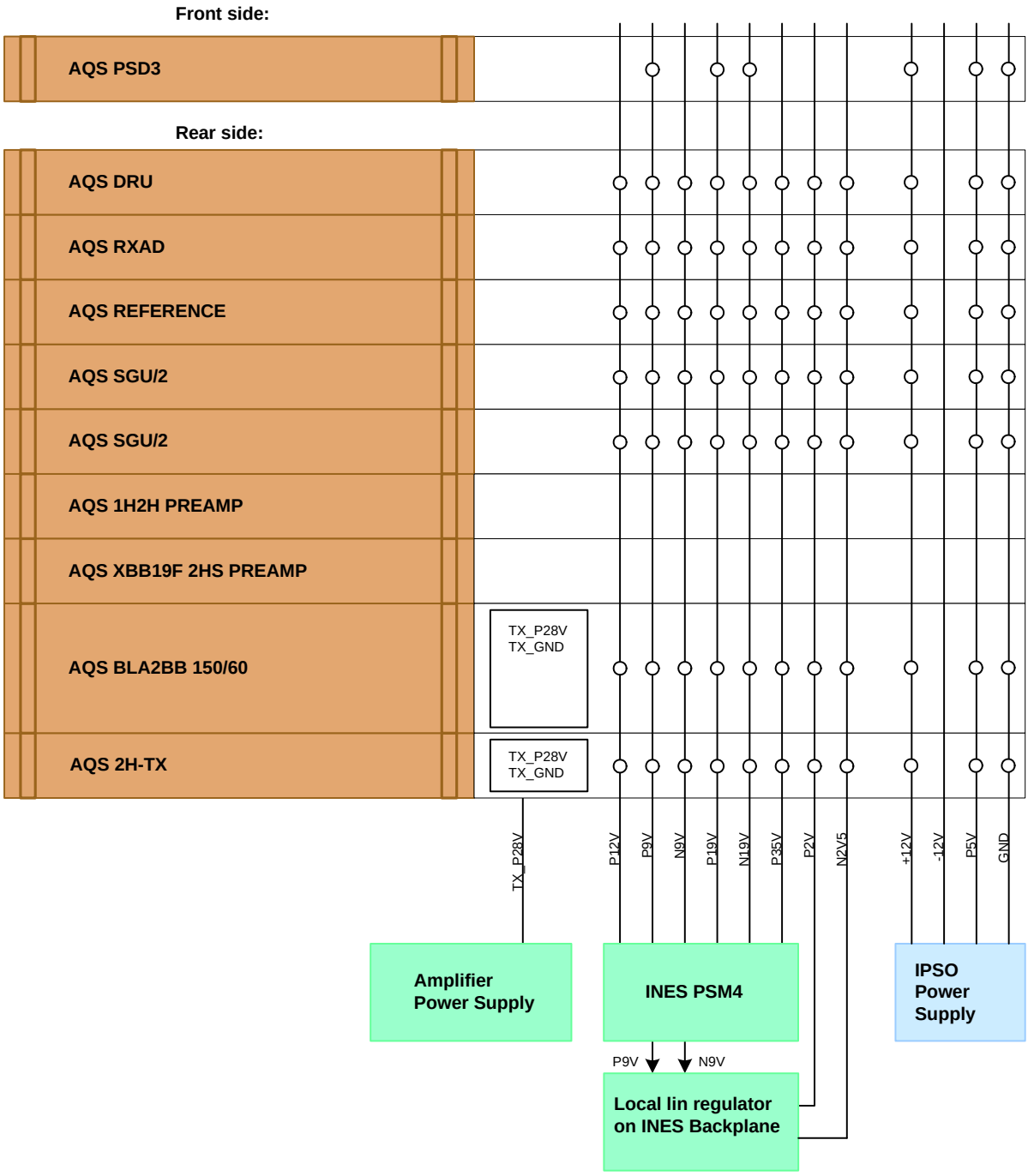


Figure 5.8 DC wiring of the AQS section

The AQS PSD3 is optional (required if there are external preamplifiers used).

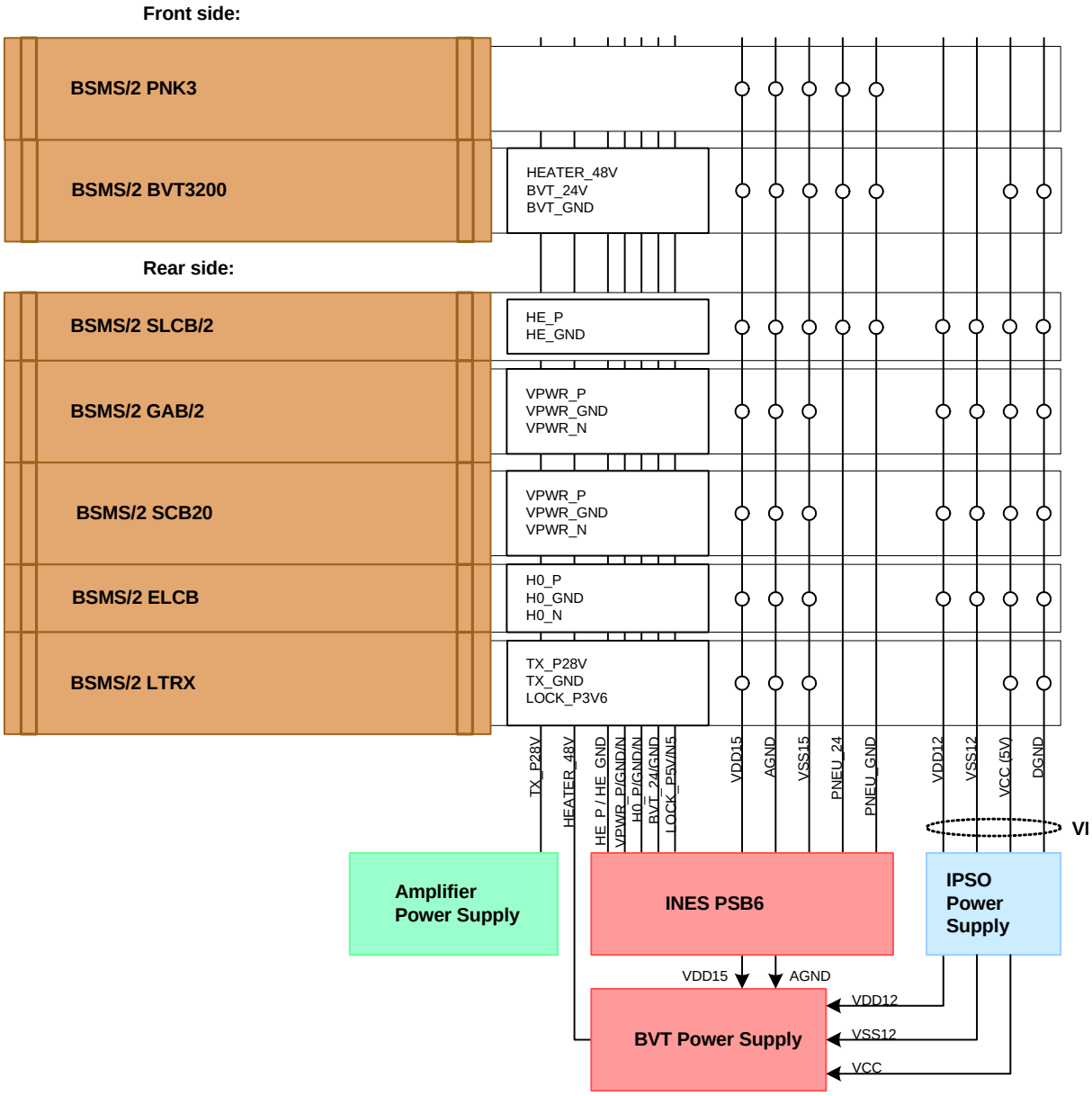


Figure 5.9 DC wiring of the BSMS section

Some of the unit connectors provide specific voltages (e. g. high voltage for HE level measurement, etc.). These specific voltages are not available on the other connectors.

The BSMS section is mainly supplied by the INES PSB6, the BVT power supply provides the high power for heating and (optional) N2 evaporator. In addition, the amplifier supply voltage is used for the L-TRX, and the IPSO power supply provides the necessary voltages for the VME bus section.

5.5 Backplane Communication

The backplane communication is shown in the diagram below. The AQS section is managed by the DRU, whereas the BSMS part is managed by the ELCB. Both, DRU and ELCB, are Ethernet devices and part of the Spectrometer network.

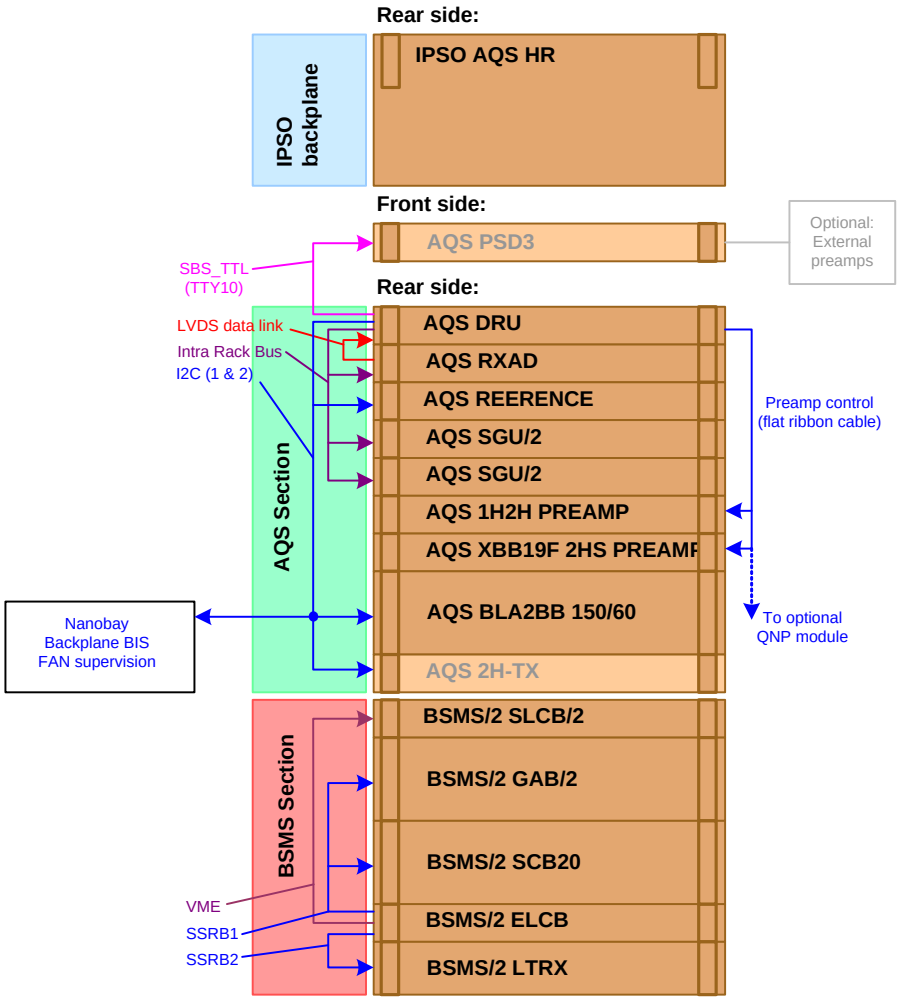


Figure 5.10 Backplane communication

5.6 Pneumatics

The Nanobay requires also compressed air or N2 gas (see in the site planning manual for exact specifications). Inside the cabinet, there is a filter and a pressure reduction valve providing clean gas to the pneumatic module (for spin and lift), the variable temperature unit (gas flow for probe temperature control) and an optional QNP probe.

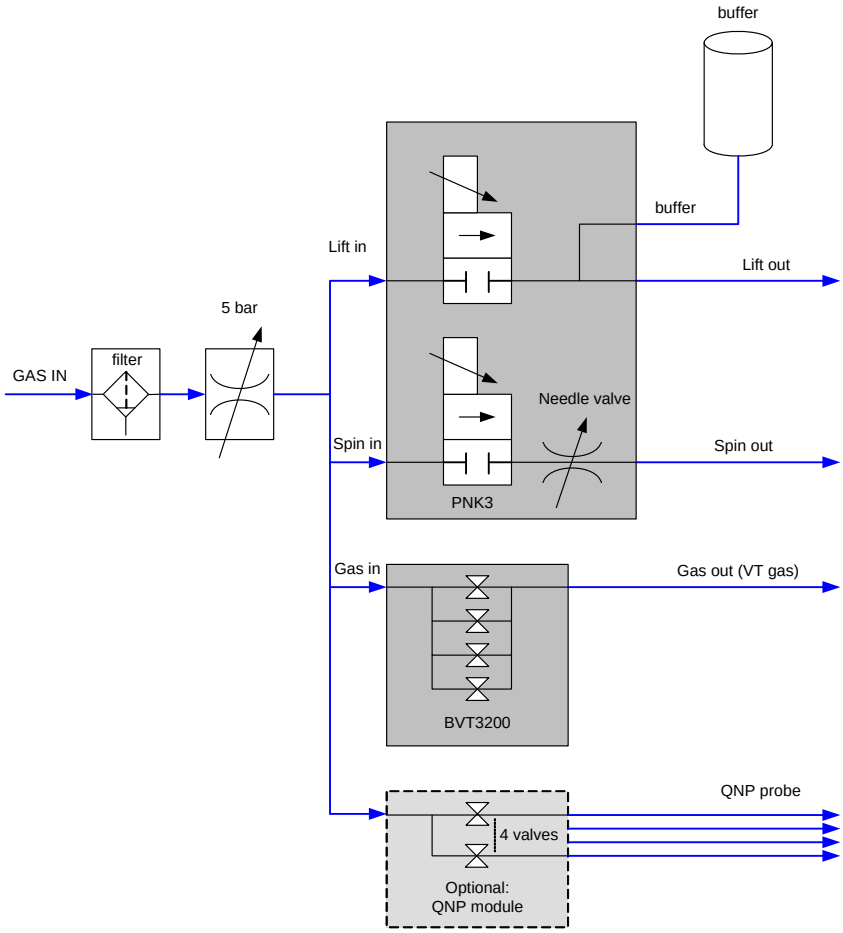


Figure 5.11 Pneumatics diagram

The particle filter must be clean (visible through a transparent cover). It may be necessary to replace it (part number ***48290***), e. g. when it has been polluted. Accumulated liquids can be drained by a valve at the bottom of the filter (see also "Maintenance of the Particle Filter for Compressed Gas" on page 134 or "Maintenance of the Particle Filter for Compressed Gas" on page 140).

5.7 Wiring and Cable Sets

There is a cable set internal (H14042) providing all cables that are necessary for the internal wiring (variant with L-TRX). In addition, the 26 pin LVDS cable (part of gradient cable set H14036) has to be connected between the AQS IPSO (F/G-Controller 4) and the GAB/2 (G-Con). For the optional AQS 2H-TX, there will be a separate cable set defined.

5.7.1 Cable Set for Internal Wiring

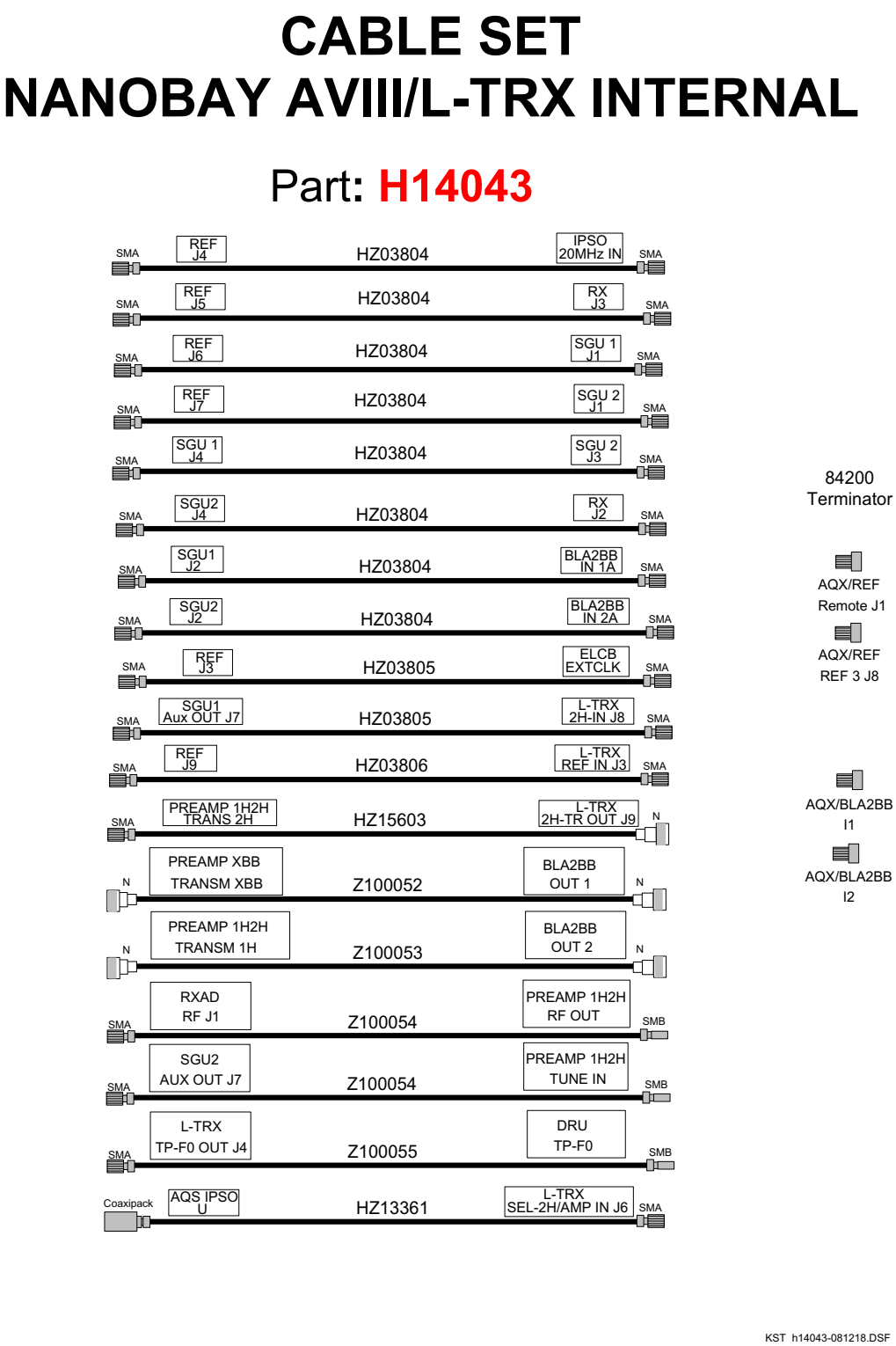


Figure 5.12 Cable set H14043 for internal wiring (page 1 of 2)

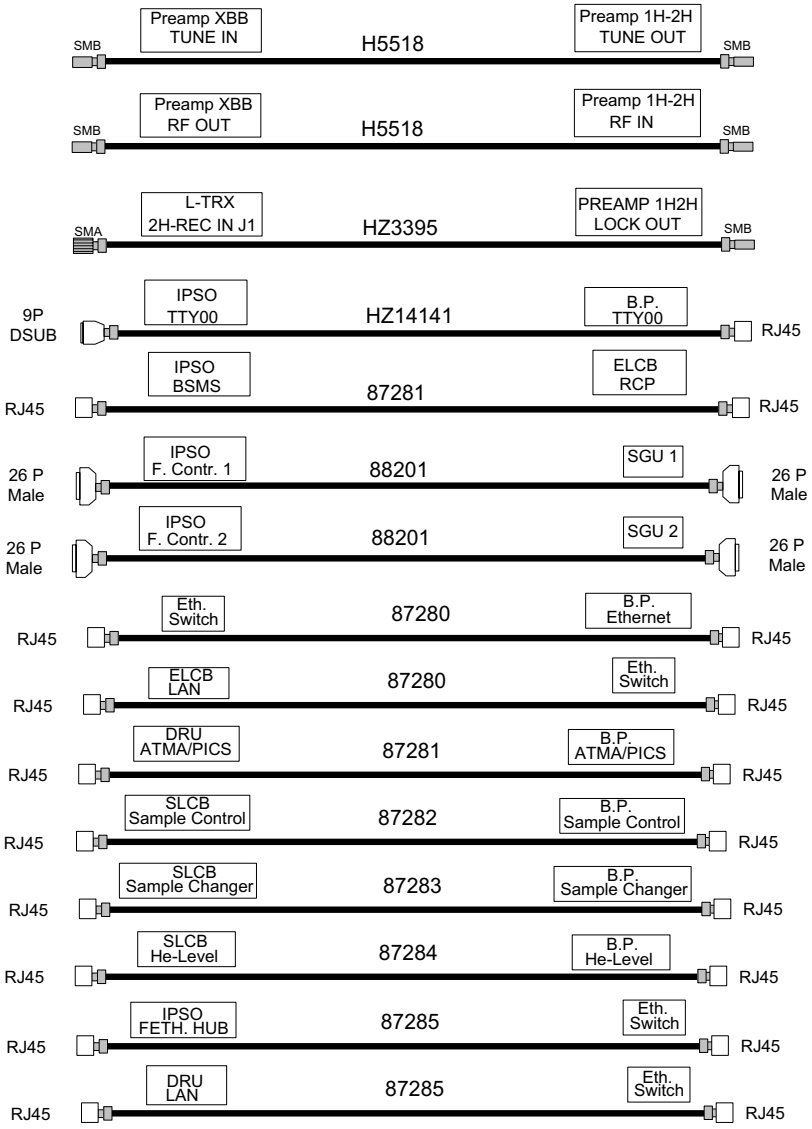
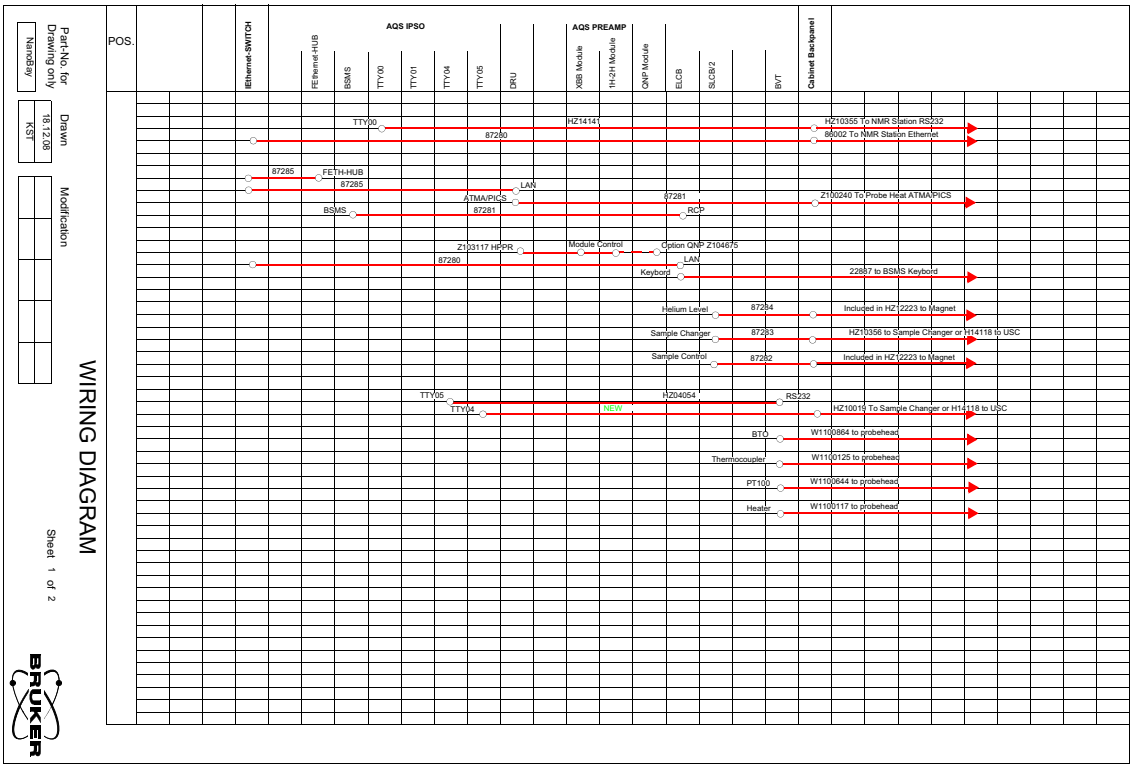


Figure 5.13 Cable set H14043 for internal wiring (page 2 of 2)

5.7.2 Wiring Overview



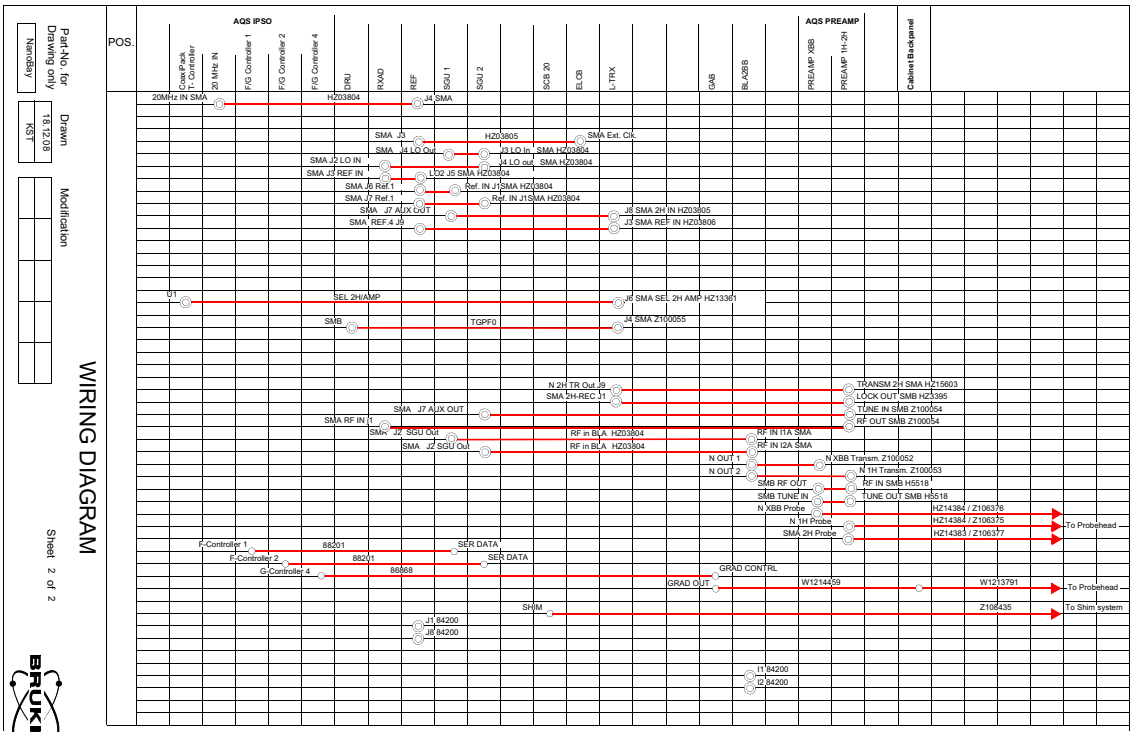


Figure 5.14 Wiring of a Nanobay console

5.7.3 External Wiring, Cable Sets and Connections

For the external wiring, there are the following cable sets necessary:

- external cable set H14033 containing most of the external cables (indicated in black color in the diagram below)
- Shim cable Z108435 (indicated in blue color)
- gradient cable set H14036 containing the gradient cable (indicated in red color)

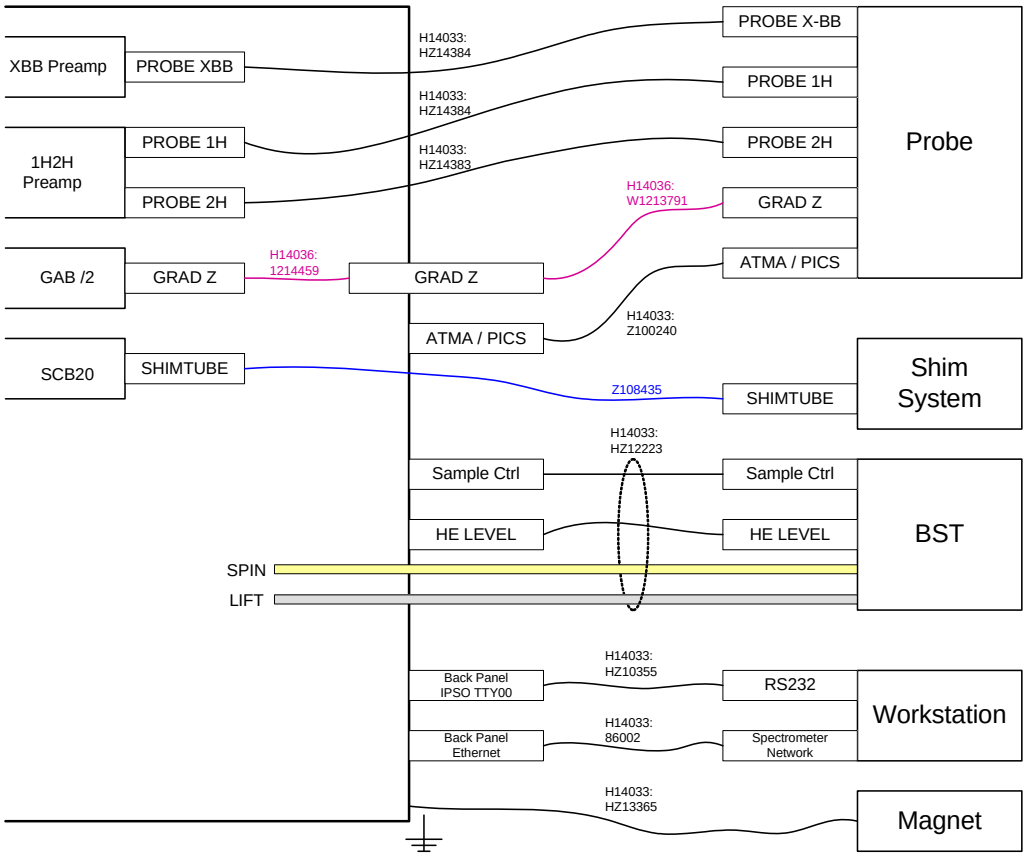


Figure 5.15 External wiring of Nanobay console

5.8 Nanobay Specific Power Supplies

In this chapter there is a detailed description of the transformer and the Nanobay specific power supplies INES PSM4 and INES PSB6.

The transformer is part of the cabinet and can not be exchanged in the field. It provides the cables with the appropriate connectors for the PSM4 and PSB6.

For the low skew clock network, there are two additional supply voltages required (P2V and N2V5), which are provided by linear power regulators on the Nanobay backplane. The related LED (common for both voltages) for indicating correct operation is located on the backplane as well and can be inspected when the left side panel is removed.

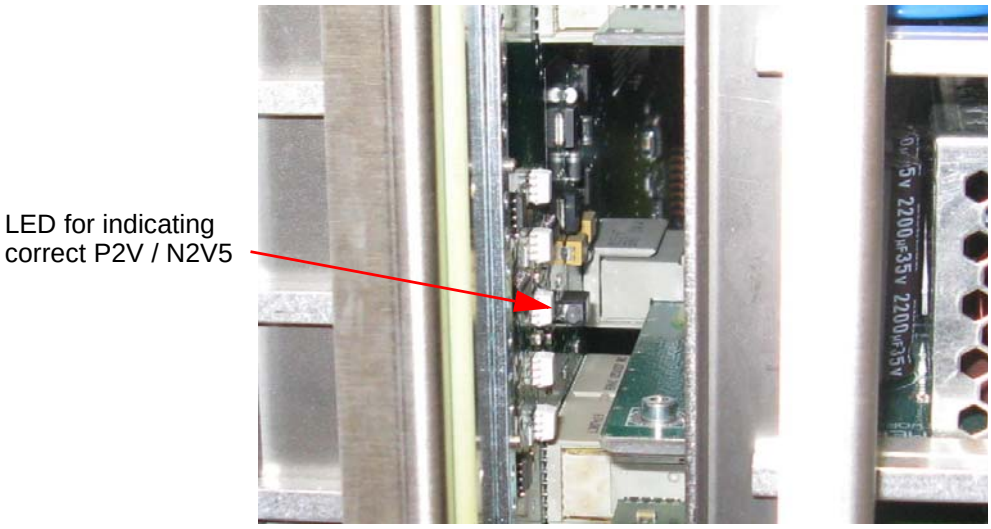


Figure 5.16 Linear power regulators on the backplane with power LED

5.8.1 Power Supply INES PSM4

There is a common ground for all PSM4 supply voltages

On the PSM4 heat sink there is an over temperature sensor providing shut down of the Nanobay console in case of excess temperature.

Voltage Name (LED)	Voltage @ rated load	Current @ rated load	ripple (mV_{eff})	Fuse	Fuse Number
P19	19.0 +/- 0.7 V	3.0 A	25 mV	5.0 AT	F1
N19	-19.0 +/- 0.7 V	0.73 A	15 mV	5.0 AT	F2
P12	12.0 +/- 0.6 V	5.7 A	25 mV	10 AT	F3
P9	9.0 +/- 0.5 V	6.1 A	25 mV	10 AT	F4
N9	-9.0 +/- 0.5 V	1.9 A	15 mV	8.0 AT	F6
P35	34.5 +/- 1.5 V	0.14 A	10 mV	0.5 AT	F5

Table 5.2 PSM4 Electrical Characteristics

5.8.2 Power Supply INES PSB6 (PSB3 for Systems with LTX / LRX)

The power supply PSB6 is used for operation with the L-TRX, whereas the PSB3 has to be installed with the former LTX / LRX boards.

Behind each LED on the PSB6 or PSB3 respectively (indicators that the according voltage is available) there is the corresponding fuse, wich can be exchanged even when the PSB is installed in the console.

Voltage Name (LED)	Reference	Voltage @ rated load	Current @ rated load	ripple (mV_{eff})	Fuse
BVT_24V	BVT_GND	24.0 +/- 1.0 V	1.65 A	10 mV	3.15 AT
H0_P	H0_GND	29.6 +/- 1.2 V	0.55 A	10 mV	1.0 AT
H0_N	H0_GND	-29.6 +/- 1.2 V	0.28 A	10 mV	1.0 AT
LOCK_P3V6 [a]	LOCK_DGND	3.6 +/- 0.1 V	2.0 A	20 mV	-
HE_P	HE_GND	36 .. 46 V	0.4 A	1 V	1.00 AT
PNEU_24V	PNEU_GND	22 .. 29 V	2.1 A	1.5 V	4.00 AT
VDD15	AGND	15 +/- 0.6 V	1.45 A	20 mV	2.5 AT
VSS15	AGND	-15 +/- 0.6 V	0.9 A	20 mV	2.5 AT
VPWR_P	VPWR_GND	20 .. 27 V	4.2 A	1 V	8.0 AT
VPWR_N	VPWR_GND	-20 .. -27 V	4.2 A	1 V	8.0 AT

Table 5.3 PSB6 Electrical Characteristics (L-TRX configurations)

a. Voltage from DC/DC converter, input voltage is PNEU_24V

Note: The shaded rows indicate that the referred voltages are non-regulated.

Voltage Name (LED)	Reference	Voltage @ rated load	Current @ rated load	ripple (mV_{eff})	Fuse
BVT_24V	BVT_GND	24.0 +/- 1.0 V	1.65 A	10 mV	3.15 AT
H0_P	H0_GND	29.6 +/- 1.2 V	0.55 A	10 mV	1.0 AT
H0_N	H0_GND	-29.6 +/- 1.2 V	0.28 A	10 mV	1.0 AT
LOCK_P5	LOCK_DGND	5 +/- 0.2 V	0.63 A	10 mV	1.25 AT
LOCK_N5	LOCK_DGND	-5 +/- 0.2 V	0.45 A	10 mV	1.25 AT
HE_P	HE_GND	36 .. 46 V	0.4 A	1 V	1.00 AT
PNEU_24V	PNEU_GND	22 .. 29 V	2.1 A	1.5 V	4.00 AT
VDD15	AGND	15 +/- 0.6 V	1.45 A	20 mV	2.5 AT
VSS15	AGND	-15 +/- 0.6 V	0.9 A	20 mV	2.5 AT
VPWR_P	VPWR_GND	20 .. 27 V	4.2 A	1 V	8.0 AT
VPWR_N	VPWR_GND	-20 .. -27 V	4.2 A	1 V	8.0 AT

Table 5.4 PSB3 Electrical Characteristics (LTX / LRX configurations)

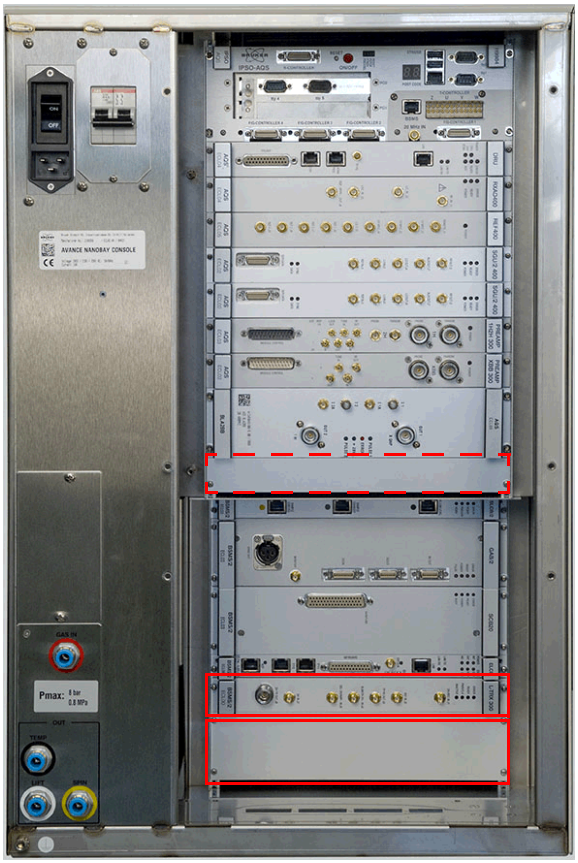
5.9 Configuration for L-TRX

New Nanobay systems are delivered with the L-TRX installed. Former Nanobay consoles (Z108356, ECL ≥ 02) with LTX / LRX can be upgraded for the L-TRX system. For the upgrade, the power supply board INES PSB3 must be replaced, and a jumper must be configured. The installation is described in detail in the following sub-chapters.

5.9.1 Installation of a L-TRX in a Nanobay

Since the L-TRX contains a compact, integrated 2H-TX (e. g. providing the required power for 2H gradient shiming), the strong AQS 2H-TX becomes optional.

For upgrading, the former LTX and LRX are removed, and the new L-TRX is inserted into the LTX slot. The LRX slot has to be covered by an appropriate blind plate. It is reserved for a future 19F option.



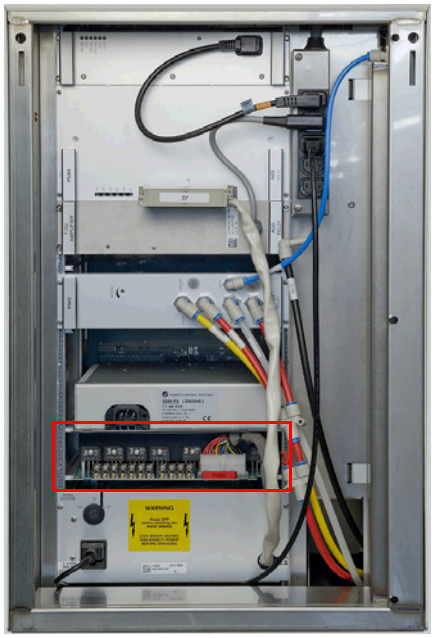
AQS 2H-TX slot (optional)

L-TRX slot

L-19F slot (optional)

Figure 5.17 L-TRX slot in NanoBay (Rear View)

The new L-TRX requires different supply voltages, so that the formerly used INES PSB3 has to be replaced by the PSB6. There is a modified covering plate for the power supply, indicating the correct voltage values next to the power LED‘s.



230V SHOCK HAZARD
Disconnect power before servicing!

Risque d'électroduction 230V déconnecter le câble de réseau avant opérations de maintenance

- Remove the coverplate over the power supply boards
- Replace PSB3 with PSB6 (Z111144)
- Replace the coverplate

Figure 5.18 PSB6 slot in NanoBay (Front View)

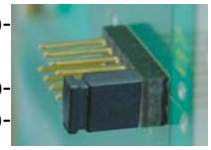
5.9.2 Configuration for L-TRX (Jumper and Service Web Configuration)

Wiring of BLNKTR_2H~ Pulse via Backplane:

The pulse is wired on the backplane via jumper J64 to the BLNKTR(3)~ pulse.

Figure 5.19 Jumper J64 installation

- Remove the right side panel of the console and the fan tray behind it
- Locate jumper J64: It is situated on the lower left side of the backplane at the rear of the BSMS/2 BVT3200 TEMP unit. It has six positions.
- Insert a jumper (3033) at the rightmost position (first position towards you)



- Reinstall the fan tray and side panel

Blanking Control Selection:

In the BSMS Service Web (see also BSMS Technical Manual with ELCB) select the correct blanking control signal routing:

- Go to the Service Web page „main“->“Lock“->“Lock Configuration“
- Set BLNKTR-2H~ source to ‚Backplane‘

2H-TX Control (Router Address):

In the BSMS Service Web enable or disable the internal power amplifier for gradient shimming:

- Go to the Service Web page „main“->“2H-TX“

If no AQS 2H-TX is present then enable the internal power amplifier for gradient shimming:

- Set router address to ‚**3**‘

If an AQS 2H-TX is present, disable the internal power amplifier:

- Set router address to ‚**255**‘.

With this setting the internal power amplifier is only used for ‚2H Lock‘ operation.

5.9.3 Wiring

The following figures describe the wiring of the L-TRX (in case of an upgrade), using the CABLE SET L-TRX UPGRADE (H14042, blue). The BLNKTR_2H~ Pulse must be routed correctly by the related jumper setting (see previous picture).

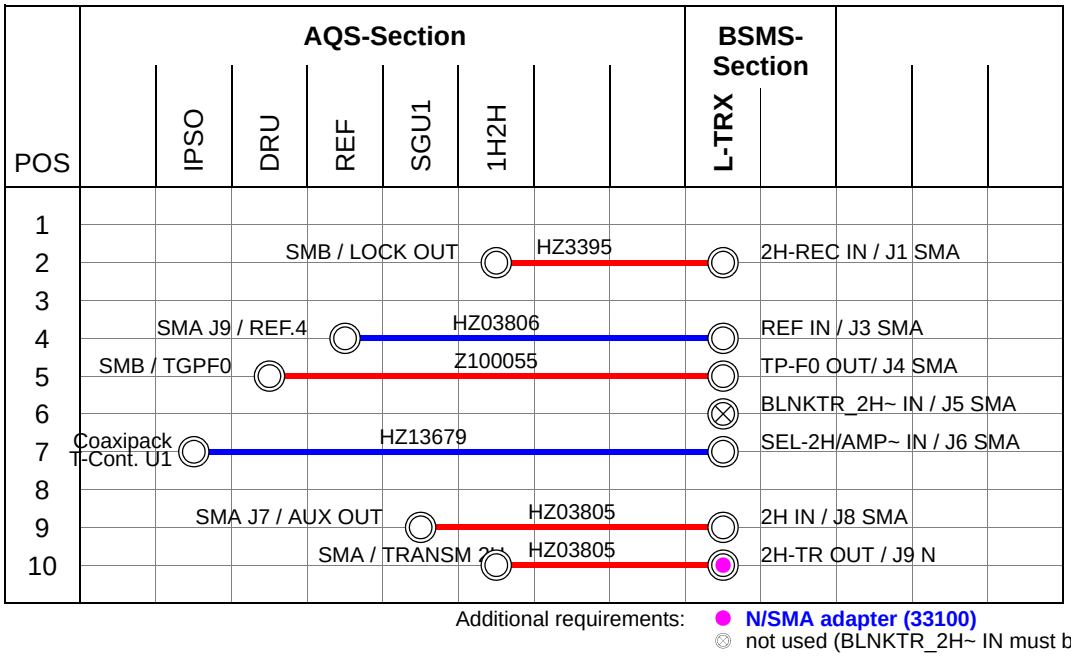


Figure 5.20 Wiring AVANCE III NanoBay

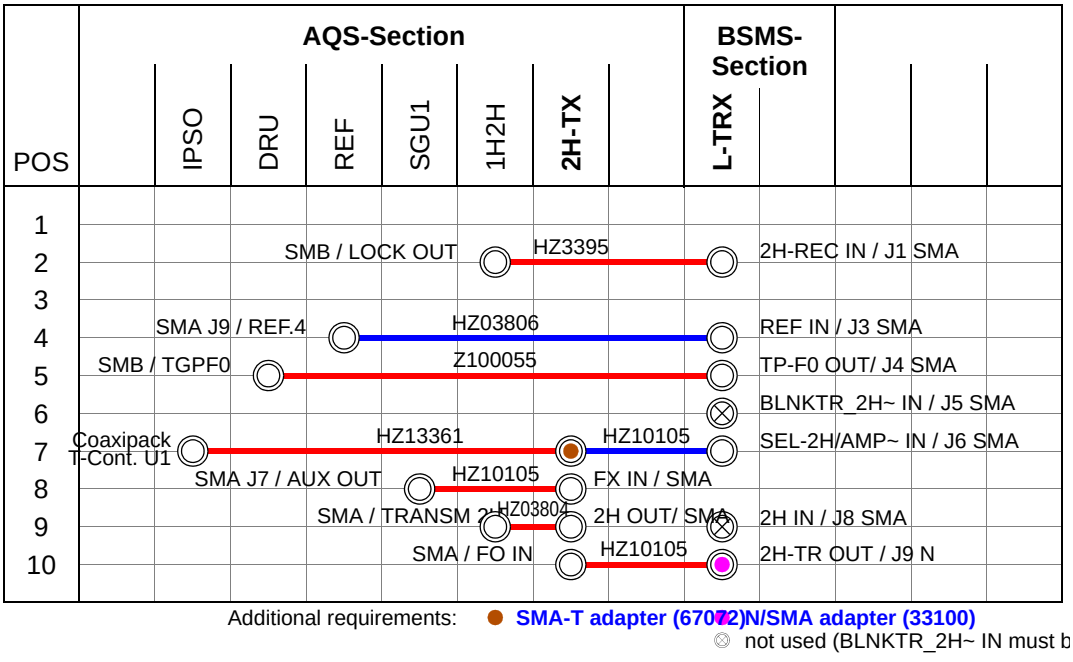


Figure 5.21 Wiring AVANCE III NanoBay with AQS 2H-TX

6 Nanobay Console Z119572 (V2)

6.1 Introduction

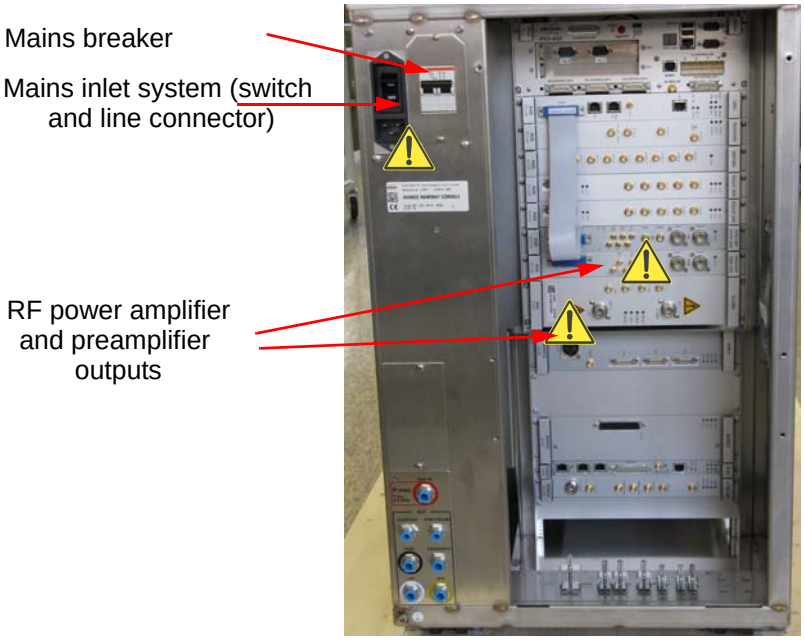
The Avance Nanobay V2 is an enhanced version of the Nanobay console Z108356.

The Nanobay V2 has full support of the new BSVT system (Bruker Smart Variable Temperature System) and L-TRX with integrated 2H amplifier for gradient shimming. However, it does no longer support former L-TX and L-RX boards and AQS 2H-TX. The Nanobay V2 requires a PSB6 with ECL02.00 or newer.

6.2 Overview

The pictures below show the Nanobay cabinet with removed housing. In contrast with the other consoles (TwoBay, OneBay and MicroBay), the units of back and front side are reverse - the power supplies, pneumatics and VT are accessible from the front side, whereas the other units (IPSO, DRU, REF, etc.) are at the rear side of the console.

Rear View *6.2.1*



Note: Nanobay appearance may slightly vary depending on the console hardware version.

Figure 6.1 Rear view

Mains Inlet System:

Connects to the cart mains distribution box (230V AC).
Do not use any other cables than the one supplied by Bruker.
Do not remove any protective cover panels inside the Nanobay.
Consult "Field Exchangeable Units" on page 28 for service information.

Systéme d'alimentation principal (des forces):

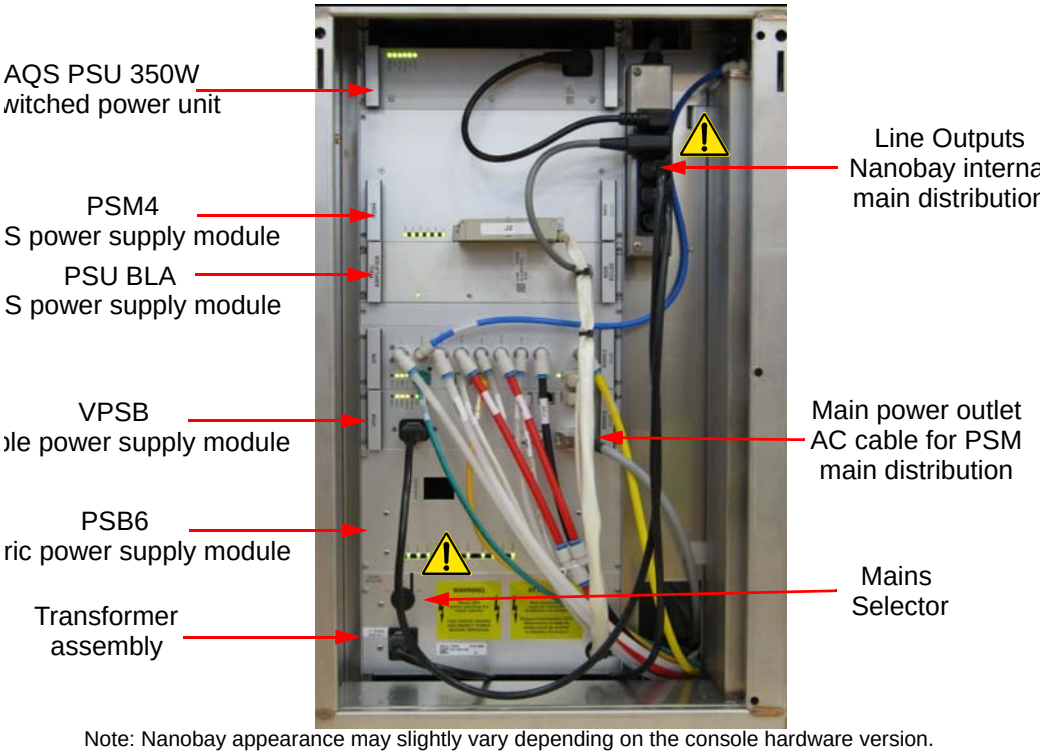
Reliez le systéme d'alimentation principal avec le boitier d’alimentation présent dans le chariot (230V AC).
N'employez aucun autre c®ble que celui fourni par Bruker. N'enlevez aucun panneau protecteur à l'intérieur du ch®ssis de Nanobay.
Consultez "Field Exchangeable Units" on page 28 pour l'information de maintenance.

Amplifier RF Out:

High Power RF output (300W), connects to the Preamplifier.
Do not unplug the cable while the amplifier mains power is ON.
Verify cabling before turning the amplifier ON

Reliez la sortie de l’amplificateur de puissance RF (300W) au préamplificateur.
Ne débranchez pas ce câble tant que l'appareillage est sous tension (interrupteur principal)
Vérifiez le câblage avant de mettre l'amplificateur EN MARCHE

6.2.2 Front View



Note: Nanobay appearance may slightly vary depending on the console hardware version.

Figure 6.2 Front view

Line Outputs:

Only connect these units to the main outlet distribution box:

Reliez seulement ces modules avec la bo te de distribution électrique principale:

- IPSO AQS POWER SUPPLY INCL.CABLE (H12588)
- INES TRAFO UNIT (Z104454)
- BSMS/2 VARIABLE POWER SUPPLY BOARD (Z115193)
- AQS POWER SUPPLY BLA 28V 20A (W1345050)

Main Selector:

Selector configured during the system installation by the Bruker service engineer. Consult a service engineer before reconfigure the selector. False selector settings may cause severe system damage.
Consult "Field Exchangeable Units" on page 28 for service information.

Sélecteur principal de tension:

Le sélecteur est configuré pendant l'installation du système par le technicien de Bruker.
Consultez un technicien de Bruker avant de modifier le sélecteur.
Un mauvais positionnement du sélecteur peut endommager gravement le système.
Consultez "Field Exchangeable Units" on page 28 pour l'information de maintenance.

6.2.3 System Parts

The diagram below shows the three sections with the corresponding sub-units. Most of them are uniform, only the preamplifiers and the Lock RF board L-TRX are proton frequency specific.

The L-TRX provides an integrated, compact 2H amplifier for gradient shimming.

Note: Make sure that the correct power supply PSB6 ECL02.00 or newer is installed!

At the bottom, there is a free space, which can be used for a 19F Lock option.Also the opposite side (front side with power supplies) can be divided into the three sections (IPSO, AQS and BSMS), but there are some relations between the sections (power supply).

- The 12V of the IPSO power supply is used also for the fan tray and for the Ethernet switch.
- The TX-P28V power is provided for all amplifiers, the BLA2BB and the L-TRX, which is part of the BSMS section.

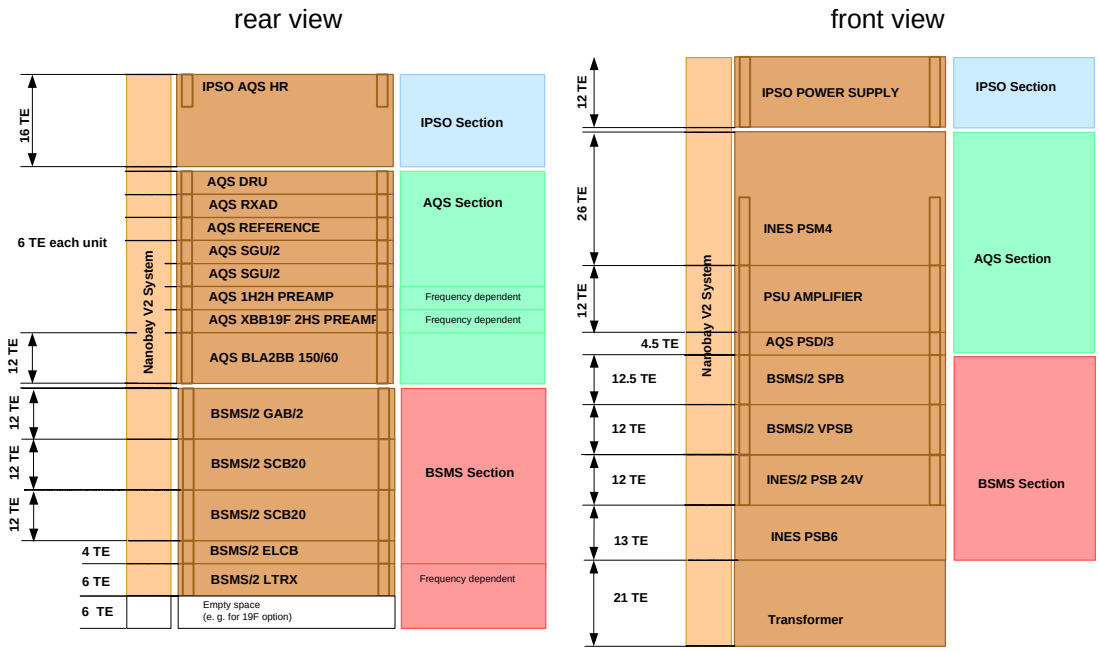


Figure 6.3 Functional sections of a Nanobay V2

6.3 Configuration of Typical 2 Channel Nanobay V2 (300-400MHz)

6.3.1 Bill of Material

Standard units:

Pos.	Units	Part Number	Description
1	1	H9984	IPSO AQS HR UNIT
2			
3			
4	1	Z100977	AQS DRU ECL ≥ 02
5	1	Z102116	AQS RECEIVER BOARD RXAD400
6	1	Z003265	AQS REFERENCE BOARD 400
7	1	Z003080	AQS SGU/2 400
8	1	Z103080	AQS SGU/2 400
9	1	See table "System frequency dependent units"	
10	1		
11	1	W1345049	AQS BLA2BB 200-400
12			
13	1	Z104844	BSMS/2 GAB/2 GRADIENT AMPLIFIER BD
14	1	Z12170 *Z102930*	BSMS FRONTPLATE BLIND 12TE *BSMS/2 SCB20 SHIM CURRENT BOARD (optional)*
15	1	Z102930	BSMS/2 SCB20 SHIM CURRENT BOARD
16	1	Z100818	BSMS/2 ELCB EXTENDED LOCK CTRL BOARD
17	1	See table "System frequency dependent units"	
18	1		
19	1	H12588	IPSO AQS POWER SUPPLY
20	1	Z103791	INES POWER SUPPLY MODULE4 (PSM4)
21	1	H14109	AQS PSD/3 BOARD
22	1	W1345050	POWER SUPPLY COMPACT 28V 20A
23	1	Z115191	BSMS/2 SPB SENSOR & PNEUMATIC
24	1	Z115193	BSMS/2 VPSB
25	1	Z122989	INES/2 POWER SUPPLY BOARD 24V (optional)

Table 6.1 Bill of material for a HR 2 channel Nanobay V2

Pos.	Units	Part Number	Description
26	1	Z111144	INES POWER SUPPLY BOARD 6 (PSB6) ECL ≥ 02
27	1	Z104454	INES TRAFO UNIT

Table 6.1 Bill of material for a HR 2 channel Nanobay V2

Frequency Dependent Units

Pos.	Units	Part Number	Description
300 MHz Systeme			
9	1	Z003950	AQS 1H2H PREAMP 300
10	1	Z003954	AQS XBB19F 2HS PREAMP 300
17	1	Z109887	BSMS/2 LOCK TRANSCEIVER 300 (L-TRX 300)
18	1	Z12489 *Z120014*	AQR FRONTPLATTE BLIND 6TE *BSMS/2 19F LOCK TRANSCEIVER 300-1000*
400 MHz Systeme			
9	1	Z003951	AQS 1H2H PREAMP 400
10	1	Z003955	AQS XBB19F 2HS PREAMP 400
17	1	Z109888	BSMS/2 LOCK TRANSCEIVER 400 (L-TRX 400)
18	1	Z12489 *Z120014*	AQR FRONTPLATTE BLIND 6TE *BSMS/2 19F LOCK TRANSCEIVER 300-1000*

Table 6.2 System frequency dependent units

6.3.2 Board Location

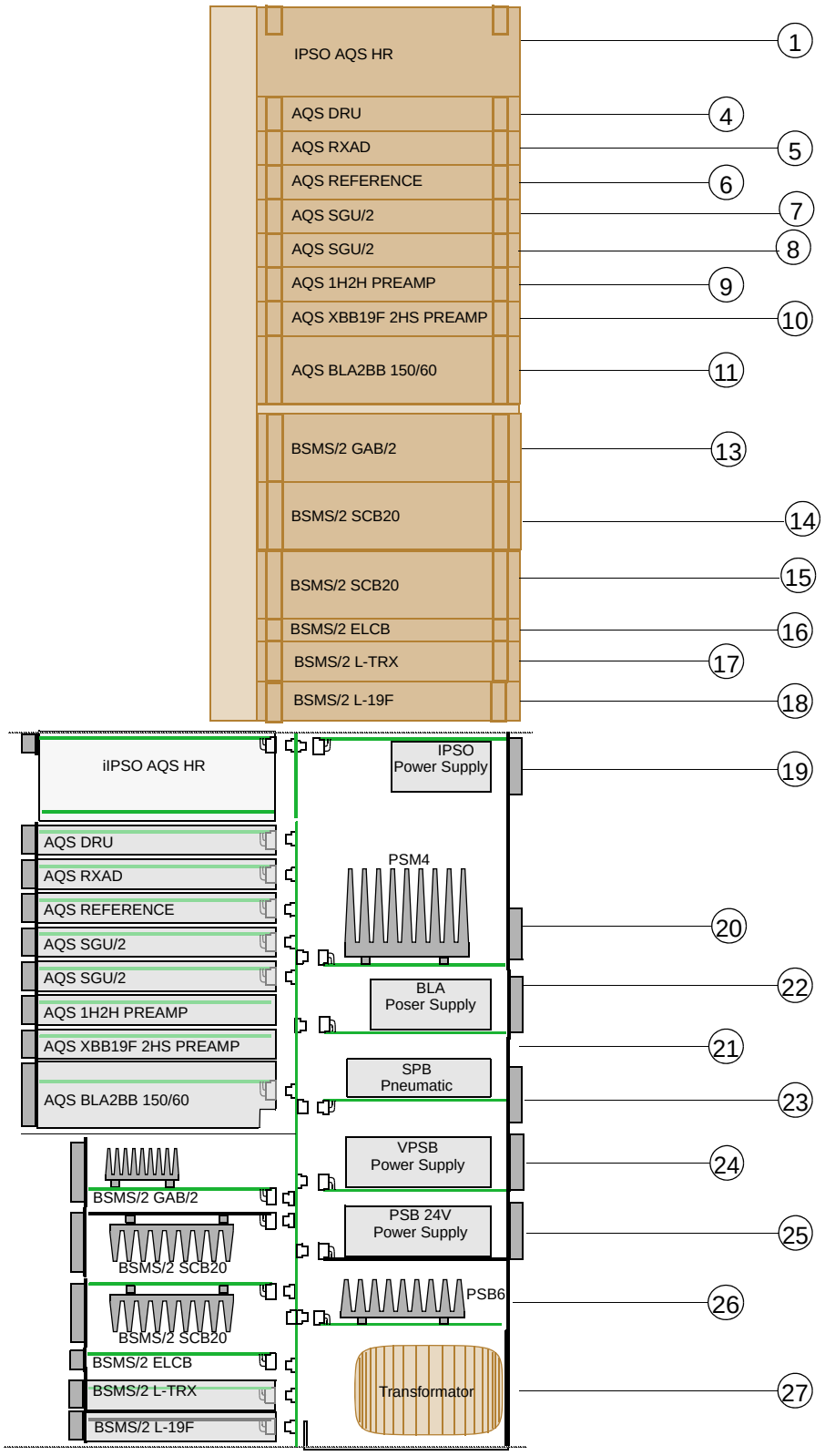


Figure 6.4 Nanobay HR 2 Channel / ECL:00.00

6.4 AC Wiring

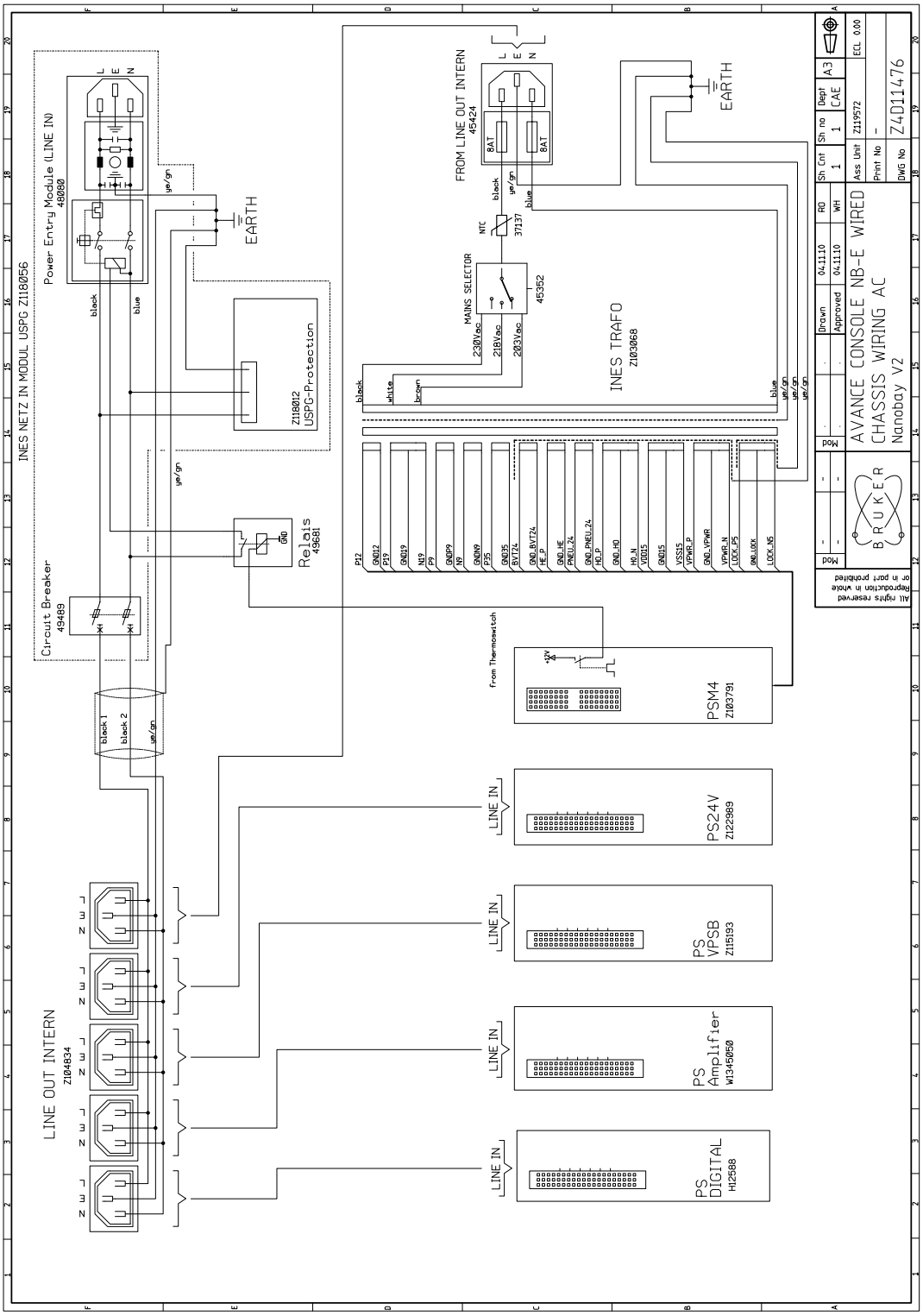


Figure 6.5 Nanobay V2 internal AC wiring, overview

The diagram above shows the AC wiring inside the Nanobay console.

- The mains power is connected to the entry module with power switch (automatical shut down when there is no input voltage), including filters.
- A circuit breaker provides fast overcurrent shut down (< 8 ms)
- A thermal safety relay switches off the console when the hot spot temperature exceeds a specific limit (the sensor is mounted on the PSM4 heat sink).
- All AC power supplies (PS DIGITAL for IPSO, PS AMPLIFIER and BSMS/2 VPSB) and also the transformer unit are connected to the internal line connectors, which are all protected by the mechanisms above mentioned.
- The transformer (part of INES TRAFO UNIT) is additionally protected by two fuses, and there is a NTC for limiting the inrush current during power up.

There is a power range switch for adaptation to the local mains voltage (see next chapter "Mains Selector Setting" on page 68).

---

i Note: After shut down, the Nanobay should stay at least 30 seconds off before it is powered up again

---

Figure 6.6 Mains power connector, circuit breaker and power switch

In case of over current the circuit breaker shuts down the mains power. It is then in the lower position and needs to be pushed to the upper position again before the Nanobay console can be switched on.

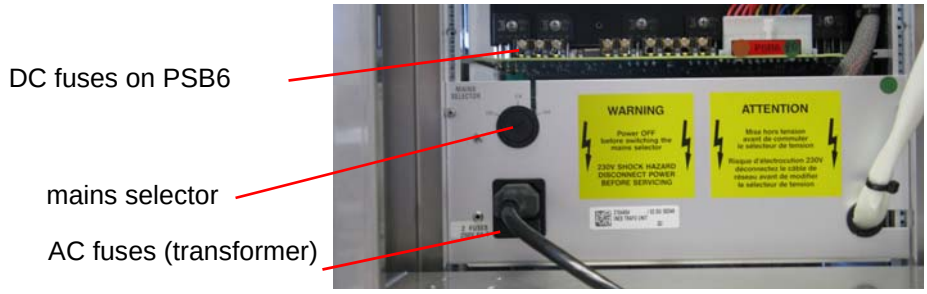


Figure 6.7 Mains selector at the front side (power supply side)

6.4.1 Mains Selector Setting

Prior to the first power-up of the Nanobay console, it must be ensured that the mains selector switch is in the correct position (see "" on page 67).

The Nanobay is safe to operate at all settings within an input voltage range of 208..230V~ ±10% according to IEC/EN 61010-1. However because the size of the linear power supply modules is designed for minimal power dissipation, the transformer input voltage should be matched to the mains voltage at the installation site. The input voltage ranges for optimal performance are as follows:

Input voltage range	Mains selector setting	Note
183 .. 223 V~	**203**	
197 .. 240 V~	**218**	
207 .. 253 V~	**230**	= factory preset

Table 6.3 Mains selector settings for optimal performance

6.4.2 Mains Selector Setting for 100-120V~ Mains Supply

In countries with 100-120V~ mains supply such as USA, Canada or Japan combined line voltages may be used.

- Connect the mains input between two phases of the mains supply to obtain a nominal input voltage of 200..208V~
- Set the selector switch to **203**

Alternatively an external step-up voltage converter with an output voltage of 208..230V~ may be used.

The diagram "" on page 69 shows in detail the power supply wiring, including the connection of the two linear power supplies PSM4 and PSB6 to the transformer.

For powering the fans, the power supply (+12V) from the IPSO power supply is used (shared), and there is a fan supervision built in on the backplane.

Also the Ethernet switch is powered by the +12V IPSO power supply.

The thermal shut down requires +12V from the IPSO power supply as well (control signal for the mains relay).

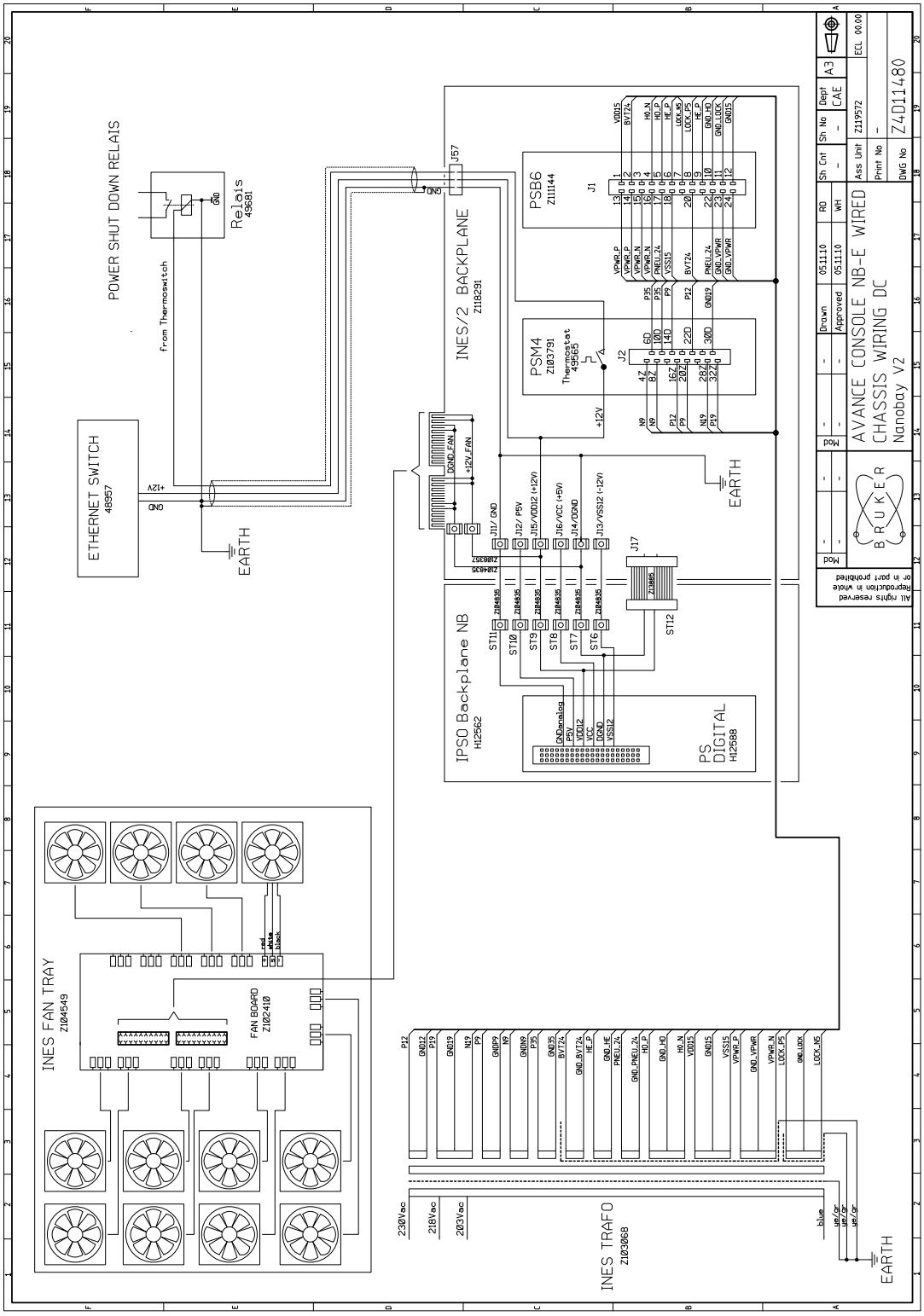


Figure 6.8 Nanobay internal DC wiring with fan tray and power supplies

6.5 DC Wiring

Each of the three sections (IPSO, AQS and BSMS) can be considered separately for the DC wiring. The IPSO is supplied by a dedicated power supply, which is at the opposite side (front side).

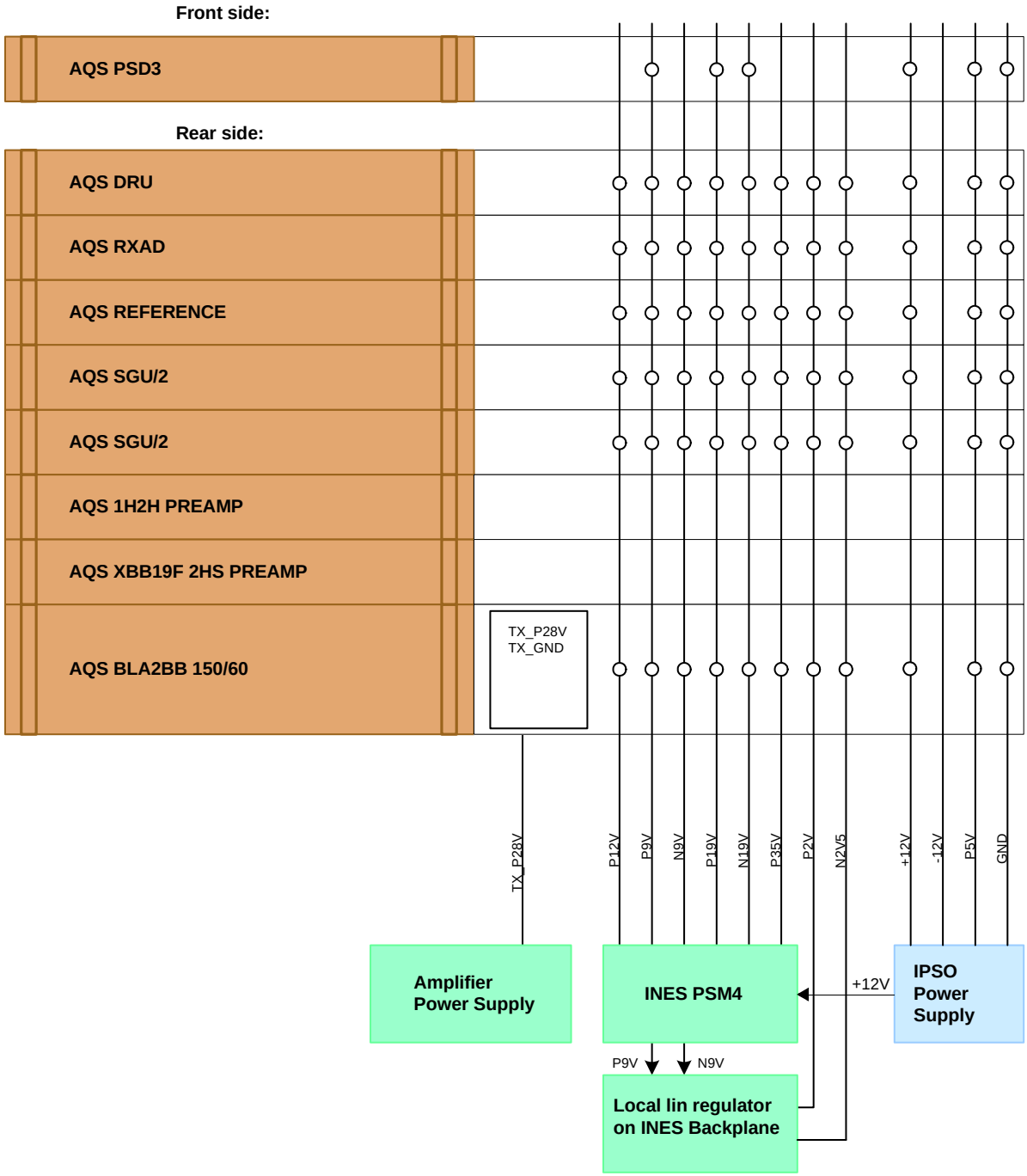


Figure 6.9 DC wiring of the AQS section

The AQS PSD3 is optional (required if there are external preamplifiers used).

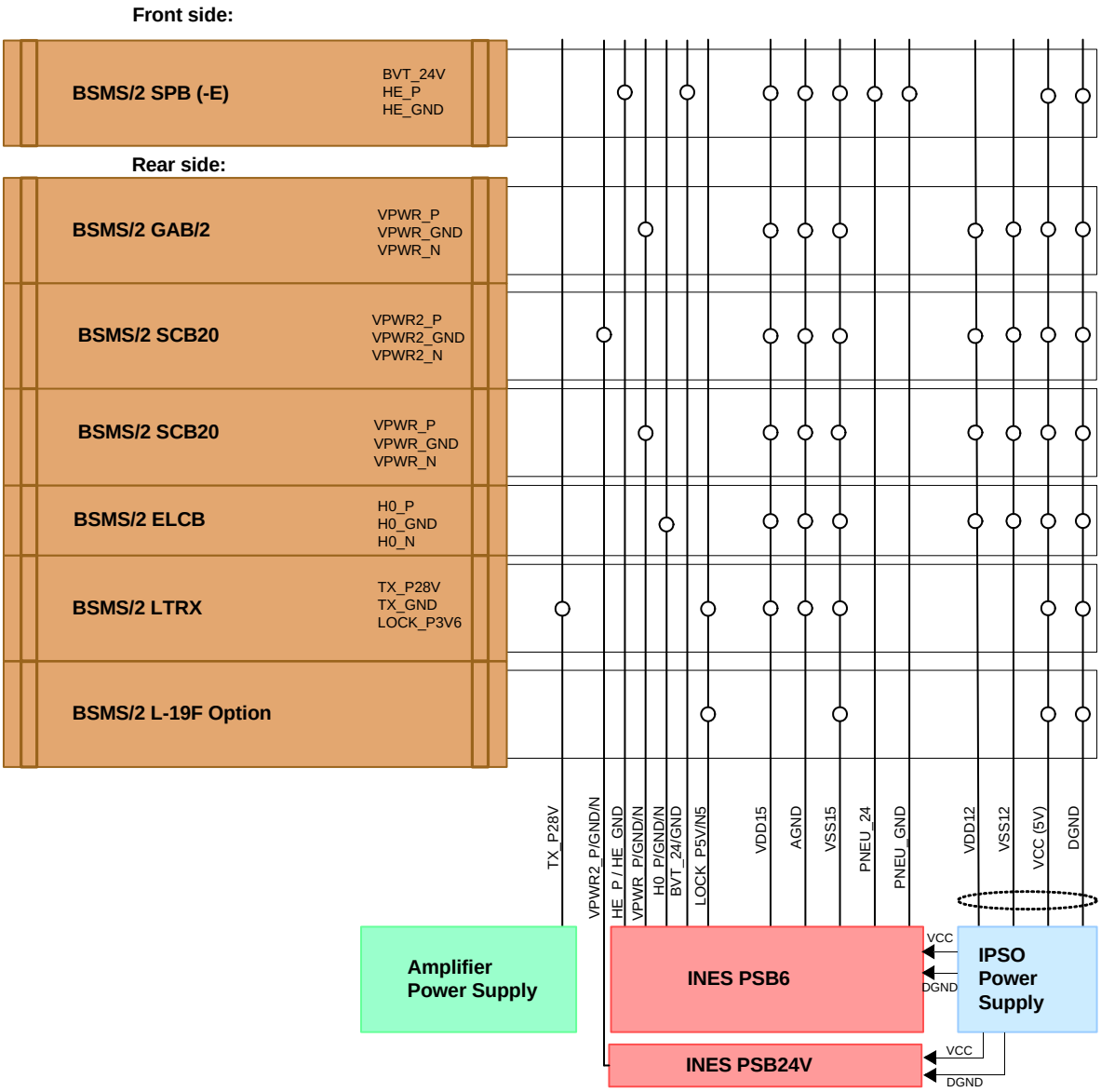


Figure 6.10 DC wiring of the BSMS section

Some of the unit connectors provide specific voltages (e. g. high voltage for HE level measurement, etc.). These specific voltages are not available on the other connectors.

The BSMS section is mainly supplied by the INES PSB6. In addition, the amplifier supply voltage is used for the L-TRX.

6.6 Backplane Communication

The backplane communication is shown in the diagram below. The AQS section is managed by the DRU, whereas the BSMS part is managed by the ELCB. Both, DRU and ELCB, are Ethernet devices and part of the Spectrometer network.

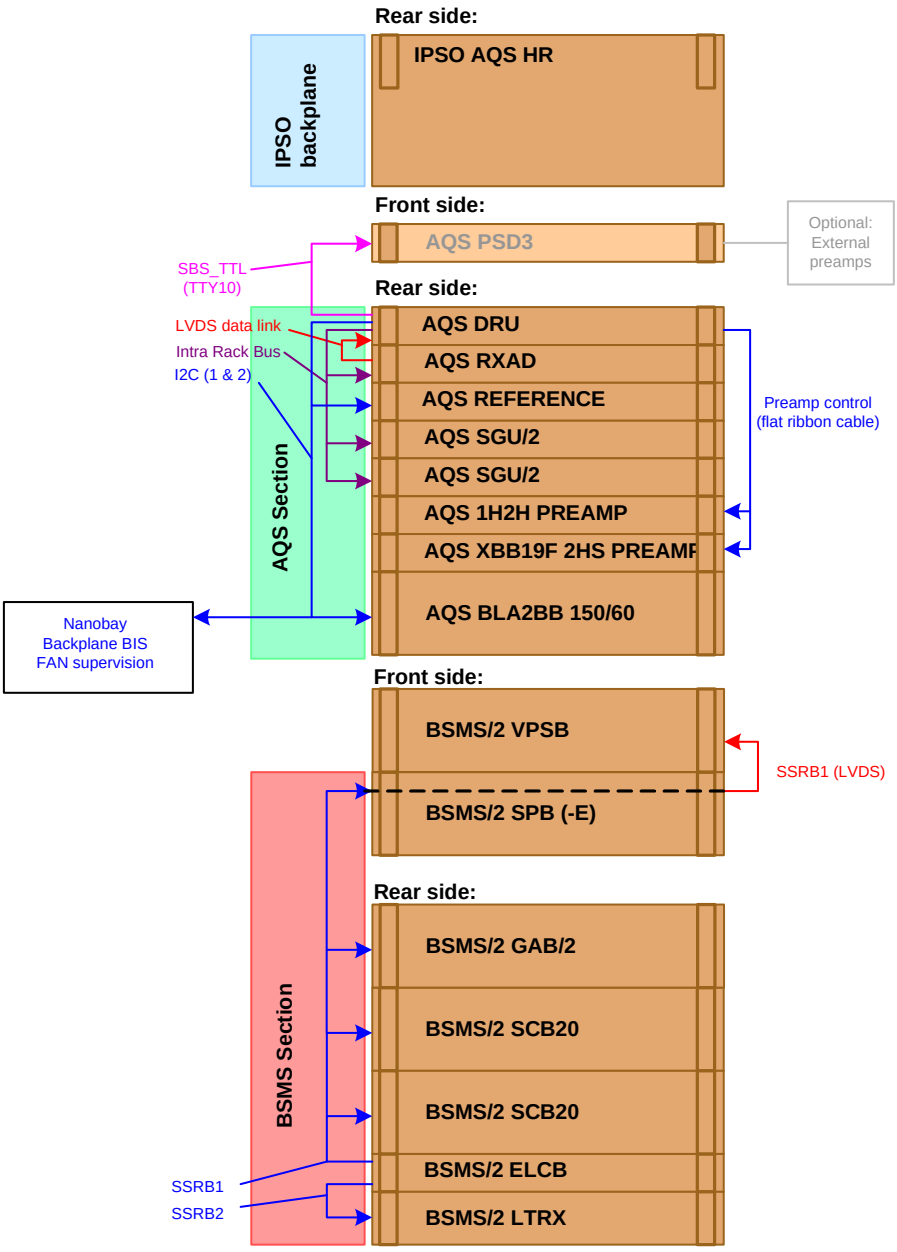


Figure 6.11 Backplane communication

6.7 Pneumatics

The Nanobay requires dry compressed air or N2 gas (see in the site planning manual for exact specifications). Inside the cabinet, there is a filter and a pressure reduction valve providing clean gas to the pnematic module (for spin and lift), the variable temperature unit (gas flow for probe temperature control) and an optional QNP probe.

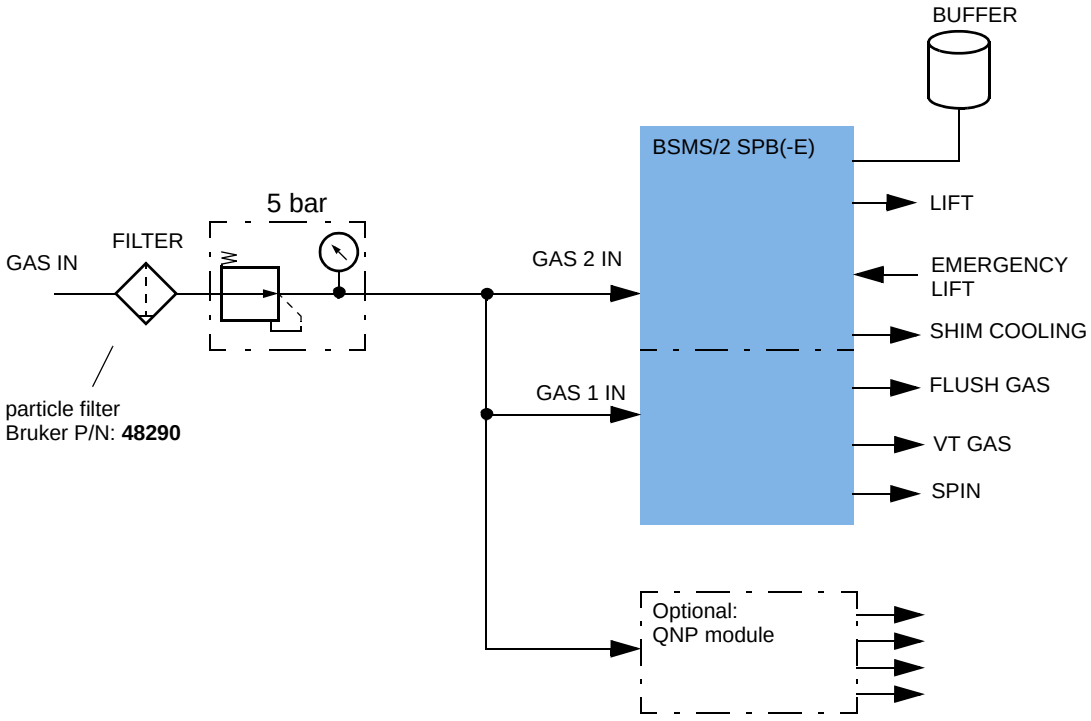


Figure 6.12 Pneumatics

The particle filter must be clean (visible through a transparent cover). It may be necessary to replace it (part number ***48290***), e. g. when it has been polluted. Accumulated liquids can be drained by a valve at the bottom of the filter (see also "Maintenance of the Particle Filter for Compressed Gas" on page 134).

6.8 Wiring and Cable Sets

There is a cable set internal (H120708) providing all cables that are necessary for the internal wiring (including new L-TRX and BSVT). In addition, the 26 pin LVDS cable (part of gradient cable set H14036) has to be connected between the AQS IPSO (F/G-Controller 4) and the GAB/2 (G-Con).

6.8.1 Cable Set for Internal Wiring

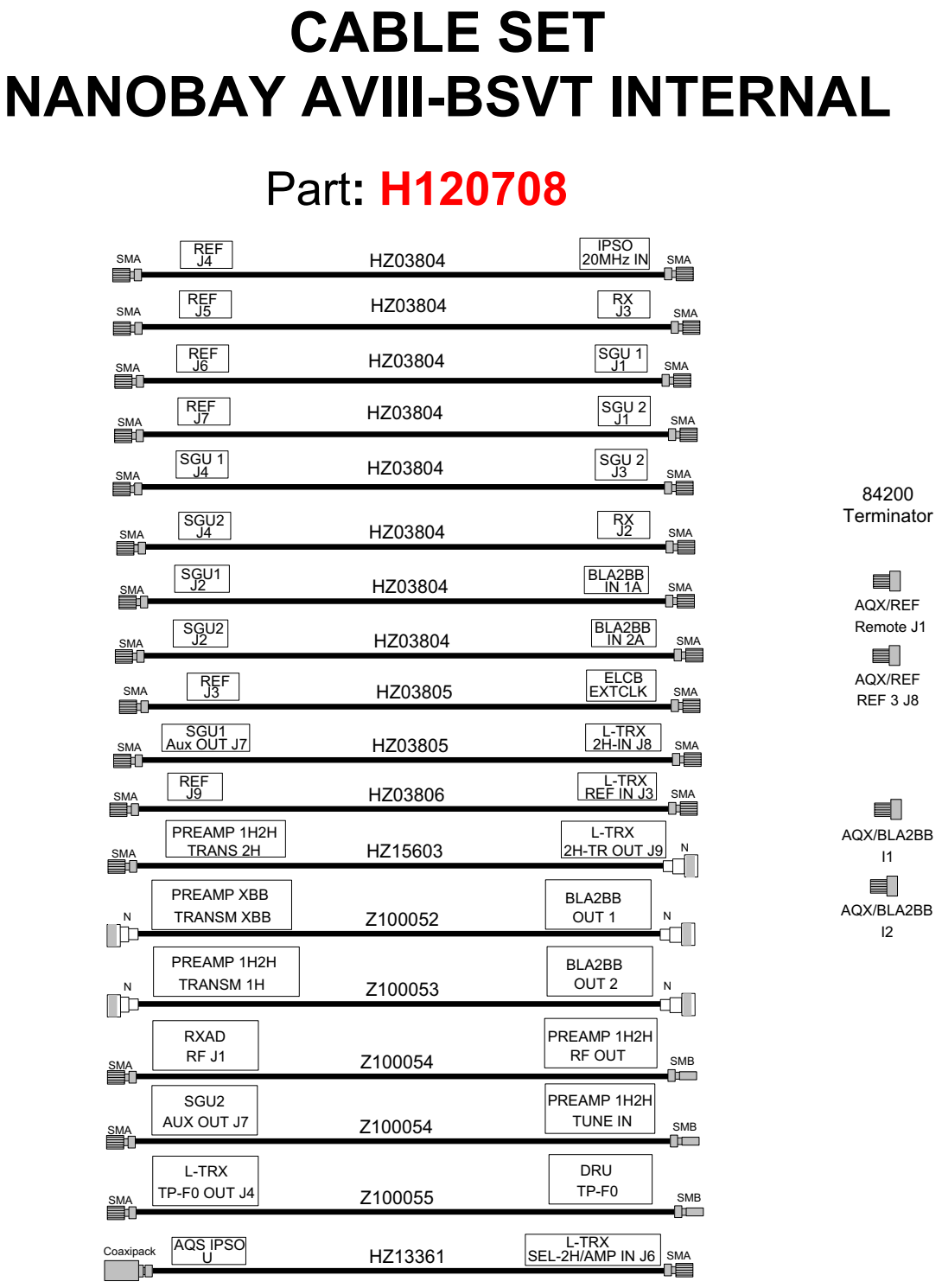


Figure 6.13 Cable set H120708 for internal wiring (page 1 of 2)

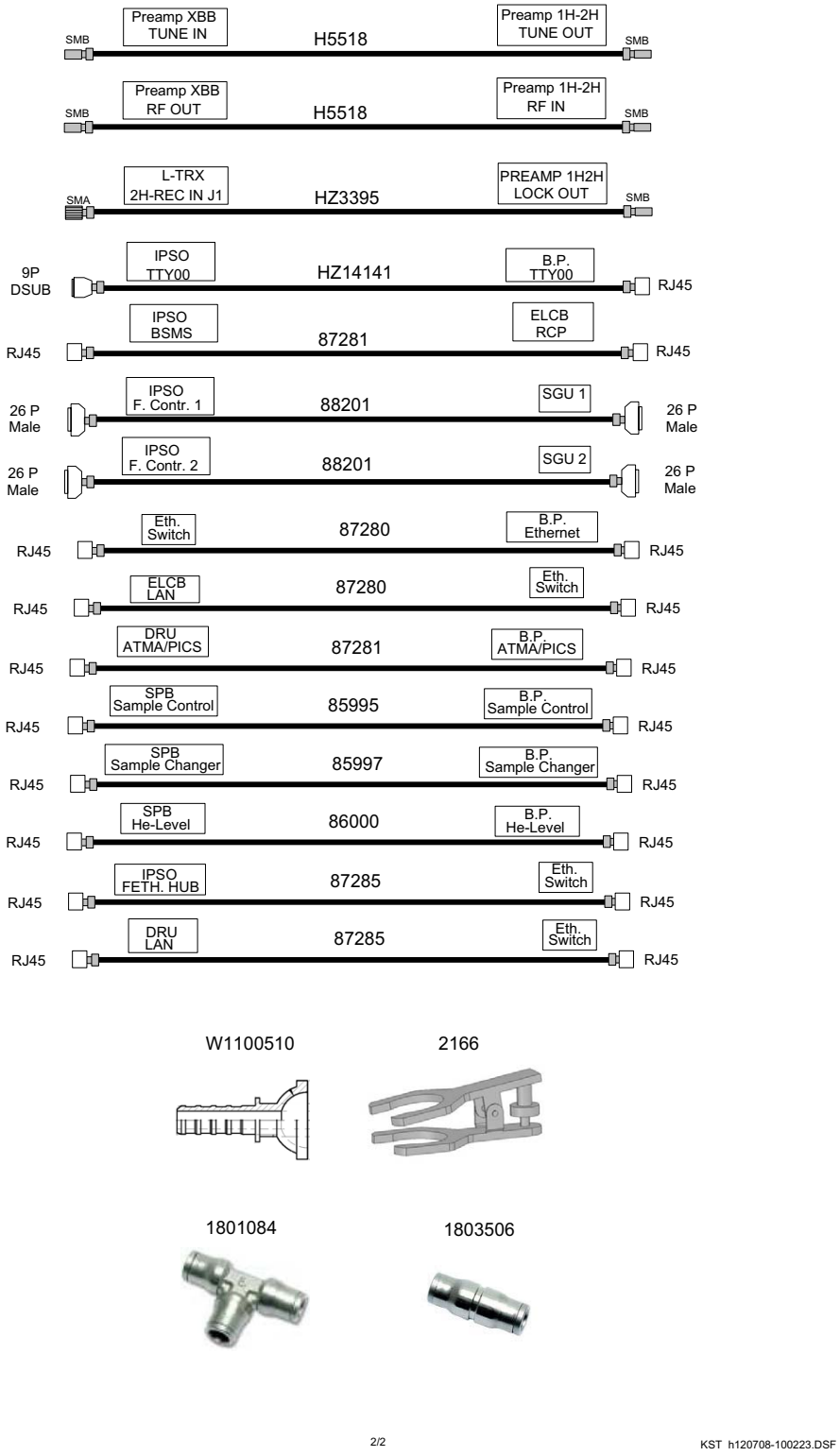


Figure 6.14 Cable set H120708 for internal wiring (page 2 of 2)

6.8.2 Wiring Overview

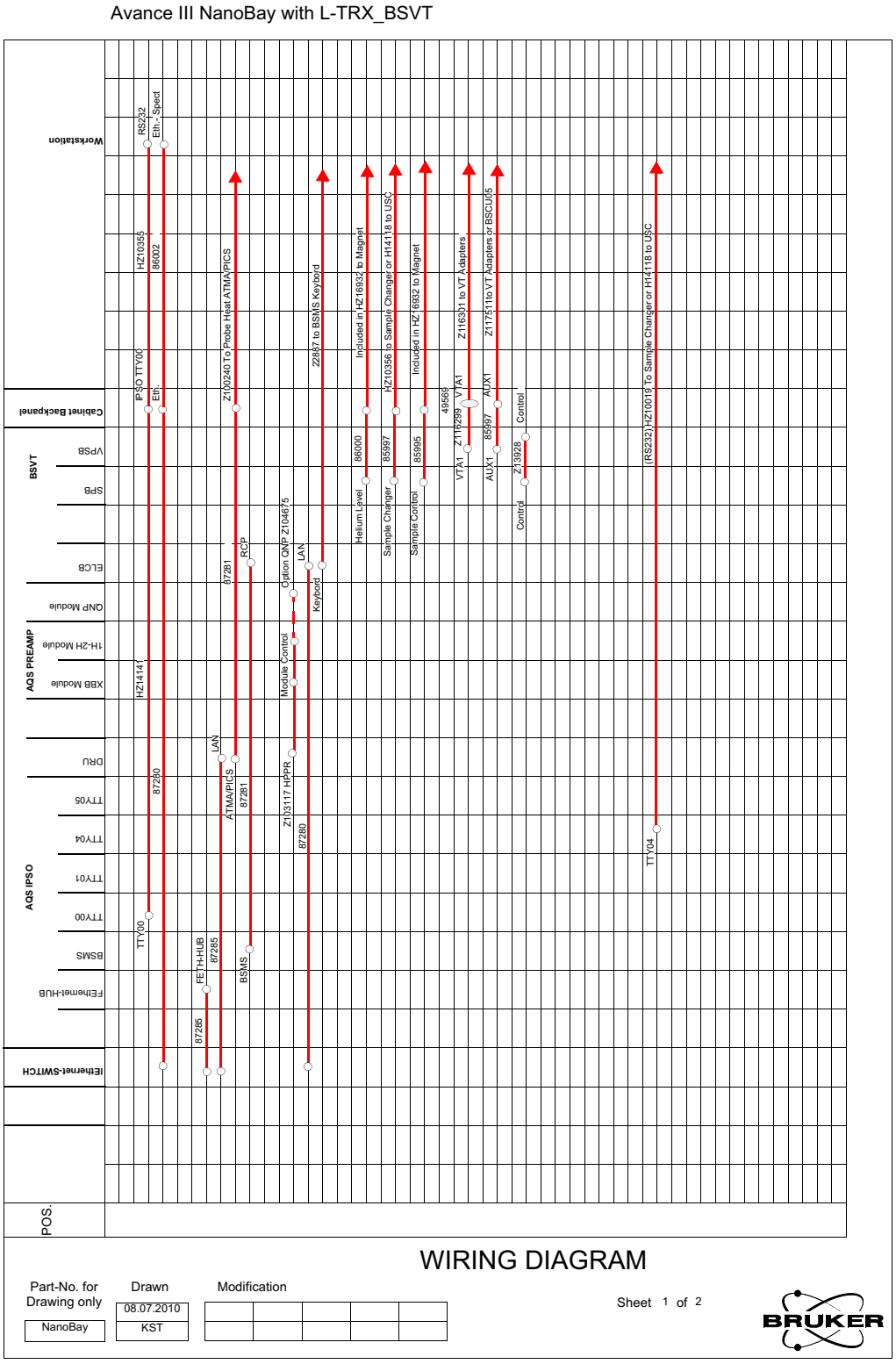


Figure 6.15 Wiring of a Nanobay V2 console (page 1)

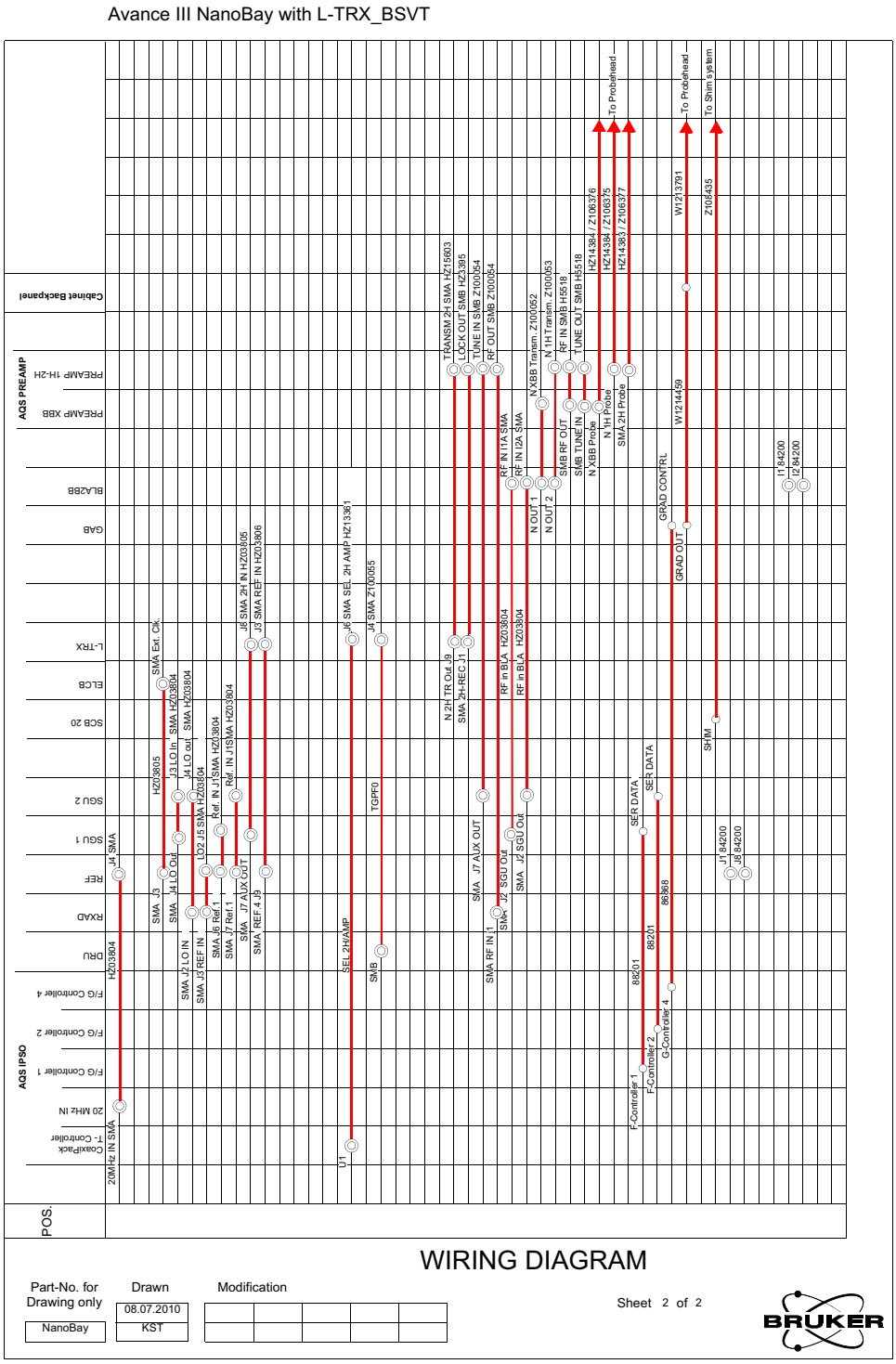


Figure 6.16 Wiring of a Nanobay V2 console (page 2)

6.8.3 External Wiring, Cable Sets and Connections

For the external wiring, there are the following cable sets necessary:

- external cable set H120707 containing most of the external cables (indicated in black color in the diagram below) and pneumatic tubes
- Shim cable Z108435 (indicated in blue color)
- gradient cable set H14036 containing the gradient cable (indicated in red color)
- If the system uses a VT option, the cable sets Z119851 CABLE SET BSVT BASIC and Z119853 CABLE SET BSVT 4.5M HEATER
- If the system uses additional VT accessory (LN2 exchanger or evaporator) Z119854 CABLE SET BSVT AUXILIARY HEATER

CABLE SET
NANOBAY AVIII-BSVT EXTERNAL

Part: H120707

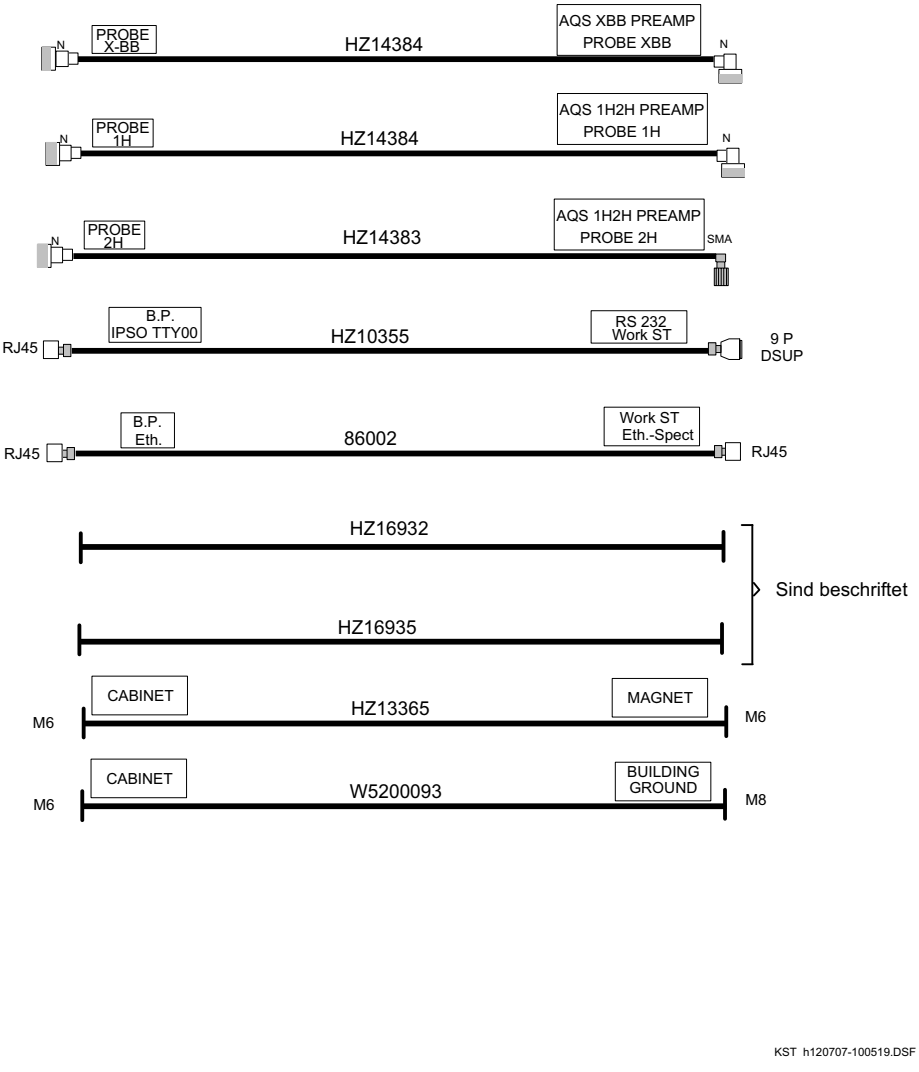


Figure 6.17 Cable set external

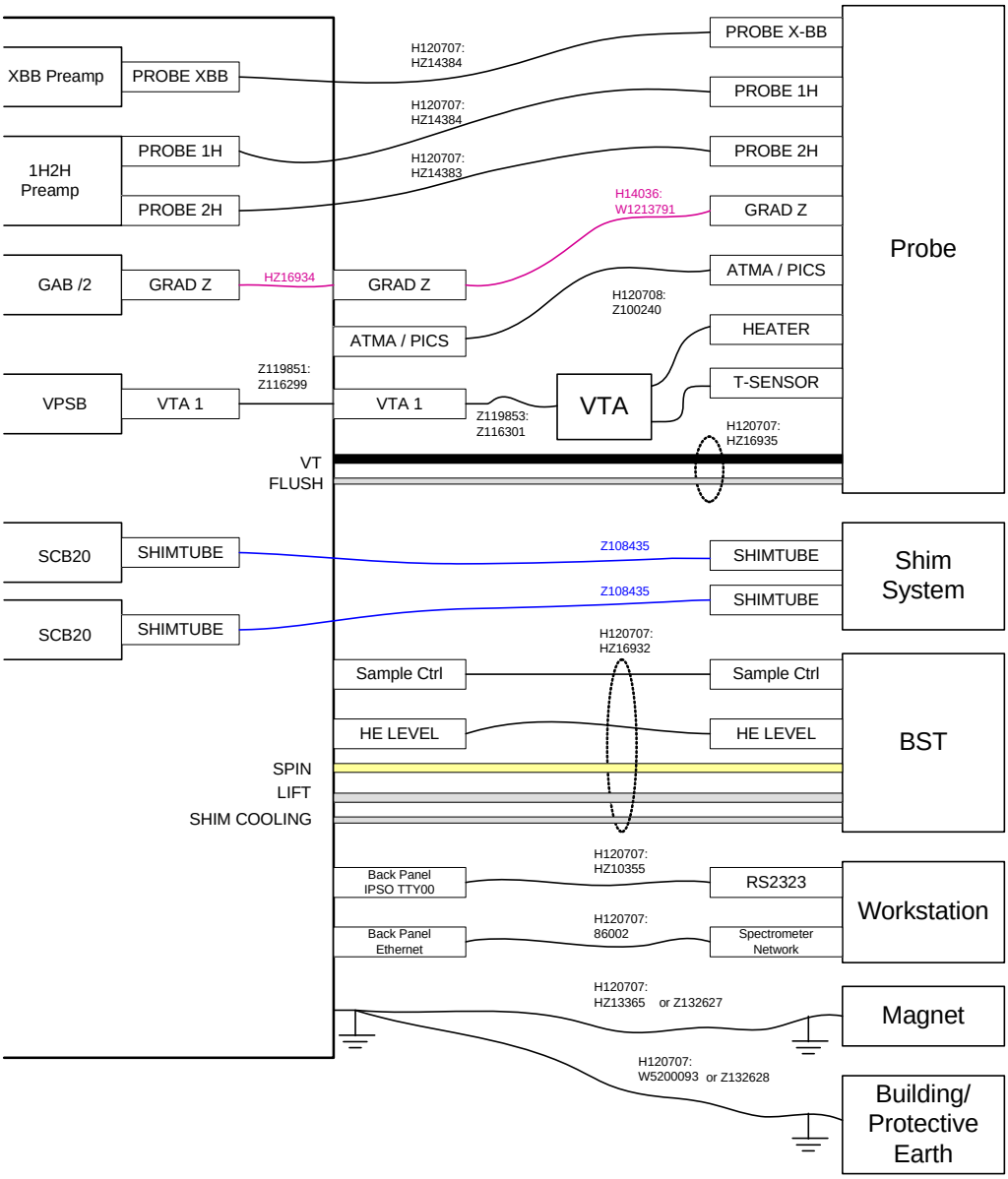


Figure 6.18 External wiring of Nanobay console

6.9 Nanobay Specific Power Supplies

In this chapter there is a detailed description of the transformer and the Nanobay specific power supplies INES PSM4 and INES PSB6.

The transformer is part of the cabinet and can not be exchanged in the field. It provides the cables with the appropriate connectors for the PSM4 and PSB6.

For the low skew clock network, there are two additional supply voltages required (P2V and N2V5), which are provided by linear power regulators on the Nanobay backplane. The related LED (common for both voltages) for indicating correct operation is located

on the backplane as well and can be inspected when the left side panel is removed.

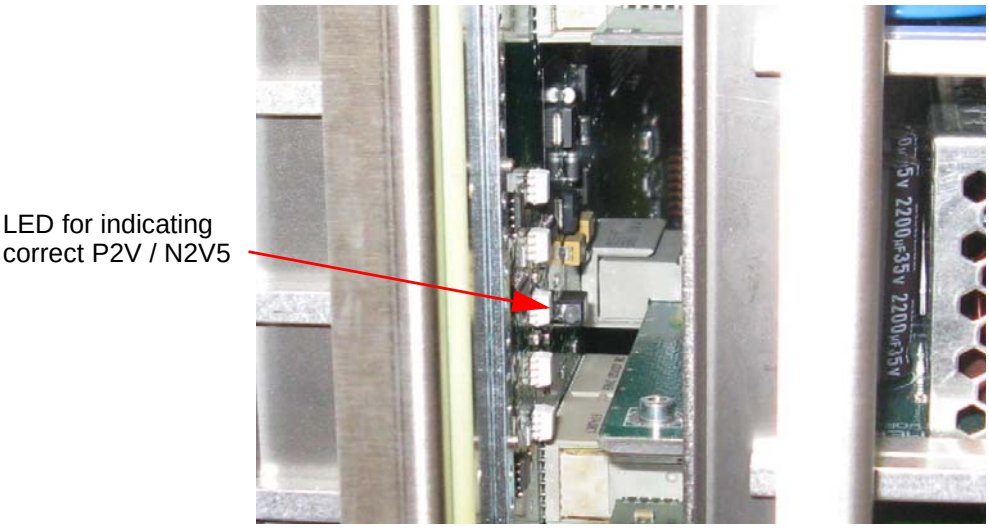


Figure 6.19 Linear power regulators on the backplane with power LED

6.9.1 Power Supply INES PSM4

There is a common ground for all PSM4 supply voltages

On the PSM4 heat sink there is an over temperature sensor providing shut down of the Nanobay console in case of excess temperature.

Voltage Name (LED)	Voltage @ rated load	Current @ rated load	ripple (mV_{eff})	Fuse	Fuse Number
P19	19.0 +/- 0.7 V	3.0 A	25 mV	5.0 AT	F1
N19	-19.0 +/- 0.7 V	0.73 A	15 mV	5.0 AT	F2
P12	12.0 +/- 0.6 V	5.7 A	25 mV	10 AT	F3
P9	9.0 +/- 0.5 V	6.1 A	25 mV	10 AT	F4
N9	-9.0 +/- 0.5 V	1.9 A	15 mV	8.0 AT	F6
P35	34.5 +/- 1.5 V	0.14 A	10 mV	0.5 AT	F5

Table 6.4 PSM4 Electrical Characteristics

6.9.2 Power Supply INES PSB6 (ECL 02.00 and newer)

The power supply PSB6 is used for operation with the L-TRX and BSVT.

Behind each LED on the PSB6 (indicators that the according voltage is available) there is the corresponding fuse, wich can be exchanged even when the PSB is installed in the console.

Voltage Name (LED)	Reference	Voltage @ rated load	Current @ rated load	ripple (mV_{eff})	Fuse
BVT_24V	BVT_GND	24.0 +/- 1.0 V	1.65 A	10 mV	3.15 AT
H0_P	H0_GND	29.6 +/- 1.2 V	0.55 A	10 mV	1.0 AT
H0_N	H0_GND	-29.6 +/- 1.2 V	0.28 A	10 mV	1.0 AT
LOCK_P3V6[a]	LOCK_DGND	3.6 +/- 0.1 V	2.0 A	20 mV	-
HE_P	HE_GND	36 .. 46 V	0.4 A	1 V	1.00 AT
PNEU_24V	PNEU_GND	24 V +/- 0.3 V	1.0 A	20mV	4.00 AT
VDD15	AGND	15 +/- 0.6 V	1.45 A	20 mV	2.5 AT
VSS15	AGND	-15 +/- 0.6 V	0.9 A	20 mV	2.5 AT
VPWR_P	VPWR_GND	20 .. 27 V	4.2 A	1 V	8.0 AT
VPWR_N	VPWR_GND	-20 .. -27 V	4.2 A	1 V	8.0 AT

Table 6.5 PSB6 Electrical Characteristics (ECL 02.00 and newer)

a. Voltage from DC/DC converter, input voltage is PNEU_24V

Note: The shaded rows indicate that the referred voltages are non-regulated.

7 Nanobay Console Z126037 (V3)

7.1 Introduction

The Avance Nanobay V3 is an enhanced version of the Nanobay console Z108356 and Z119572.

This version includes a completely rebuilt power supply system with latest generation switched mode power supply electronics for less weight, expanded input voltage range and improved power efficiency.

With actually improved device cooling for even more reliability, the overall noise level is lower compared with the previous models.

The RF system is based on SGU/3 and REF/3 technology and is expandable for up to 3 channels.

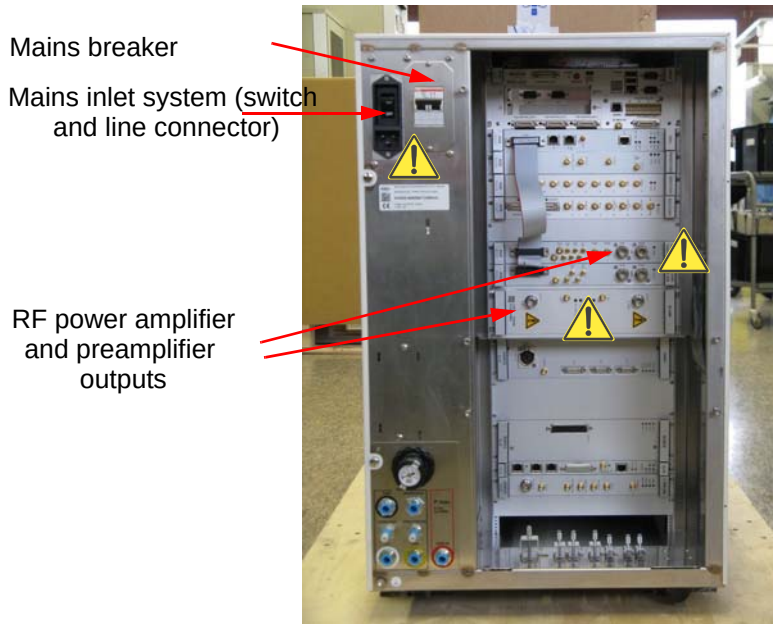
In basic configuration, the console is ready for connection to a CryoProbe.

The Nanobay V3 has full support of the new BSVT system (Bruker Smart Variable Temperature System) and L-TRX with integrated 2H amplifier for gradient shimming.

7.2 Overview

The pictures below show the Nanobay cabinet with removed housing. In contrast with the other consoles (TwoBay, OneBay and MicroBay), the units of back and front side are reverse - the power supplies, pneumatics and VT are accessible from the front side, whereas the other units (IPSO, DRU, REF, etc.) are at the rear side of the console.

Rear View *7.2.1*



Note: Nanobay appearance may slightly vary depending on the console hardware version.

Figure 7.1 Rear view

Mains Inlet System:

Connects to the cart mains distribution box (230V AC).
Do not use any other câbles than the one supplied by Bruker.
Do not remove any protective cover panels inside the Nanobay.
Consult "Field Exchangeable Units" on page 28 for service information.

Systéme d'alimentation principal (des forces):

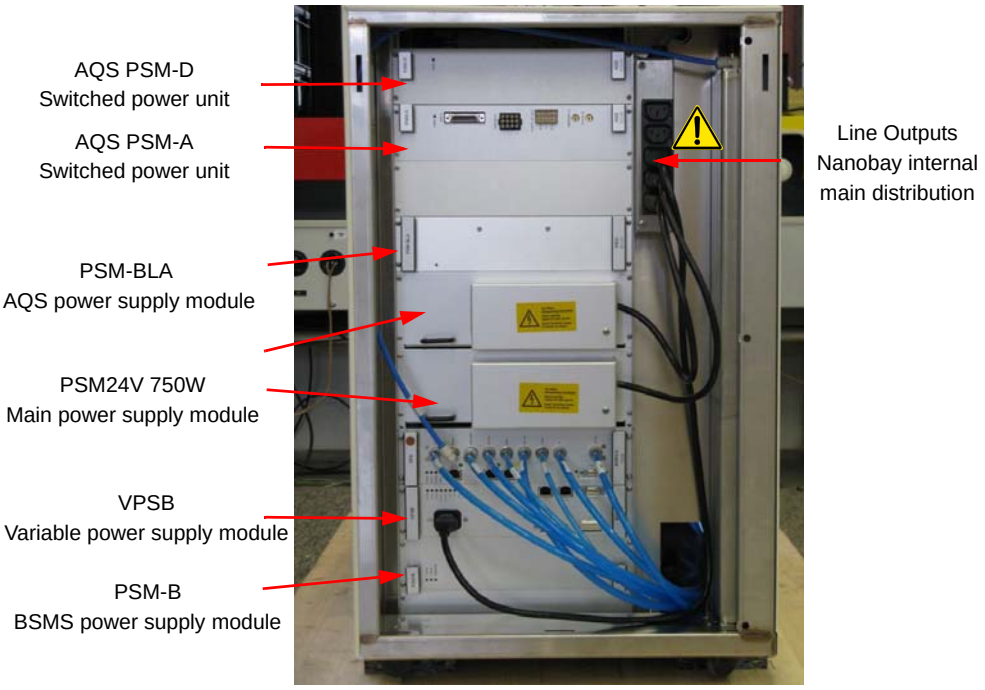
Reliez le systéme d'alimentation principal avec le boitier d'alimentation présent dans le chariot (230V AC).
N'employez aucun autre cble que celui fourni par Bruker. N'enlevez aucun panneau protecteur à l'intérieur du châssis de Nanobay.
Consultez "Field Exchangeable Units" on page 28 pour l'information de maintenance.

Amplifier RF Out:

High Power RF output (300W), connects to the Preamplifier.
Do not unplug the cable while the amplifier mains power is ON.
Verify cabling before turning the amplifier ON

Reliez la sortie de l'amplificateur de puissance RF (300W) au préamplificateur.
Ne débranchez pas ce câble tant que l'appareillage est sous tension (interrupteur principal)
Vérifiez le câblage avant de mettre l'amplificateur EN MARCHE

7.2.2 Front View



Note: Nanobay appearance may slightly vary depending on the console hardware version.

Figure 7.2 Front view

Line Outputs:

Only connect these units to the main outlet distribution box:

Reliez seulement ces modules avec la bo⌊te de distribution électrique principale:

- BSMS/2 VARIABLE POWER SUPPLY BOARD (Z115193)
- AQS POWER SUPPLY BLA 28V 20A (W1345050)

7.2.3 System Parts

The diagram below shows the three sections of a typical 2-channel system with the corresponding sub-units. Most of them are uniform, only the preamplifiers and the Lock RF board L-TRX are proton frequency specific.

The L-TRX provides an integrated, compact 2H amplifier for gradient shimming.

At the bottom, there is a free space, which can be used for a 19F Lock option. Also the opposite side (front side with power supplies) can be divided into the three sections (AQS, Common and BSMS), but there are some relations between the sections (power supply).

- 12V of the PSM-D power supply is used also for the fan tray and for the Ethernet switch.

- 3.6V and 5V for the BSMS part are supplied from the PSM-D
- There is 12TE extra-space for a second RF Power Amplifier Supply

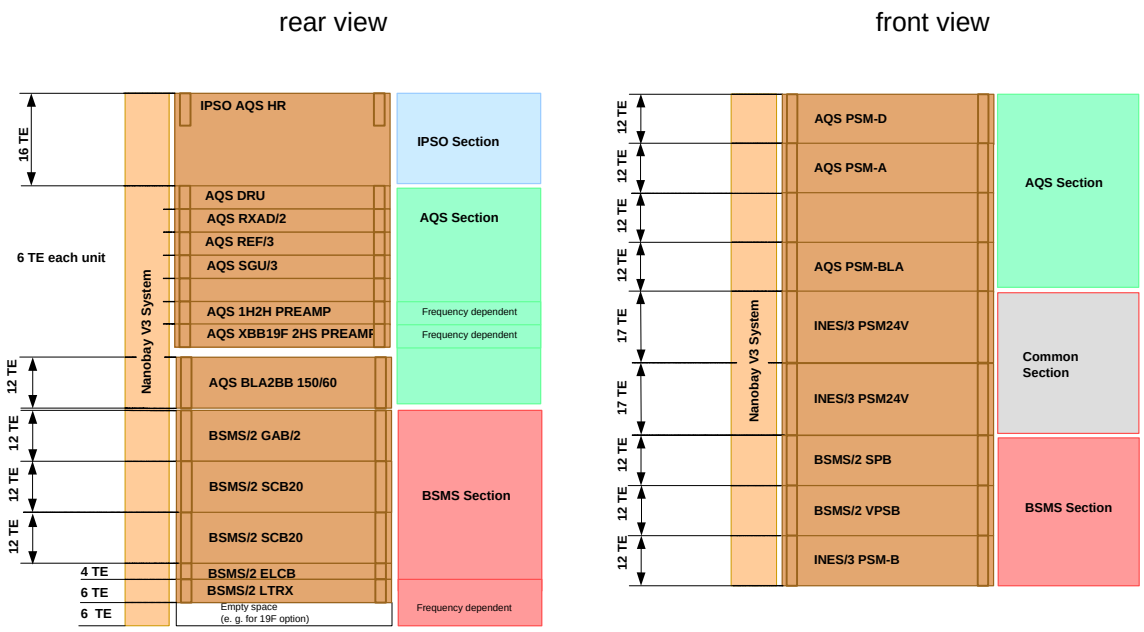


Figure 7.3 Functional sections of a Nanobay V3

7.3 Configuration of Typical 2 Channel Nanobay V3 (300-400MHz)

7.3.1 Bill of Material

Standard Units:

Pos.	Part Number	Description
1	H9984	IPSO AQS HR UNIT
2	Z100977	AQS DRU ECL ≥ 07
3	Z130588	AQS RECEIVER BOARD RXAD/2 600
4	Z116985	AQS REFERENCE BOARD/3
5	Z117129	AQS SGU/3 600

Table 7.1 Bill of material for a HR 2 channel Nanobay V3

Pos.	Part Number	Description
6	See table "System frequency dependent units"	
7		
8	W1345049	AQS BLA2BB 20-400MHZ
9	Z104844	BSMS/2 GAB/2 GRADIENT AMPLIFIER BD
10	Z12170 *Z102930*	BSMS FRONTPLATE BLIND 12TE *BSMS/2 SCB20 SHIM CURRENT BOARD (optional)*
11	Z102930	BSMS/2 SCB20 SHIM CURRENT BOARD
12	Z100818	BSMS/2 ELCB EXTENDED LOCK CTRL BOARD
13	See table "System frequency dependent units"	
14		
15	Z121625	AQS PSM-D POWER SUPPLY MODULE
16	Z121623	AQS PSM-A POWER SUPPLY MODULE
17	Z12170	BSMS FRONTPLATTE BLIND 12TE
18	Z128045 *W1345050*	AQS INES PSM-BLA POWER SUPPLY *AQS POWER SUPPLY BLA 28V 20A*
19	Z131927	INES3 PSM-24V 750W POWER_SUPPLY UNIT
20	Z131927	INES3 PSM-24V 750W POWER_SUPPLY UNIT
21	Z115191	BSMS/2 SPB SENSOR & PNEUMATIC
22	Z115193	BSMS/2 VPSB
23	Z128071	INES/3 PSM-B POWER SUPPLY

Table 7.1 Bill of material for a HR 2 channel Nanobay V3

Frequency Dependent Units

Pos.	Part Number	Description
300 MHz Systems		
6	Z003950	AQS 1H2H PREAMP 300
7	Z003954	AQS XBB19F 2HS PREAMP 300
13	Z109887	BSMS/2 LOCK TRANSCEIVER 300 (L-TRX 300)
14	Z12489 *Z120014*	AQR FRONTPLATTE BLIND 6TE *BSMS/2 19F LOCK TRANSCEIVER 300-1000*
400 MHz Systems		
6	Z128274	AQS 1H2H PREAMP 400 CRP

Table 7.2 System frequency dependent units

Pos.	Part Number	Description
7	Z128143	AQS XBB19F 2HS PREAMP CRP 400
13	Z109888	BSMS/2 LOCK TRANSCEIVER 400 (L-TRX 400)
14	Z12489 *Z120014*	AQR FRONTPLATTE BLIND 6TE *BSMS/2 19F LOCK TRANSCEIVER 300-1000*

Table 7.2 System frequency dependent units

7.3.2 Board Location

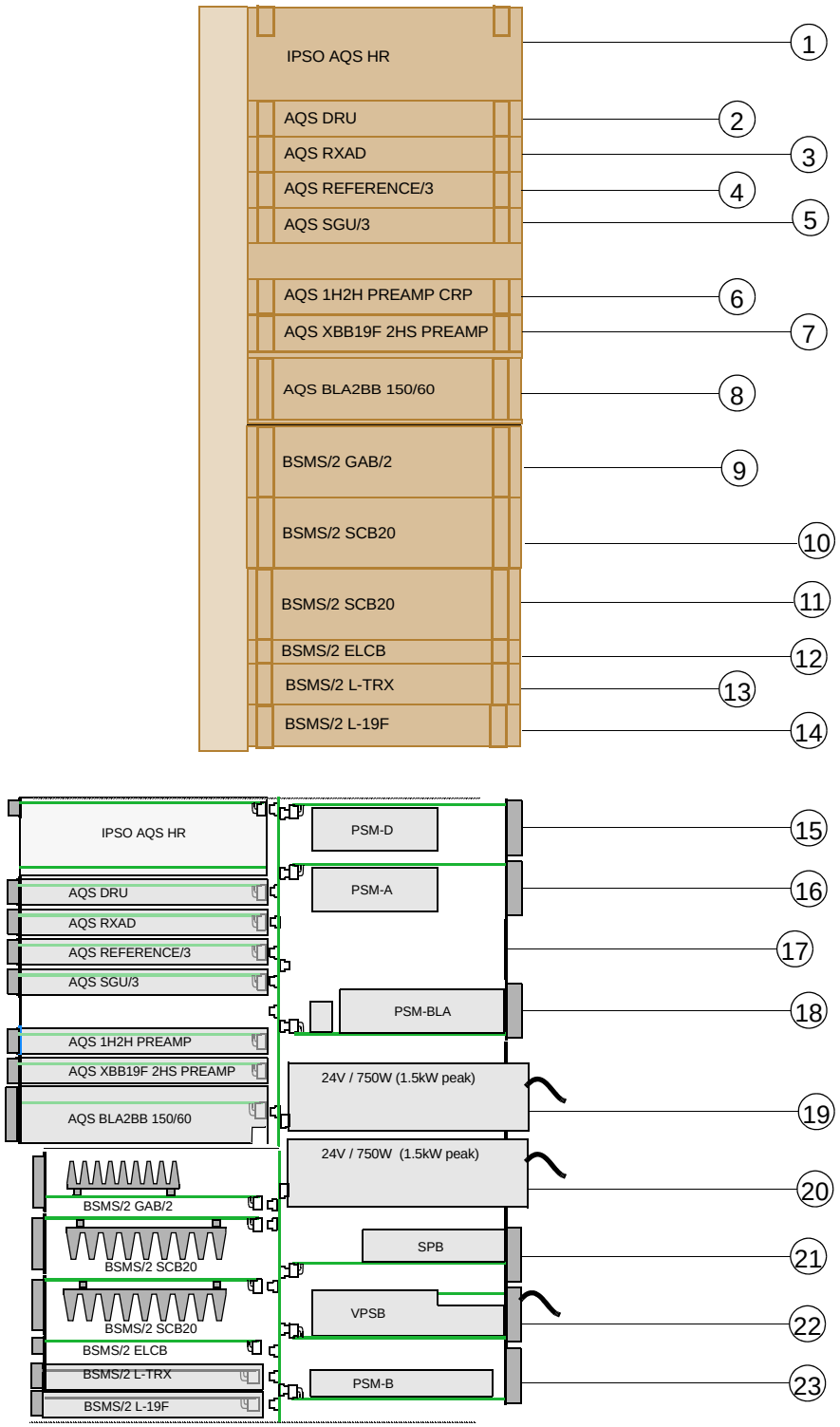


Figure 7.4 Board location Nanobay V3 2 Channel and AQS Preamplifier

7.4 Configuration of Typical Nanobay V3 with HPPR/2 (300-400MHz)

7.4.1 Bill of Material

Standard Units:

Pos.	Part Number	Description
1	H9984	IPSO AQS HR UNIT
2	Z100977	AQS DRU ECL ≥ 07
3	Z130588	AQS RECEIVER BOARD RXAD/2 600
4	Z116985	AQS REFERENCE BOARD/3
5	Z117129	AQS SGU/3 600
6	Z12489 *Z117129*	AQR FRONTPLATTE BLIND 6TE *AQS SGU/3 600 (3 Channel Variant)*
7	Z12170 *W1345052*	BSMS FRONTPLATE BLIND 12TE *AQS BLAX300 6-243MHZ (3 Channel Variant)*
8	W1345049	AQS BLA2BB 20-400MHZ
9	Z104844	BSMS/2 GAB/2 GRADIENT AMPLIFIER BD
10	Z12170 *Z102930*	BSMS FRONTPLATE BLIND 12TE *BSMS/2 SCB20 SHIM CURRENT BOARD (optional)*
11	Z102930	BSMS/2 SCB20 SHIM CURRENT BOARD
12	Z100818	BSMS/2 ELCB EXTENDED LOCK CTRL BOARD
13	See table "System frequency dependent units"	
14		
15	Z121625	AQS PSM-D POWER SUPPLY MODULE
16	Z121623	AQS PSM-A POWER SUPPLY MODULE
17	Z12170 *W1345050*	BSMS FRONTPLATE BLIND 12TE *AQS POWER SUPPLY BLA 28V 20A (3-Ch. Variant)*
18	Z128045 *W1345050*	AQS INES PSM-BLA POWER SUPPLY *AQS POWER SUPPLY BLA 28V 20A (optional)*
19	Z131927	INES3 PSM-24V 750W POWER_SUPPLY UNIT
20	Z131927	INES3 PSM-24V 750W POWER_SUPPLY UNIT
21	Z115191	BSMS/2 SPB SENSOR & PNEUMATIC
22	Z115193	BSMS/2 VPSB
23	Z128071	INES/3 PSM-B POWER SUPPLY

Table 7.3 Bill of material for a Nanobay V3 with HPPR/2

Frequency Dependent Units

Pos.	Part Number	Description
200 MHz Systems		
13	Z109886	BSMS/2 LOCK TRANSCEIVER 200 (L-TRX 200)
14	Z12489	AQR FRONTPLATTE BLIND 6TE
250 MHz Systems		
13	Z123938	BSMS/2 LOCK TRANSCEIVER 250 (L-TRX 250)
14	Z12489 *Z120014*	AQR FRONTPLATTE BLIND 6TE *BSMS/2 19F LOCK TRANSCEIVER 300-1000*
300 MHz Systems		
13	Z109887	BSMS/2 LOCK TRANSCEIVER 300 (L-TRX 300)
14	Z12489 *Z120014*	AQR FRONTPLATTE BLIND 6TE *BSMS/2 19F LOCK TRANSCEIVER 300-1000*
400 MHz Systems		
13	Z109888	BSMS/2 LOCK TRANSCEIVER 400 (L-TRX 400)
14	Z12489 *Z120014*	AQR FRONTPLATTE BLIND 6TE *BSMS/2 19F LOCK TRANSCEIVER 300-1000*

Table 7.4 System frequency dependent units

7.4.2 Board Location

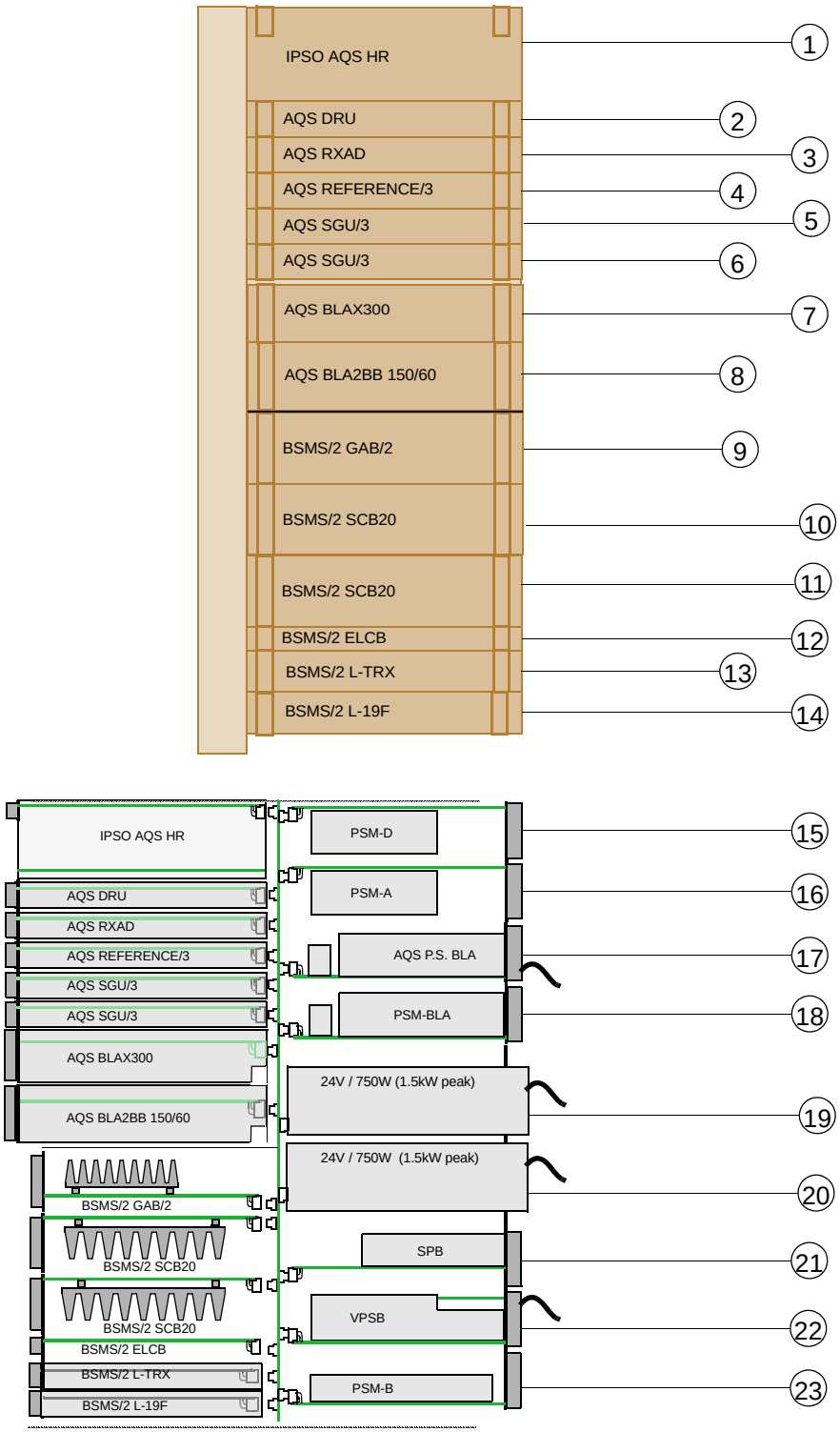


Figure 7.5 Board location Nanobay V3 with HPPR/2

7.5 AC Wiring

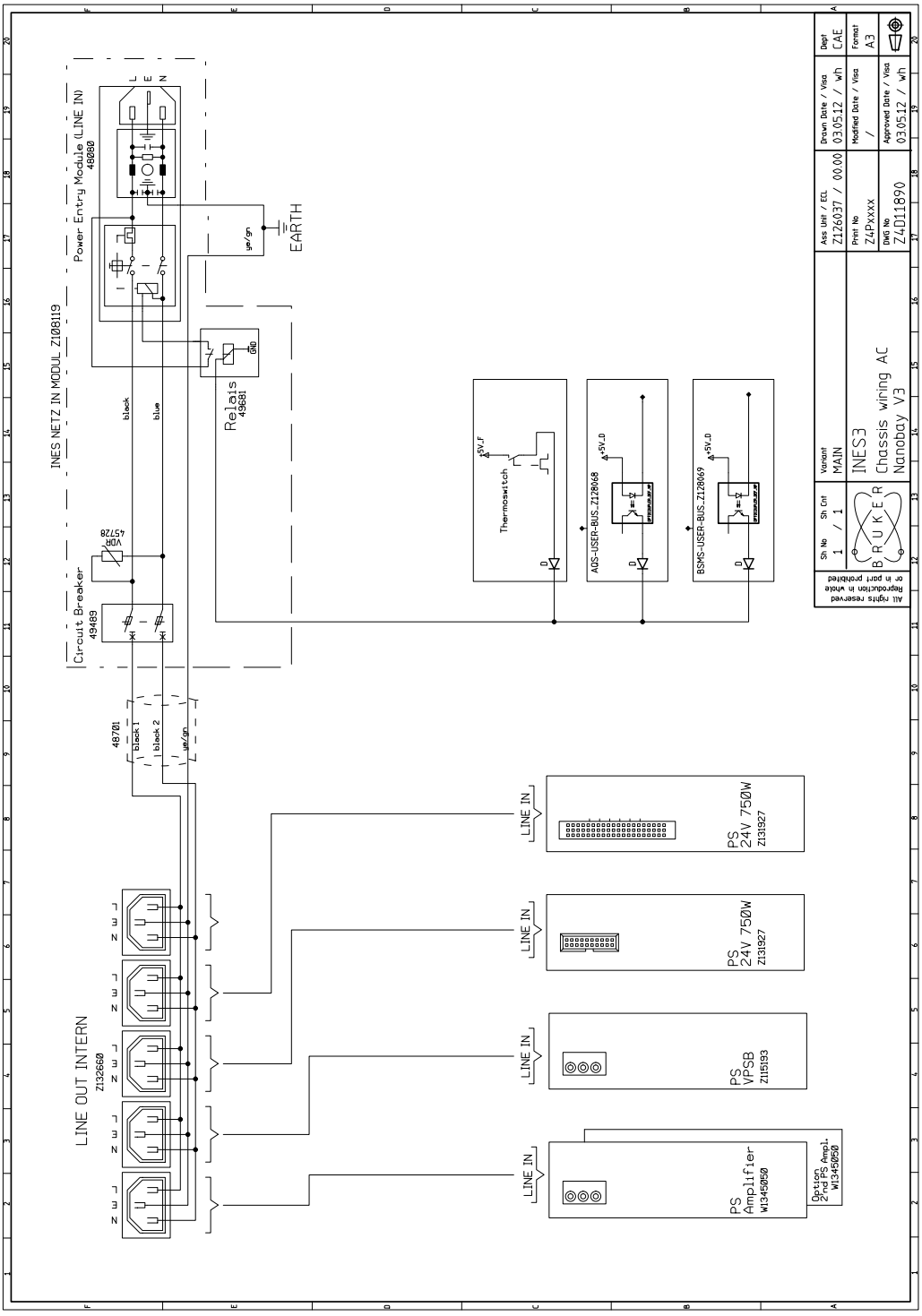


Figure 7.6 Nanobay V3 internal AC wiring, overview

The diagram above shows the AC wiring inside the Nanobay console.

- The mains power is connected to the entry module with power switch (automatical shut down when there is no input voltage), including filters.
- A circuit breaker provides fast overcurrent shut down (< 8 ms)
- A safety relay switches off the console when the hot spot temperature exceeds a specific limit.
- All AC power supplies (INES/3 PSM24V 750W, BSMS/2 VPSB) are connected to the internal line connectors, which are all protected by the mechanisms above mentioned.

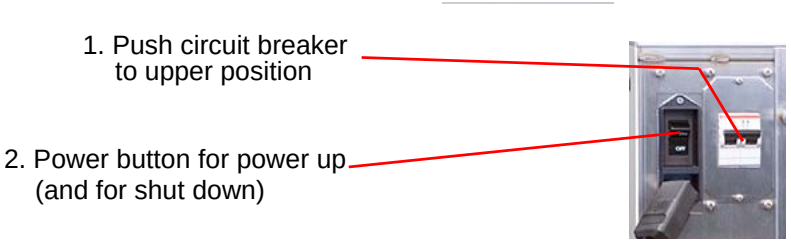


Figure 7.7 Mains power connector, circuit breaker and power switch

In case of over current the circuit breaker shuts down the mains power. It is then in the lower position and needs to be pushed to the upper position again before the Nanobay console can be switched on.

The Nanobay V3 does no longer have a mains selector. The internal power supplies have an input voltage range from 200-230VAC (±10% according to IEC/EN 61010-1)

7.6 DC Wiring

The Nanobay V3 has a novel DC wiring architecture. High efficient AC/DC and DC/DC converter are used. As backbone infrastructure +/- 24V are used for all power devices (Gradient and RF power amplifier, Shim current sources, pneumatics).

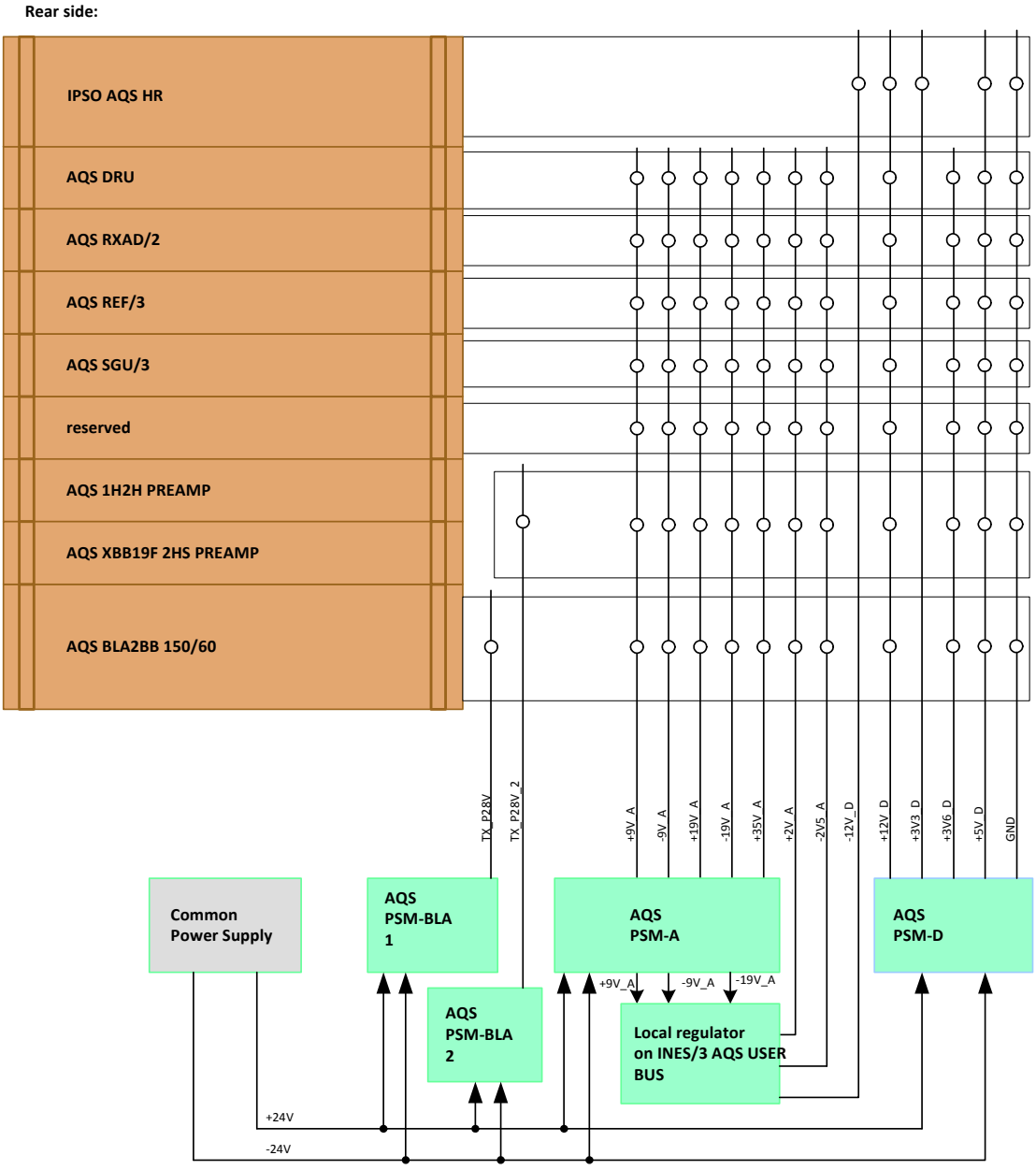


Figure 7.8 DC wiring of the AQS section (typical **2 Channel** System)

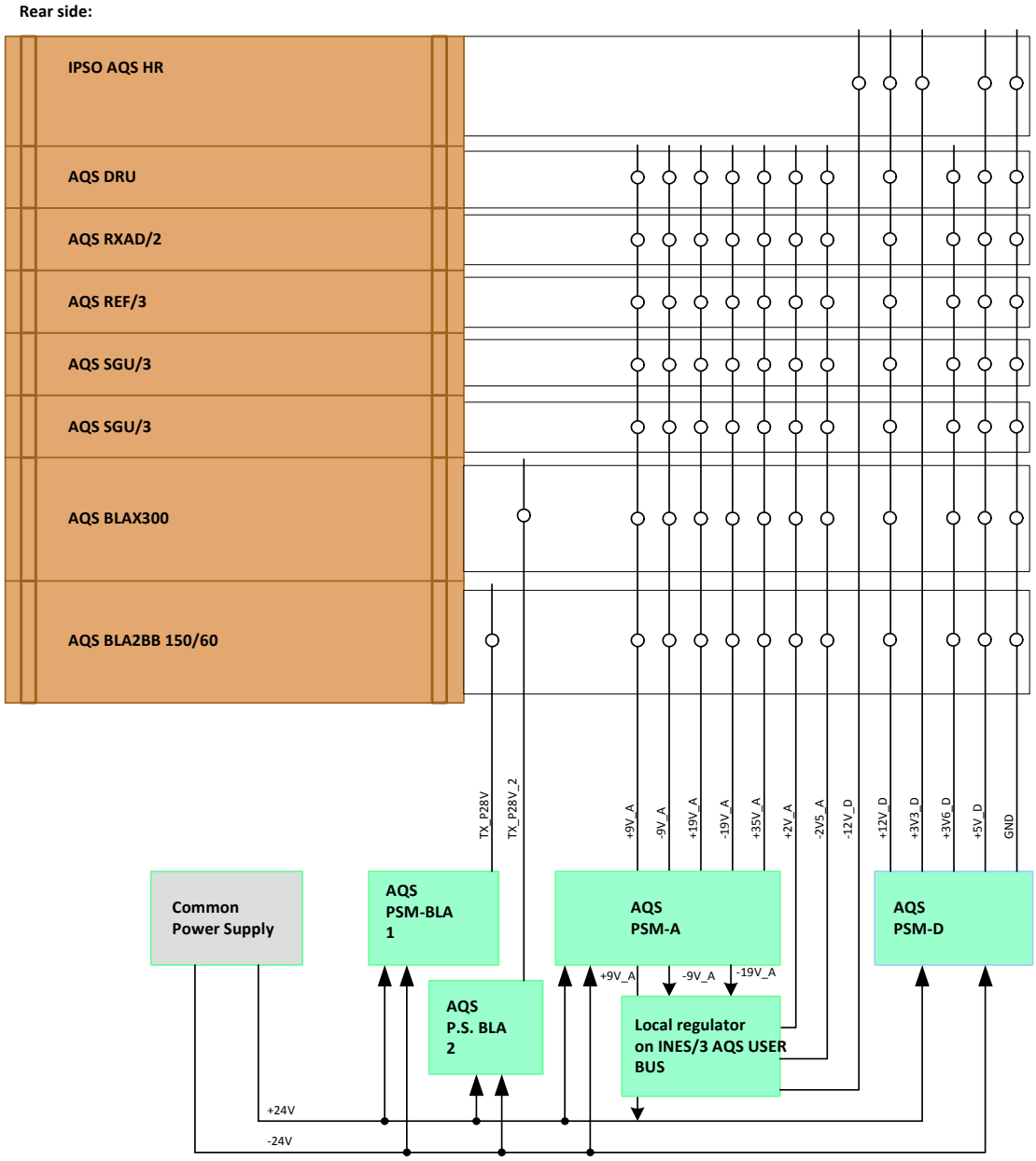


Figure 7.9 DC wiring of the AQS section (typical system with **HPPR/2**)

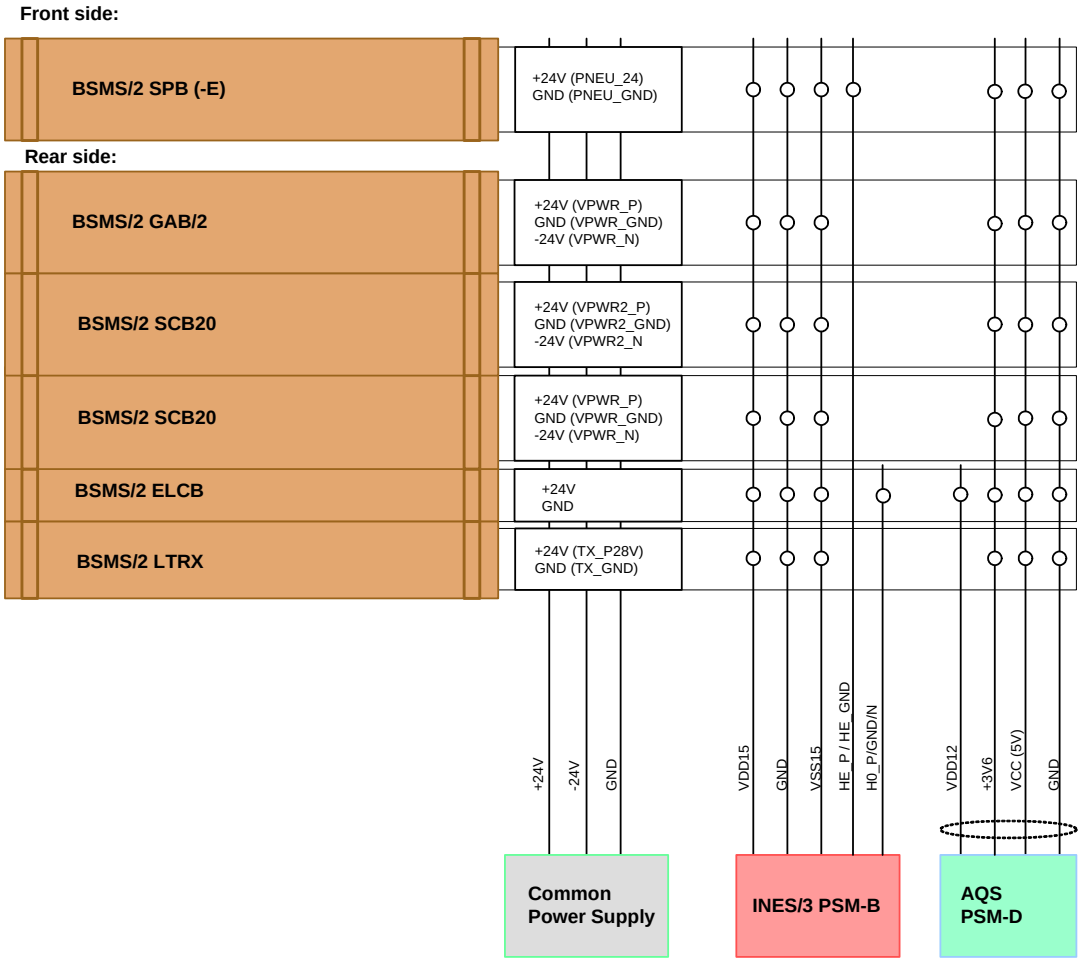


Figure 7.10 DC wiring of the BSMS section

Some of the unit connectors provide specific voltages (e. g. voltage for HE level measurement, etc.). These specific voltages are not available on the other connectors.

The BSMS section is mainly supplied by the INES/3 PSM-B.

7.7 Backplane Communication

The backplane communication is shown in the diagrams below. The AQS section is managed by the DRU, whereas the BSMS part is managed by the ELCB. Both, DRU and ELCB, are Ethernet devices and part of the Spectrometer network.

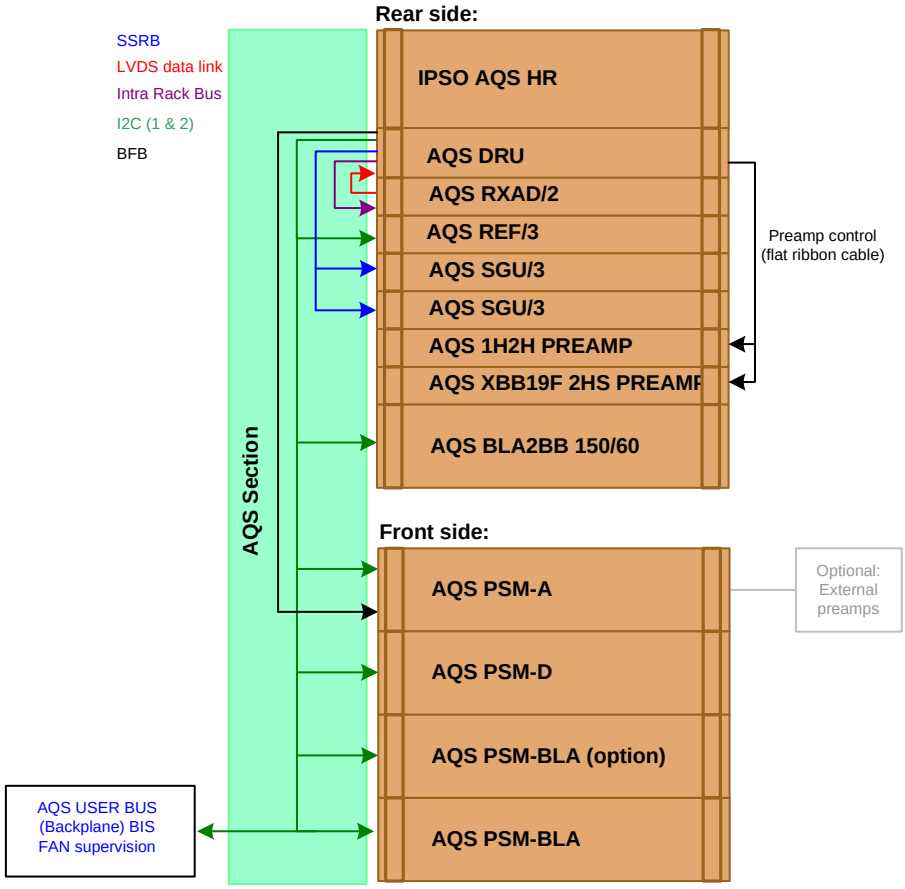


Figure 7.11 Backplane communication AQS part

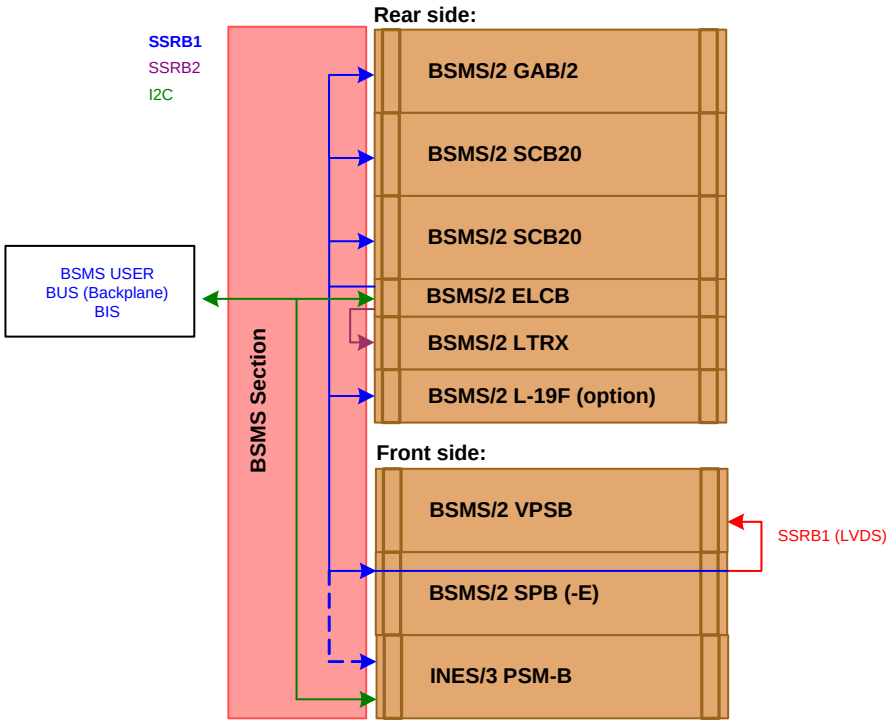


Figure 7.12 Backplane communication BSMS part

7.8 Pneumatics

The Nanobay requires dry compressed air or N2 gas (see in the site planning manual for exact specifications). The pressure reduction valve with a built in manometer is accessible from the rear side, without any opening of the console. Inside the cabinet, there is a filter providing clean gas to the pnematic module (for spin and lift), the variable temperature unit (gas flow for probe temperature control) and an optional QNP probe.

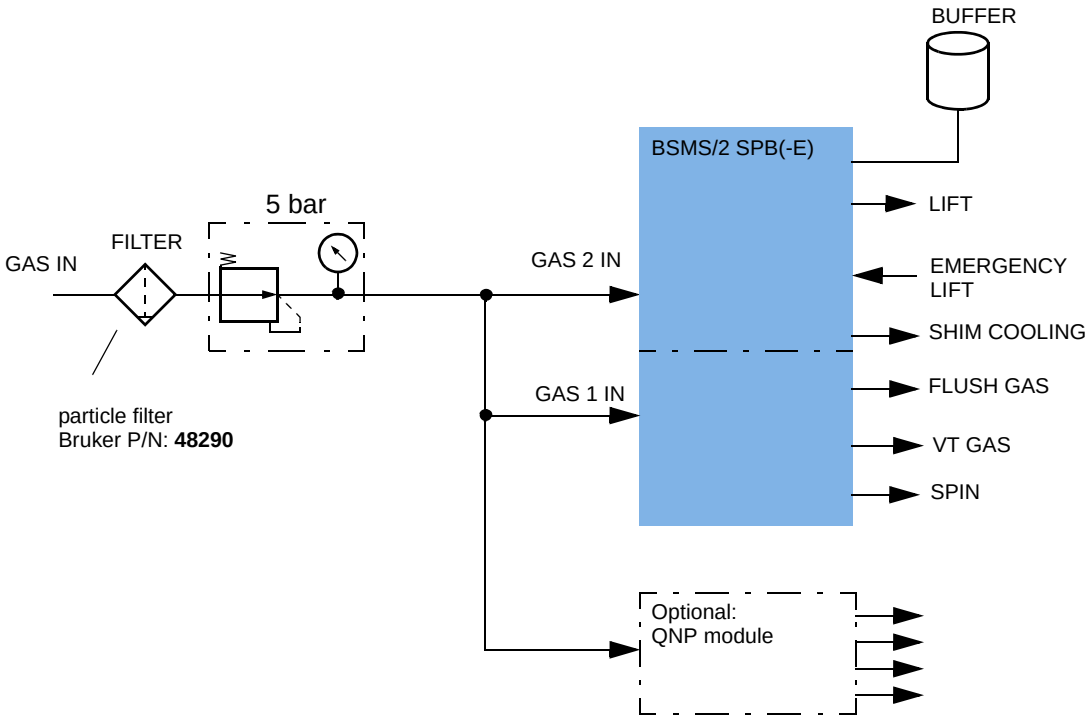


Figure 7.13 Pneumatics

The particle filter must be clean (visible through a transparent cover). It may be necessary to replace it (part number ***48290***), e. g. when it has been polluted. Accumulated liquids can be drained by a valve at the bottom of the filter (see also "Maintenance of the Particle Filter for Compressed Gas" on page 134).

7.9 Wiring and Cable Sets

Wiring and cable sets differ depending on preamplifier configuration (AQS preamps or HPPR/2).

Included Cable Sets for Variants with AQS Preamplifiers

- Z133001 AVANCE NANOBAY V3-I 300MHZ
- Z133003 AVANCE NANOBAY V3-I 400MHZ

	Bruker P/N	Description
Internal Wiring	H133013 Z119851	CABLE SET NANOBAY AVIII-V3 INTERNAL CABLE SET BSVT BASIC
External Wiring	H120707 Z119853	CABLE SET NANOBAY AVIII-BSVT EXTERNAL CABLE SET BSVT **4.5**M HEATER
Gradient	H14036	CABLE SET GRASP NANOBAY
Shim	Z108435	CABLE RD **4.5**M M-F 1:1 SHIMCOIL NB

Table 7.5 Included cable sets for variants with AQS Preamplifiers

Included Cable Sets for Variants with HPPR/2

- Z132999 AVANCE NANOBAY V3-E 200MHZ
- Z133000 AVANCE NANOBAY V3-E 250MHZ
- Z133002 AVANCE NANOBAY V3-E 300MHZ
- Z133004 AVANCE NANOBAY V3-E 400MHZ
- Z133253 AVANCE NANOBAY V3-E 3CH 300MHZ
- Z133254 AVANCE NANOBAY V3-E 3CH 400MHZ

	Bruker P/N	Description
Internal Wiring	H134107 Z119851	CABLE SET NANOBAY AVIII-V3 HPPR/2 INTERN CABLE SET BSVT BASIC
External Wiring	H134108 Z119852	CABLE SET NANOBAY AVIII-V3 HPPR/2 EXTERN CABLE SET BSVT **9**M HEATER
Gradient	H14036	CABLE SET GRASP NANOBAY
3rd channel only	H14030 Z2739 Z12285	CABLE SET AQS-E CHANNEL UPGRADE ONEBAY CABLE COAX SHF393 8500 N/N,G/W CABLE COAX RG214 1500 N/N

Table 7.6 Included cable sets for variants with HPPR/2

7.9.1 Configurations with AQS Preamplifiers

7.9.1.1 Internal Wiring

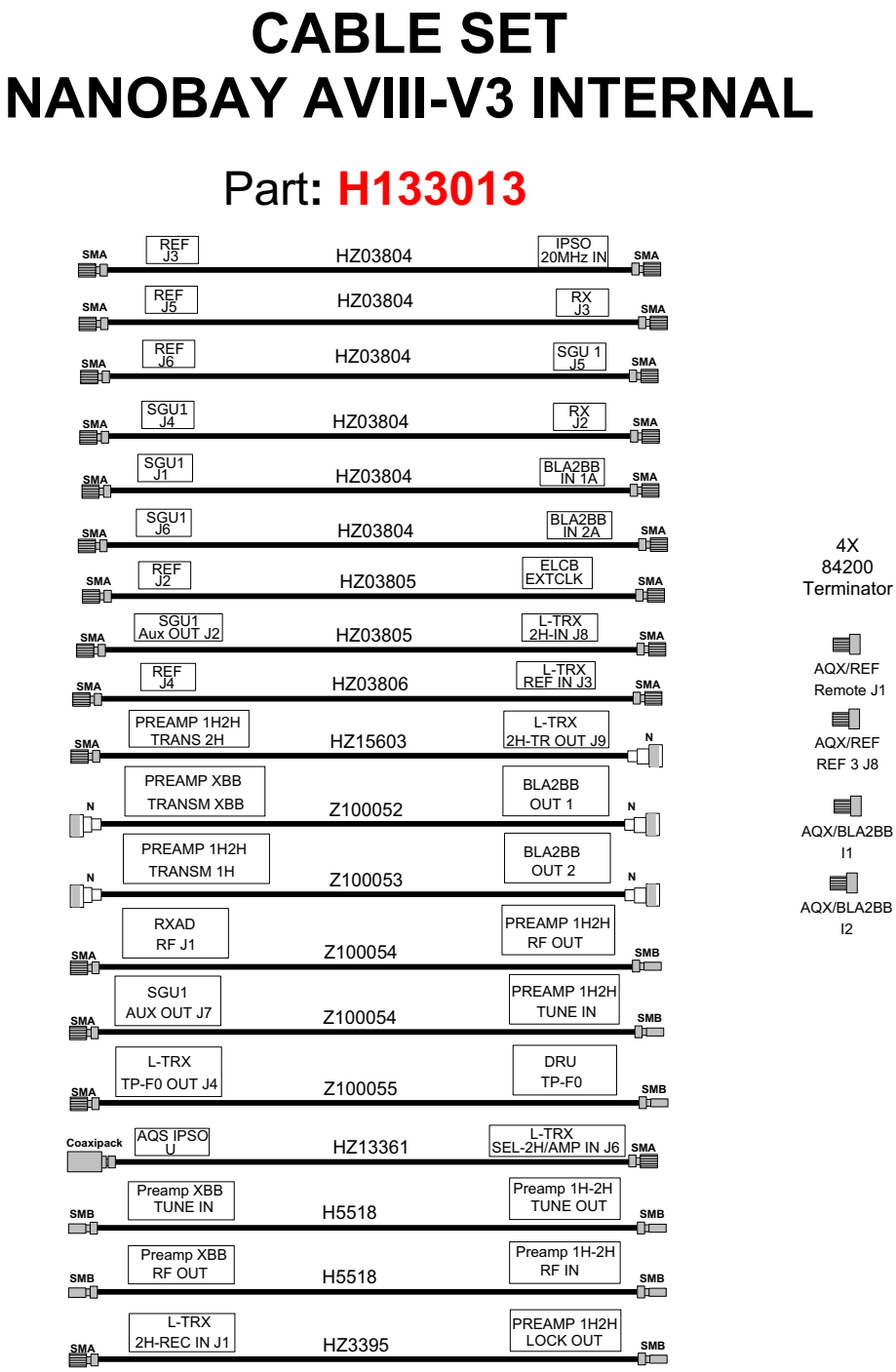


Figure 7.14 Cable set H133013 for internal wiring (page 1 of 2)

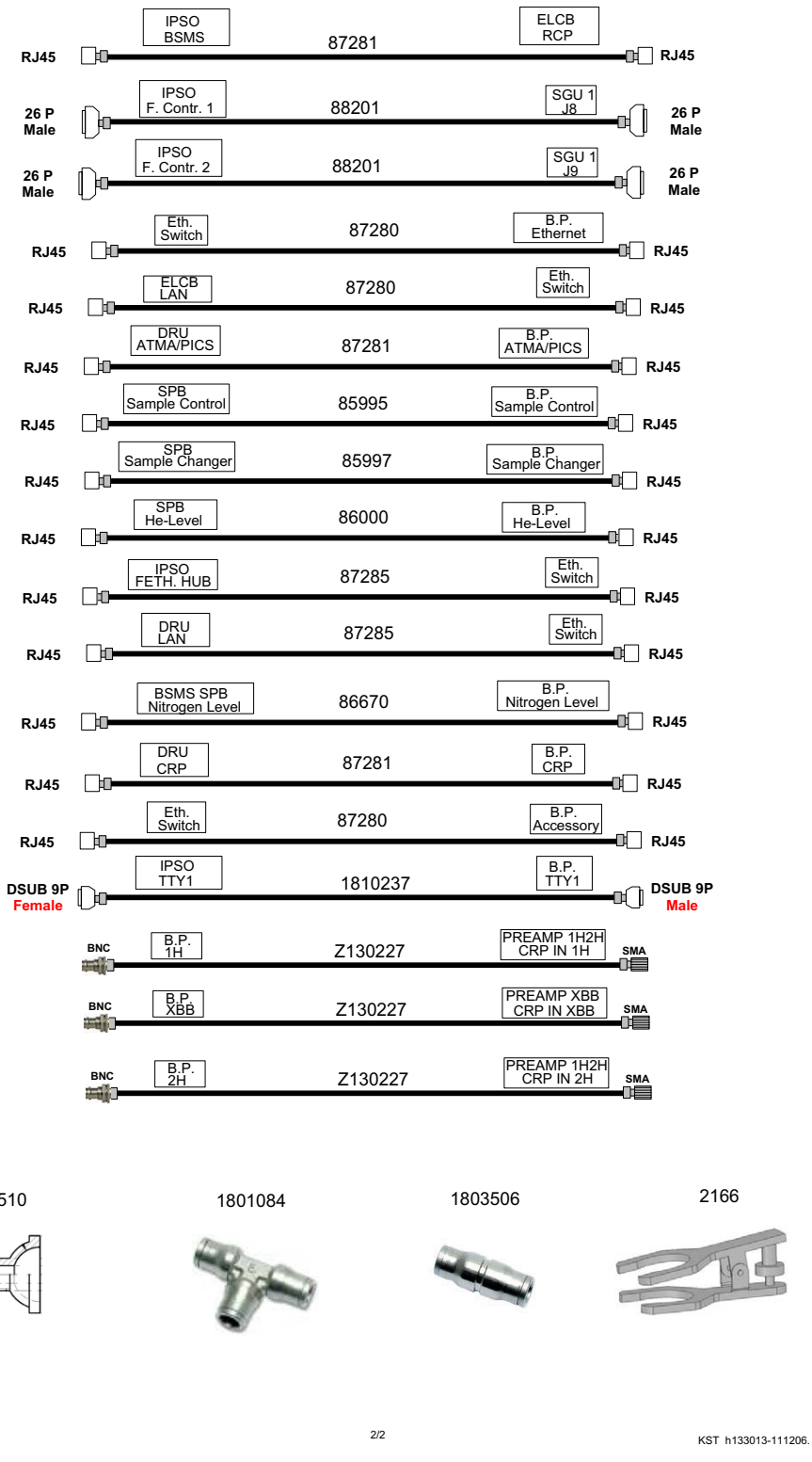


Figure 7.15 Cable set H133013 for internal wiring (page 2 of 2)

Avance III NanoBay V3 with AQS Preamplier

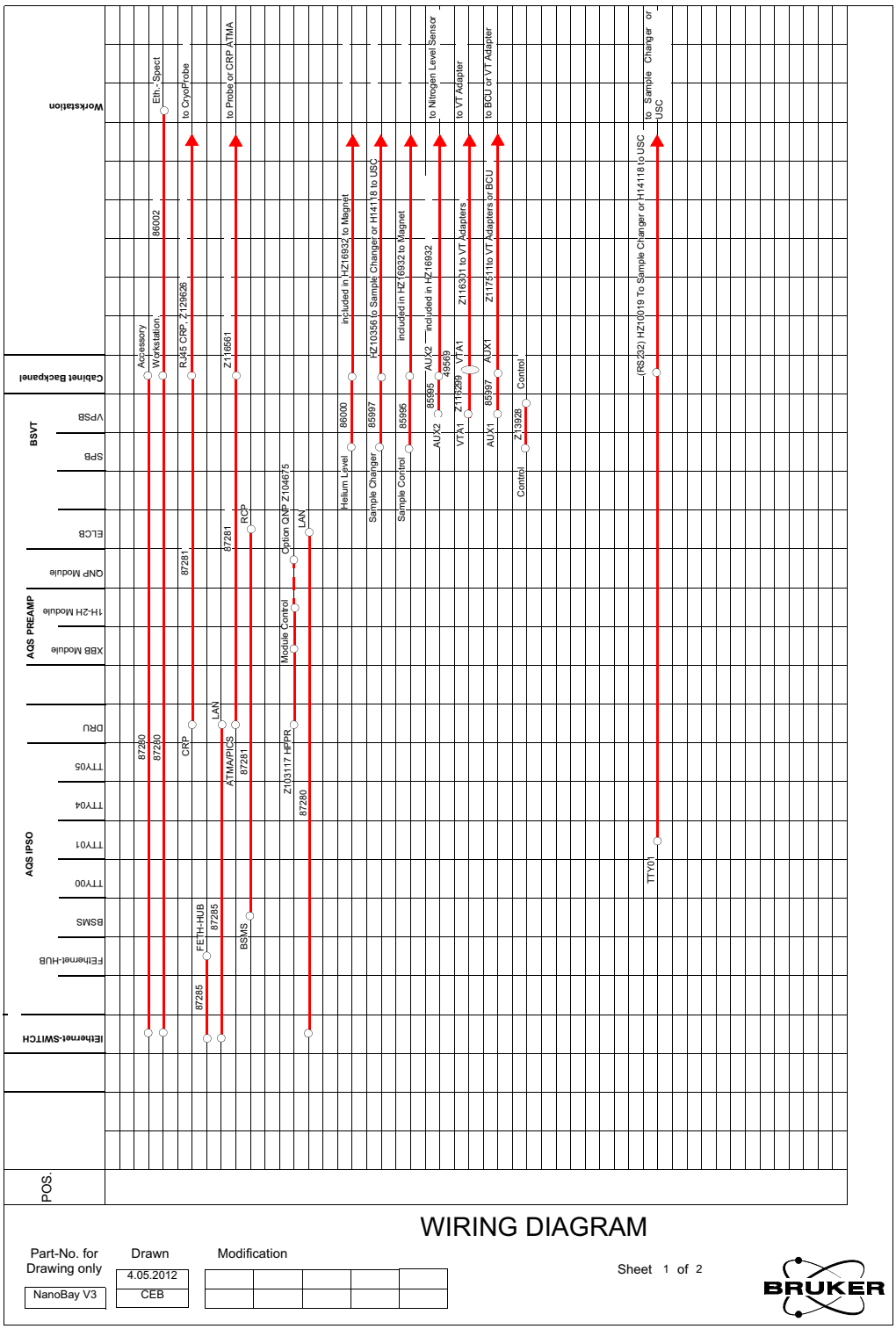


Figure 7.16 Wiring of a Nanobay V3 console (page 1)

Avance III NanoBay V3 with AQS Preamplier

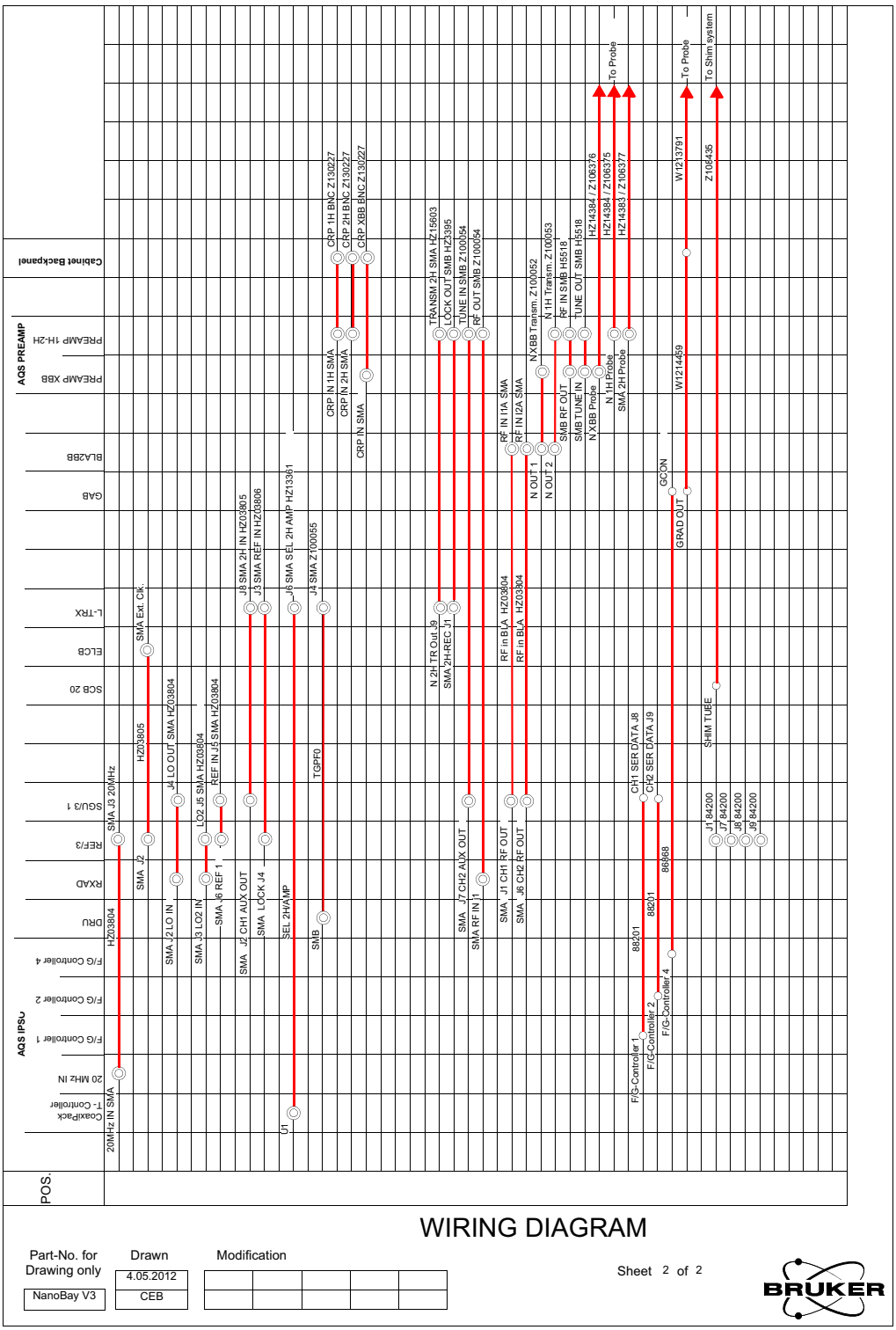


Figure 7.17 Wiring of a Nanobay V3 console (page 2)

7.9.1.2 External Wiring, Cable Sets and Connections

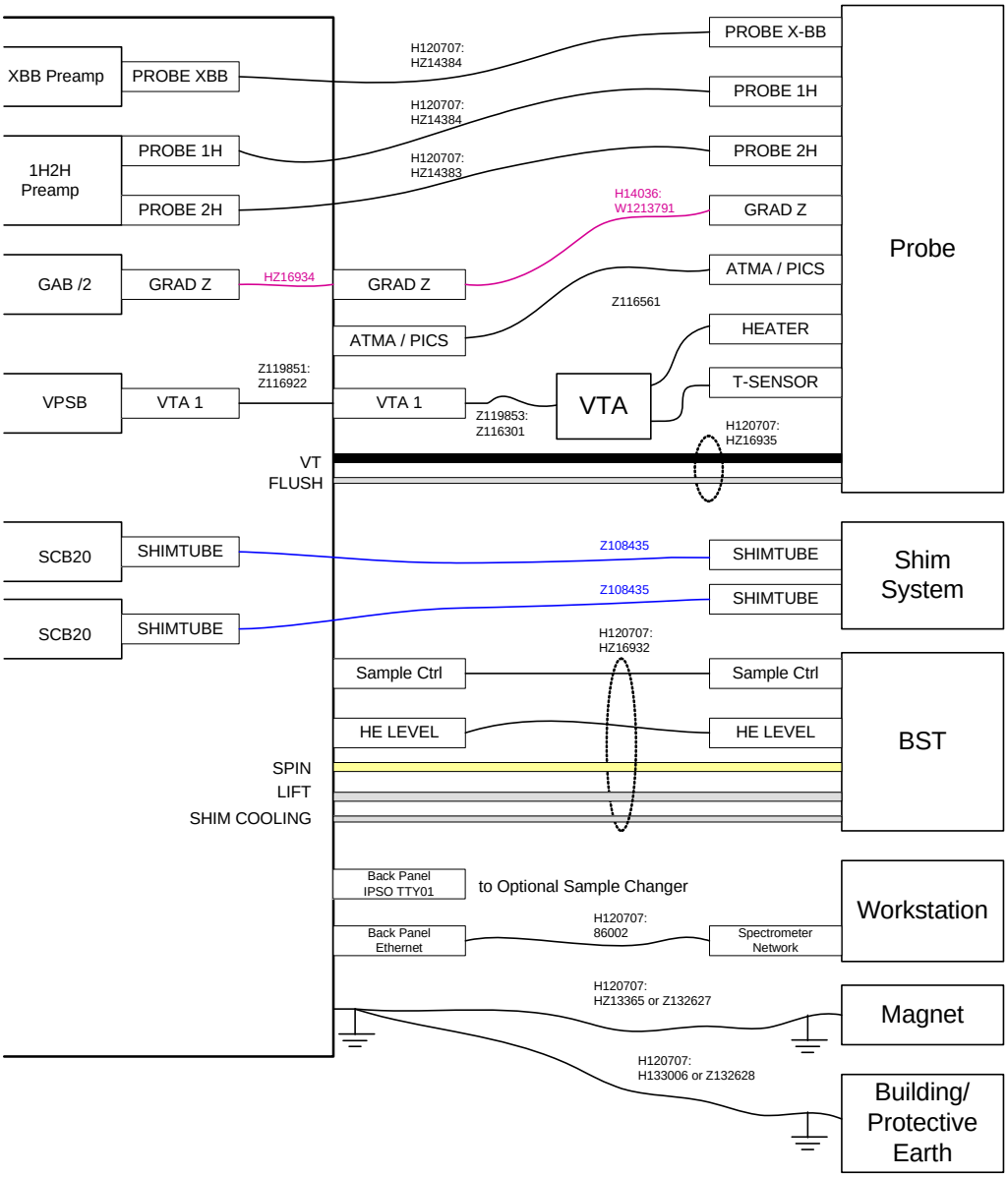


Figure 7.18 External wiring of a configuration with AQS preamplifier

CABLE SET
NANOBAY AVIII-BSVT EXTERNAL

Part: H120707

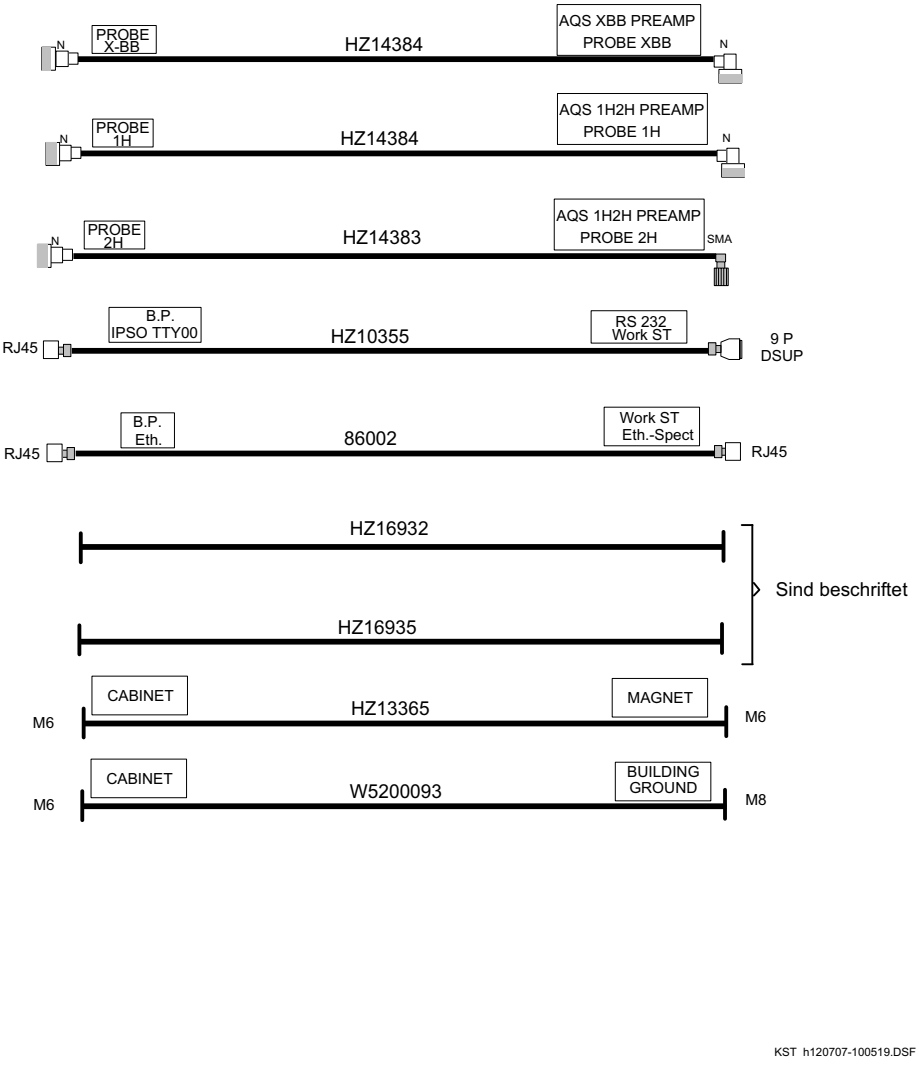


Figure 7.19 Cable set external

7.9.2 Configurations with HPPR2

7.9.2.1 Internal Wiring

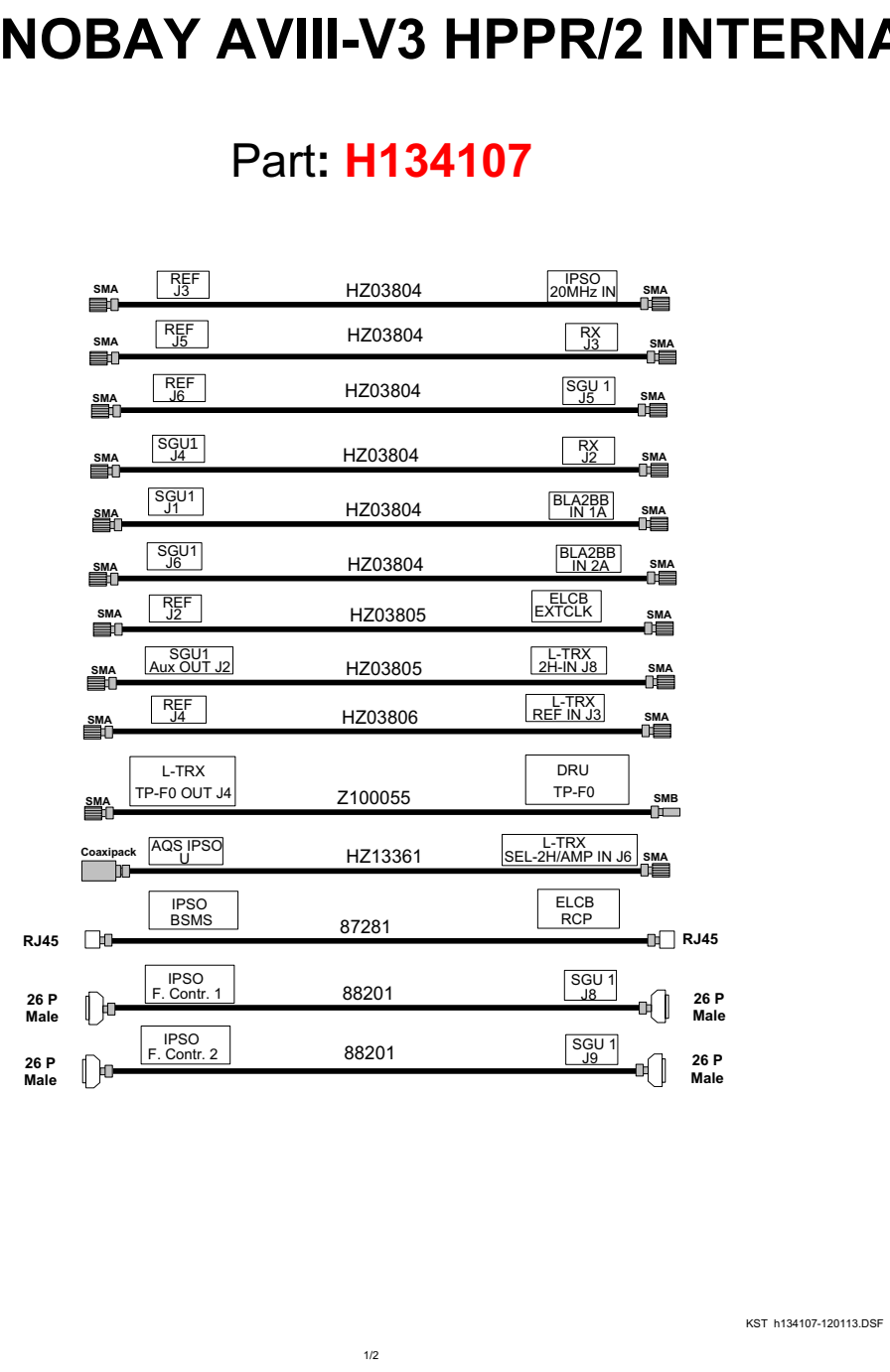


Figure 7.20 Cable set for internal wiring with HPPR/2 (page 1 of 2)

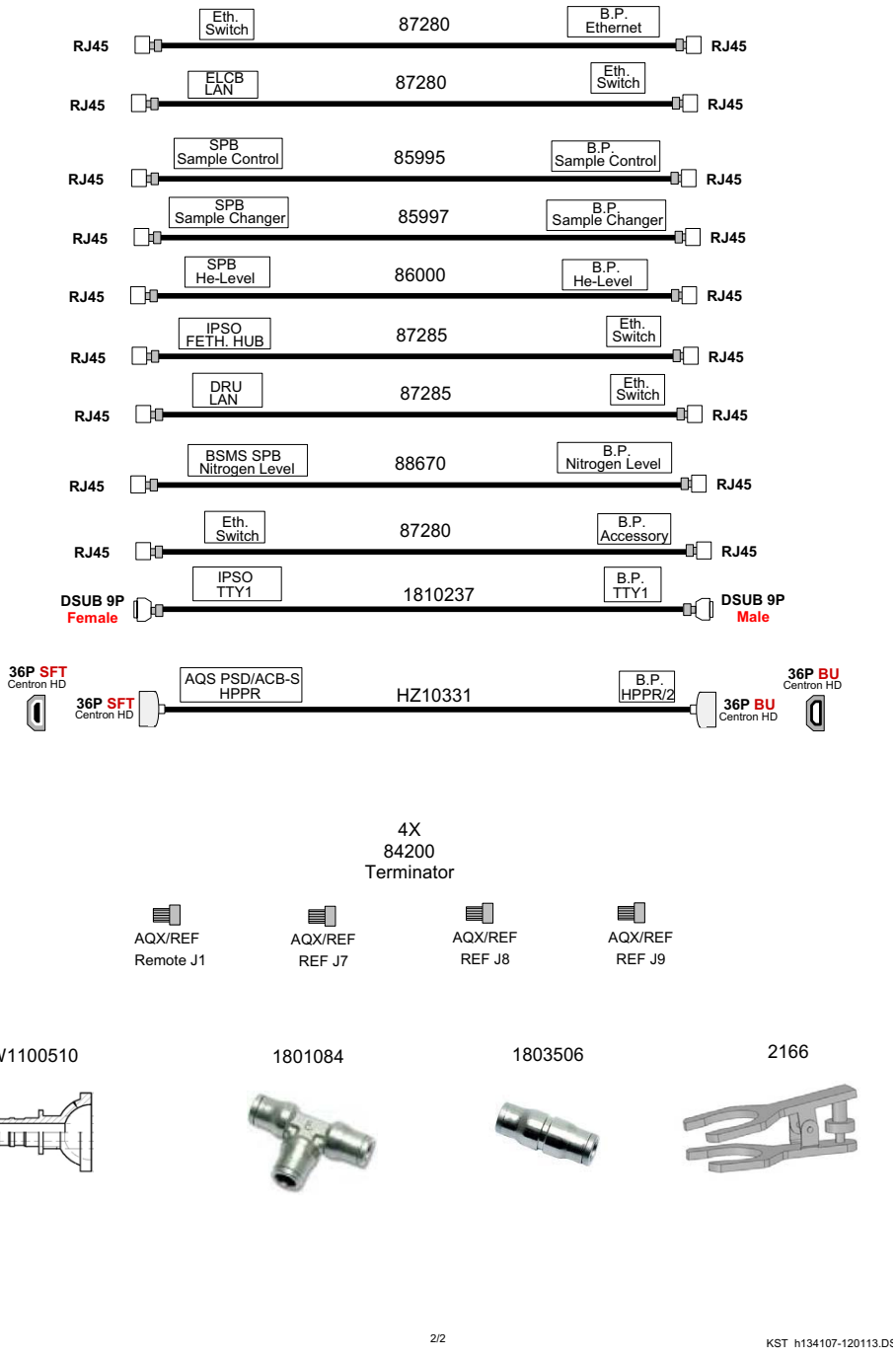


Figure 7.21 Cable set for internal wiring with HPPR/2 (page 2 of 2)

Avance III NanoBay V3 with HPPR/2

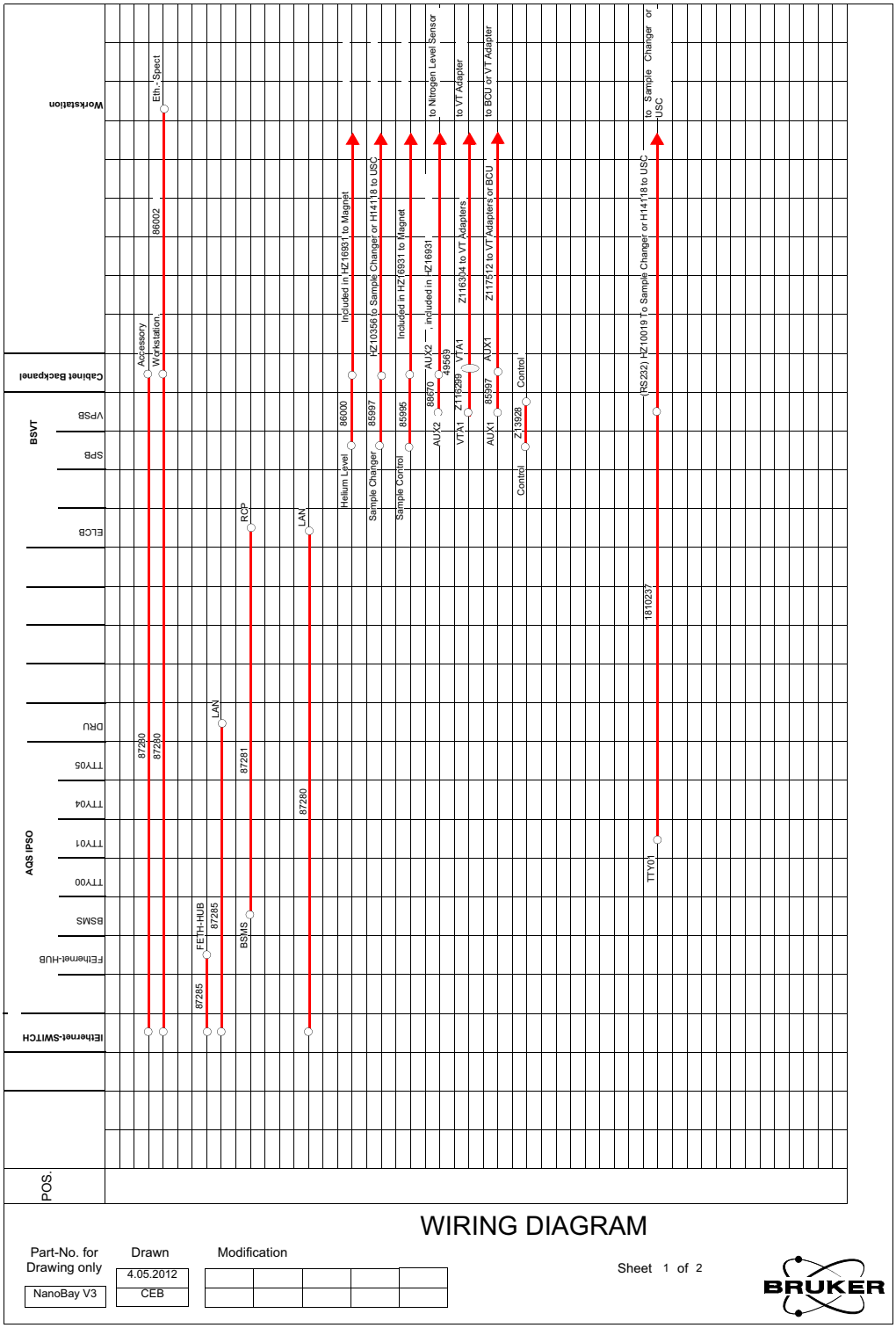


Figure 7.22 Wiring diagram of a Nanobay V3 console with HPPR/2 (page 1)

Avance III NanoBay V3 with HPPR/2

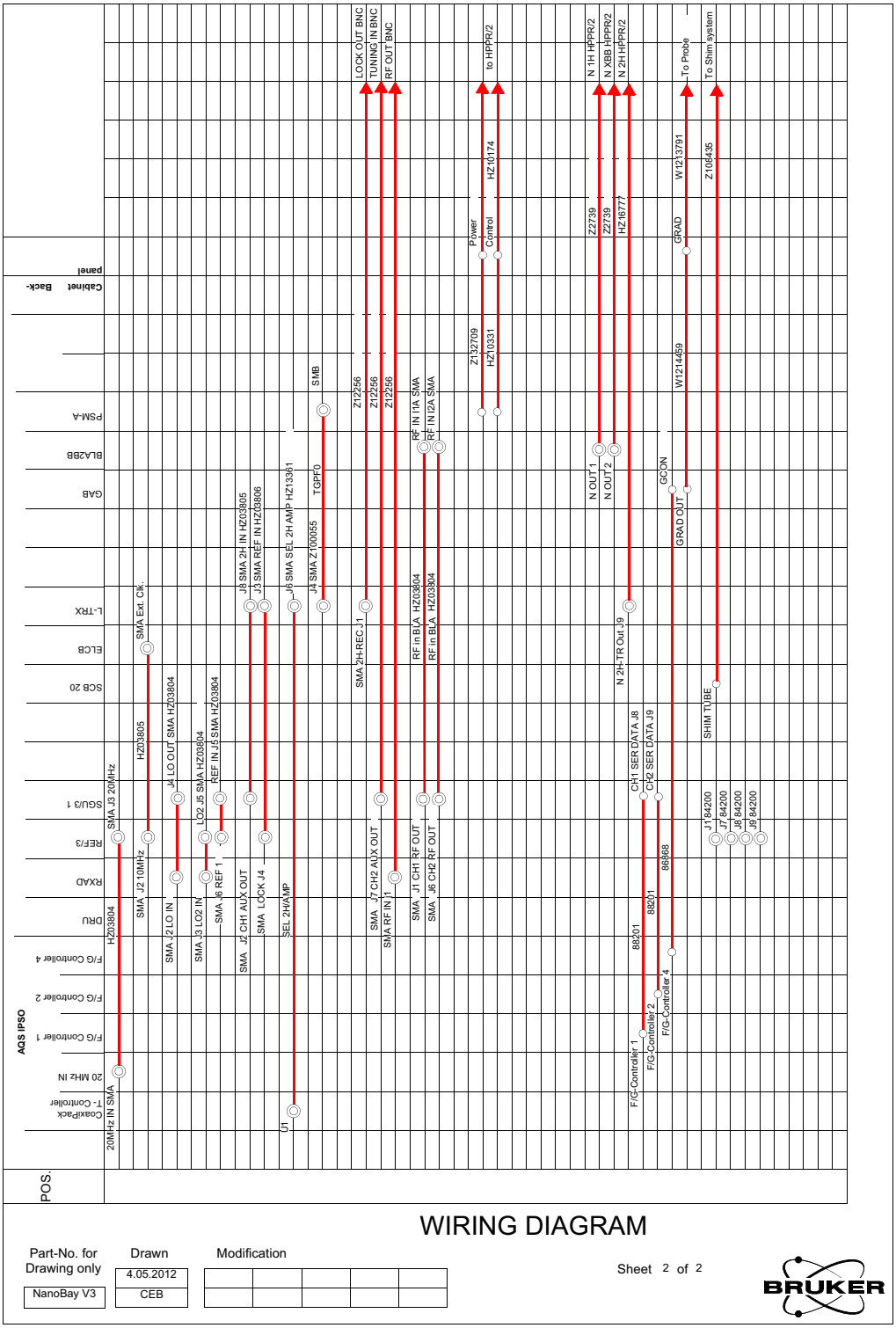


Figure 7.23 Wiring diagram of a Nanobay V3 console with HPPR/2 (page 2)

7.9.2.2 External Wiring, Cable Sets and Connections

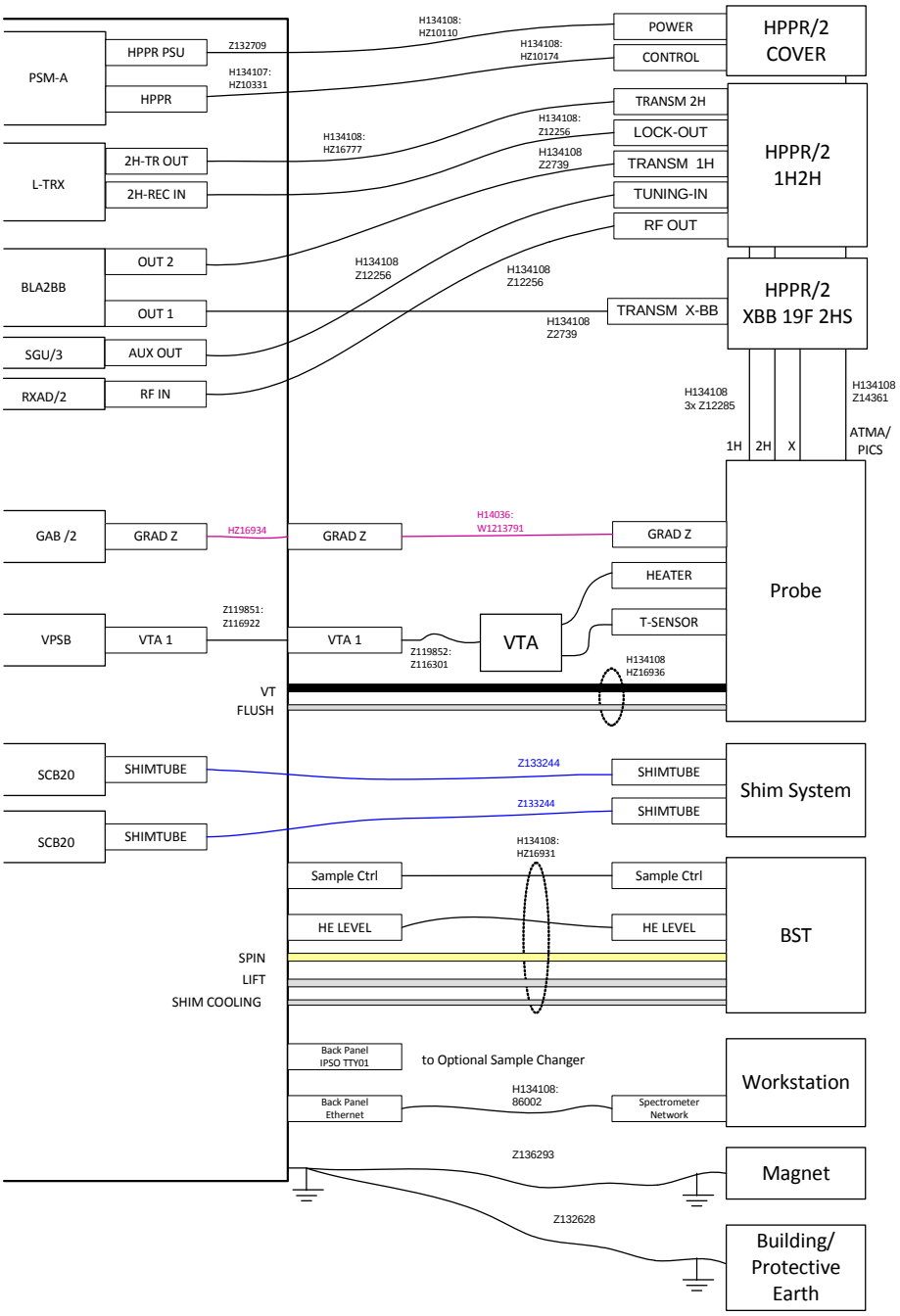


Figure 7.24 External wiring of a configuration with AQS preamplifier

Part: H134108

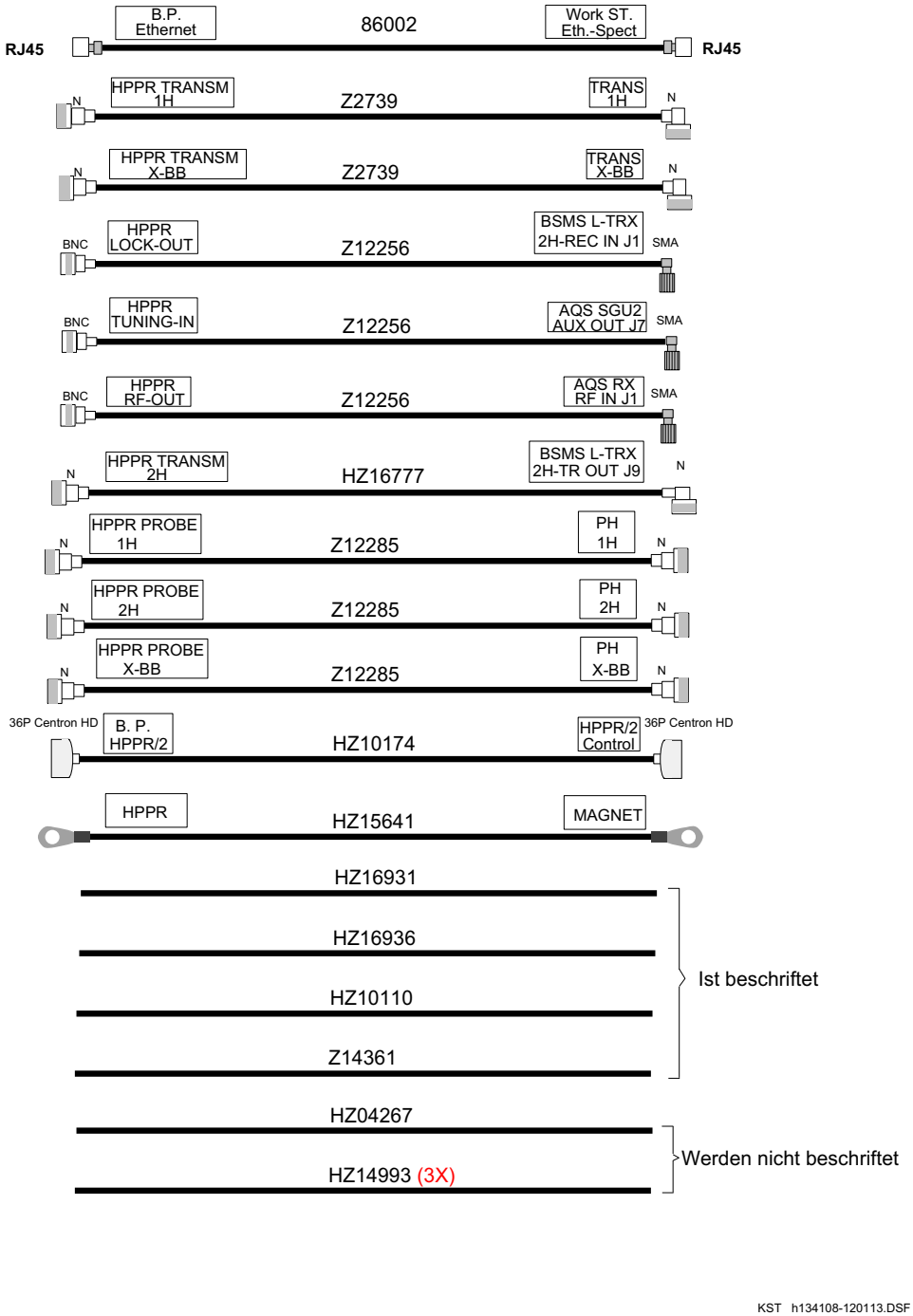


Figure 7.25 Cable set external

7.10 Nanobay Specific Power Supplies

In this chapter there is a more detailed description of the Nanobay specific power supplies INES/3 PSM24V, INES/3 PSM-B and AQS PSM-BLA. PSM-A and PSM-D are described in the AQS/3 Technical Manual.

For the low skew clock network, there are two additional supply voltages required (P2V and N2V5), which are provided by linear power regulators on the Nanobay backplane.

7.10.1 Power Supply INES/3 PSM24V 750W

The main supply of the Nanobay V3 console is provided by two of these power supply units. They are wired in such a way that +/-24V can be delivered to subunits and subsequent low voltage power supplies. AC input is wide range and replaces the transformer with mains selector found in former Nanobay consoles.

	Spezification	Value	Unit
AC Input	Voltage	200-240 (180-264)	V AC
	Frequency	50/60 (47 - 63)	Hz
	Efficiency	88typ (Io=100%)	%
DC Output	Voltage	24 +/-0.5V	V DC
	Current (Io)	31.5 (Peak 63)	A DC
	Ripple	<40	mVp-p
Fuses		internal	
Safety	UL60950-1,C-UL(CSA60950-1),EN60950-1, EN60065, EN50178 Complies with DEN-AN and IEC60950-1 (At only AC input)		
Others	Operating indication	green LED	

Table 7.7 PSM24V 750W Electrical Characteristics

Note: Power-up and operating monitoring is realized on the INES/3 AQS USER BUS. In case of a failure the Nanobay console is switched off by a circuit breaker.

7.10.2 Power Supply INES/3 PSM-B

This power supply unit provides voltages for the BSMS part of the Nanobay. Its input is +/-24V.

The unit provides a BIS and board information is accessible by the BSMS Service Web.

Output voltages are enabled by a signal from the backplane as soon as a stable input voltage is available. A POWER_GOOD signal is provided for diagnostics and is accessible by the ELCB Service Web.

Input is protected by 2 fuses 8AT (Bruker P/N 1801423). All outputs are short-circuit-proof.

Output Voltage	Refererence	Voltage @rated load [V]	Current @rated load [A]	Ripple [mVeff]
VDD15 (+15V)	GND	+15V +/-0.2V	1.0	< 1mV
VSS15 (-15V)	GND	-15V +/-0.2V	1.0	< 1mV
H0_P	H0_GND	+29.75 +/-0.25V	0.3	< 1mV
H0_N	H0_GND	-29.75 +/-0.25V	0.3	< 1mV
HE_P	HE_GND	30V +0.5 / -0.6V	0.35	< 1mV
VDD12V[a] (+12V)	GND	12V +/-0.5V	10mA	N/A

Table 7.8 PSM-B Electrical Characteristics

a. PSM-B ECL01 and newer, voltage provided for ELCB with ECL < 07

LED	Description
-24V	-24V from INES/3 PSM24V 750W is OK (when green LED is ON)
+24V	+24V from INES/3 PSM24V 750W is OK (when green LED is ON)
POWER OUT	all output voltages OK (when green LED is ON)

Table 7.9 PSM-B Electrical Characteristics

7.10.3 AQS POWER SUPPLY BLA 28V 20A & AQS PSM-BLA

This power supply unit provides the voltage for the AQS BLA2BB of the Nanobay.

Two versions are available :

- W1345050 AQS POWER SUPPLY BLA 28V 20A
- Z128045 AQS INES PSM-BLA POWER SUPPLY

W1345050 has a separate mains input and in Nanobay V3 configuration it is mainly used for the optional RF Power Amplifier BLAX300. There is no separate enable signal or BIS available.

Z128045 is a newer design and its input is +48V DC. A high efficient DC/DC converter with output filter feeds the +28V for Bruker RF power amplifier AQS BLA2BB. This unit provides a BIS and board information is accessible by the DRU Service Web. Output

voltage is enabled by a signal from the backplane as soon as a stable input voltage is available. A POWER_GOOD signal is provided for diagnostics and is accessible by the DRU Service Web. Input is protected by 2 fuses 8AT (Bruker P/N 1801423). The output is short-circuit-proof.

Output Voltage	Refererence	Voltage @rated load [V]	Max. Output Current [A]	Ripple [mVeff]
+28V	GND	28V +/-0.5V	20	< 2mV

Table 7.10 PSM-BLA Electrical Characteristics

The green LED on the front panel indicates proper operation.

7.10.4 Control Signals

The power supply for the Ethernet switch is provided from the backplane. In addition, there is a control line for switching off the console in case of a power supply fault or a software power off command. These two signals are connected to the backplane on the upper edge.

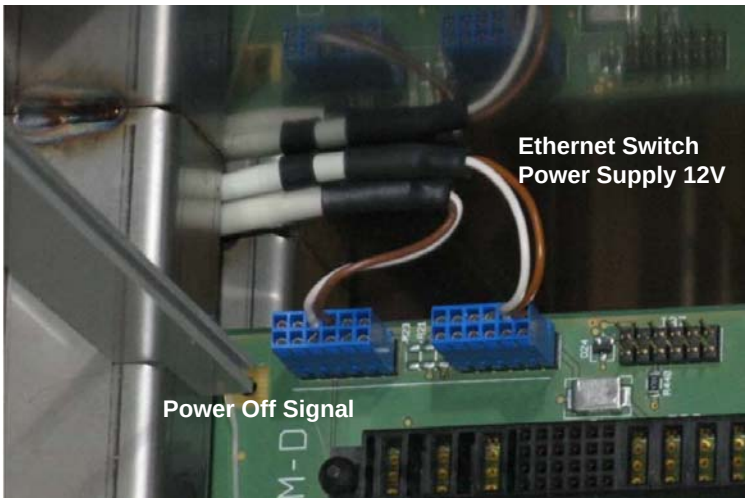


Figure 7.26 Control signal connectors (Z126037, V3 only)

Never disconnect these signals!

8 QNP Accessory

8.1 Introduction

Existing and new QNP probes are fully supported by all versions of Nanobay consoles.

Preamplifier System	QNP ACCESSORIES	QNP MODULE
AQS preamplifier	Z032617, ECL01	Z003550
HPPR/2		Z104452

Table 8.1 QNP Accessory part numbers

The function of Z003550 and Z104452 is identical.

i For detailed description of the function, topology, adressing etc. please refer to the HPPR/2 Technical Manual Z31559.

8.2 Installation (Systems with AQS Preamplifiers)

Installation of the QNP Module Z104452 is straightforward. Nevertheless, some safety precautions must be adhered to strictly.

1. **Switch off the Nanobay console and pull the power cord.**
2. Remove the back panel as described in chapter "Removing covering" on page 129 (Z1Z108356 „V1“and Z119572 „V2“) or "Removing Covering Panels" on page 135 (Z126037 „V3“).
3. Turn off the gas supply! **Before starting work on the pneumatics system, ensure that it has been completely depressurised.**
4. Remove the cover plate on the rear side of the Nanobay Console. Screws have to be reused for the mounting of the QNP module. **Be aware of the sharpness of edges** (to avoid cuts).
5. Mount the module
6. Replace the ribbon cable Z103117 by the longer cable Z104675 (included in Z104452) and reconnect it to all premaplifier modules and the QNP module.
7. Remove the blind plug on the output of the pressure regulator and connect the pneumatic hose from the QNP module. Pay attention to proper fitting of the pneumatic coupler.
8. Power-up the console and turn on the gas supply.
9. Restart Topspin and execure a ‚cf‘.

QNP Accessory

9 Transport, Packaging and Storage

9.1 Symbols on the Packaging

The following symbols are affixed to the packaging material. Always observe the symbols during transport and handling.

Top

The arrow tips on the sign mark the top of the package. They must always point upwards; otherwise the content may be damaged.

Fragile

Marks packages with fragile or sensitive contents.
Handle the package with care; do not allow the package to fall and do not allow it to be impacted.

Protect Against Moisture

Protect packages against moisture and keep dry.

Weight, Attached Load

Indicates the weight of packages.
Handle the marked package in accordance with its weight.

Permitted Stacking Load

Indicates packages which are partially stackable.
Do not exceed the maximum load-bearing capacity specified on the symbol in order to avoid damaging or destroying the content.

Component Sensitive to Electrostatic Charge

The packaging contains components which are sensitive to an electrostatic charge.
Only allow packaging to be opened by trained personnel.
Establish potential equalisation before opening.

9.2 Inspection at Delivery

Upon receipt, immediately inspect the delivery for completeness and transport damage.

Proceed as follows in the event of externally apparent transport damage:

- Do not accept the delivery, or only accept it subject to reservation.
- Note the extent of the damage on the transport documentation or the shipper's delivery note.
- Initiate complaint procedures.

i Issue a complaint in respect to each defect immediately following detection. Damage compensation claims can only be asserted within the applicable complaint deadlines.

9.3 Packaging

About Packaging

The individual packages are packaged in accordance with anticipated transport conditions. Only environmentally friendly materials have been used in the packaging.

The packaging is intended to protect the individual components from transport damage, corrosion and other damage prior to assembly. Therefore do not destroy the packaging and only remove it shortly before assembly.

Handling Packaging Materials

Dispose of packaging material in accordance with the relevant applicable legal requirements and local regulations.

9.4 Storage

Storage of the Packages

Store the packages under the following conditions:

- Do not store outdoors.
- Store in dry and dust-free conditions.
- Do not expose to aggressive media.
- Protect against direct sunlight.
- Avoid mechanical shocks.
- Storage temperature: 15 to 35 °C.
- Relative humidity: max. 60%.

If stored for longer than 3 months, regularly check the general condition of all parts and the packaging. If necessary, top-up or replace preservatives.

Transport, Packaging and Storage

10 Installation and Initial Commissioning

Installation, initial commissioning, retrofitting, repairs, adjustments or dismantling of the device must only be carried out by employees of the manufacturer or persons authorised by the manufacturer.

For installation of a Nanobay, the site planning manuals have to be considered.

⚠ WARNING

To minimize the shock hazard, the Nanobay chassis must be connected to protective earth (electrical ground).

Pour réduire le risque d'électrocution au minimum le châssis de Nanobay doit être relié à la terre protectrice (la terre électrique).

⚠ WARNING

Do only use power cables supplied or approved by BRUKER.

Utilisez seulement les câbles électriques fournis ou approuvés par BRUKER.

- Connect the Ethernet cable of the Spectrometer network to the Nanobay. It is recommended to use an intermediate Ethernet switch between workstation and console (see service information SI0346).
- Nanobay V2 require Topspin 3.0 and newer installed
- Nanobay V3 variants require Topspin 3.1 and newer installed
- Make sure that the external units (probe, shim system, BST, HE-level sensor, etc.) are connected correctly (see chapter „Wiring“).
- Connect the hose for compressed gas / air to the Nanobay.
- Verify, that the pressure reduction valve is set to about 5 bar and that there is actually the required pressure and flow available.

⚠ CAUTION

Nanobay V1 and V2 variants only

Before first power up, pay particularly attention to the correct setting of the mains selector, as described in chapter "Mains Selector Setting" on page 42

Avant la première mise sous tension, vérifiez la position correcte du sélecteur de tension, comme décrit dans le chapitre """Mains Selector Setting" on page 42

- Connect the Nanobay to the mains power supply, according to the instructions in the site planning manual. The electronics cabinet is equipped with a three-conductor ac power cable compliant with IEC/EN safety standards.
- After power up of the console, it must be prepared for NMR operation (Topspin configuration „cf“, initializsation of the hardware „ii“, setup correct values for shim, lock, etc.).
- When the console is operational, some calibrations have to be made (e. g. calibration of the HE-level measurement), and some specific configurations have to be set. For this step, please refer to the related AQS and BSMS manual.

11 Operation

11.1 General Operating Guidelines

Prior to the first use after installation, make sure that the Nanobay system is properly configured. Please refer to the chapters "Installation and Initial Commissioning" on page 123 and "Wiring and Cable Sets" on page 48 in this manual.

The only user operations permitted are:

- Starting up and shutting down the Nanobay system
- Operating the users software interface
- Connecting RF and data interface cables that are accessible outside of the Nanobay
- Replacing or installing field exchangable units (by instructed operating or service personal)

11.1.1 Operator Protection

The electronic circuitry of Nanobay systems is operating with low and safe voltages, except for the power supply and its connection to mains and the RF excitation. Nevertheless, any electrical equipment can become a source of danger under extreme conditions.

12 Maintenance and Repair

12.1 Safety and Function Protection

Electrical System

⚠ WARNING

Before a unit can be unplugged for exchange, the Nanobay must be completely switched off and the cables to the unit must be disconnected.

Avant qu'une unité puisse être débranchée pour l'échange, le Nanobay doit être complètement hors tension et le câble de réseau doit être débranché.

Function Protection

Handling under ESD safety conditions is absolutely necessary.

NOTICE

Use the ECD discharge bracelets while servicing the Nanobay. Don’t touch uncovered metal surfaces on the PCBs, electronic devices or connectors before beeing grounded by the ESD bracelet.

Mettez le bracelet ESD avant de toucher les surfaces métallique sur le PCBs, les appareils électroniques ou les connecteurs.

12.2 Maintenance Schedule

The console is almost maintenance free. It is recommended to regularly every 6 to 12 months) depending on the environment to check and if necessary clean the filter mat for the ventilators.

Do not operate the instrument without filter, since dirt will build up in the electronics. Repairs on the console should only be carried out by trained Bruker personnel. For probe and magnet maintenance, refer to the relevant manuals.

12.3 Cleaning

Cleaning the surface of the enclosure and/or front panel can be carried out by the customer, if the following instructions are adhered to:

- Switch off the equipment and unplug the power cable.
- Clean up the outside surface with a soft, lint-free cloth dampened in water.

NOTICE

Use only water. Do not use any detergent or other cleaning solvents.

Employez seulement de l'eau. N'employez aucun détergent ni d'autres dissolvants de nettoyage.

- Let all surfaces completely dry before installing.
- Connect all cables and power up.

12.4 Maintenance of Console Version V1 and V2

The following pictures and instructions are valid for

- Z108356 AVANCE CONSOLE NB-E WIRED
- Z119572 AVANCE CONSOLE NB-E WIRED V2

12.4.1 Removing covering

There is a simple quick fastening mechanism for removing the covering plates at both sides of the Nanobay console (quick snap-in fastening).

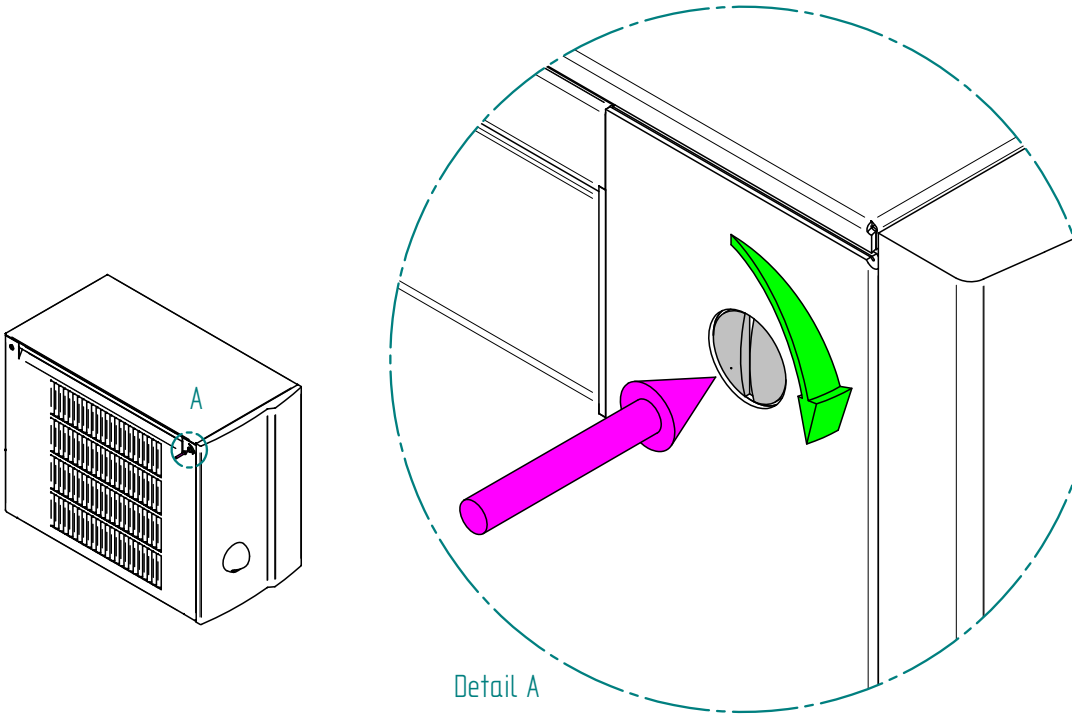
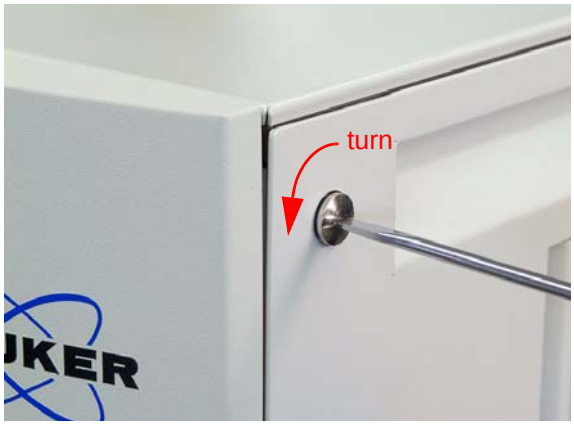


Figure 12.1 Quick snap-in fastening

The fastening can be opened like a screw by a quarter-turn to the left or to the right, as indicated by the green arrow.

I

1. Open the two quick snap-in fastenings



2. Detach the covering panel

Figure 12.2 Side panel removal

1. Push the handle inside the blue dome

2. Detach the front panel a t the upper side

3. Lift the front panel carefully

4. Now it can be removed

Figure 12.3 Front panel removal

NOTE: Connectors and inlets shown on this picture are different from Nanobay variant Z108356 to Z119572.

Figure 12.4 Back panel removal

12.4.2 Fan Maintenance

The fan tray can be easily removed from the Nanobay console. First, the panel at the right side has to be detached (see description above). Then the four quick snap-in fastenings can be opened and the fan tray can be pulled out by a handle.

1. Open the 4 quick snap-in fixes

2. pull out the fan tray by the handle

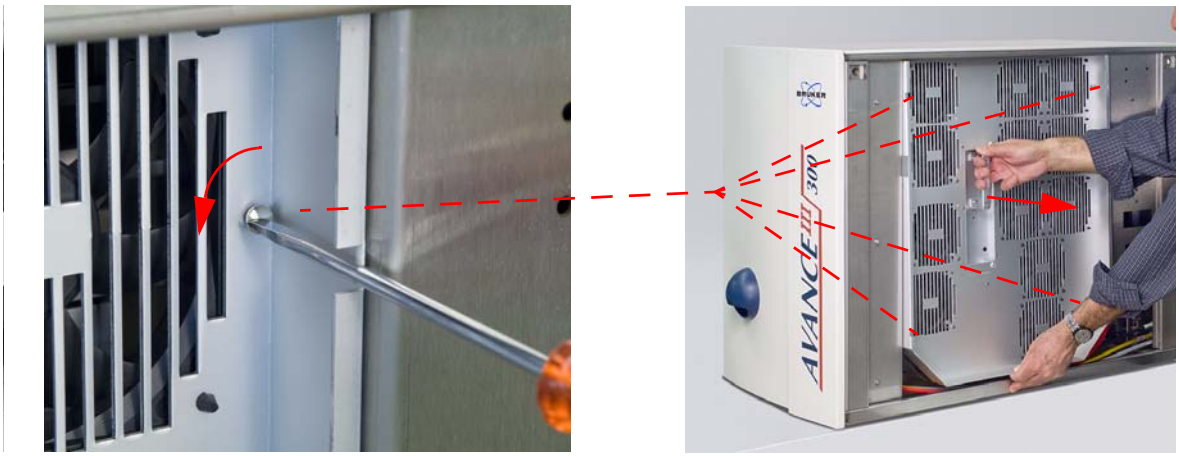


Figure 12.5 Fan maintenance

12.4.3 Fan Filter Mat Replacement

The filter is integrated in the covering panel. It can be taken out when the covering grid has been removed (open related fastenings). Both, the fan tray and the grid which fixes the filter mat, are mounted by a quick snap-in fastening (see description above).

Important: Check the filter in regular intervals. Replace dusty filters in order to provide correct fan operation (filter fleece part number ***Z104570***).

1. remove the grid covering the filter mat

2. replace the filter mat

Figure 12.6 Replacement of fan filter mat

12.4.4 Attaching the Covering Panels after Servicing

For attaching the side panel after servicing, move the grooves of the quick snap-in fastening into vertical position. In this position the fastening can be pushed until it snaps in.

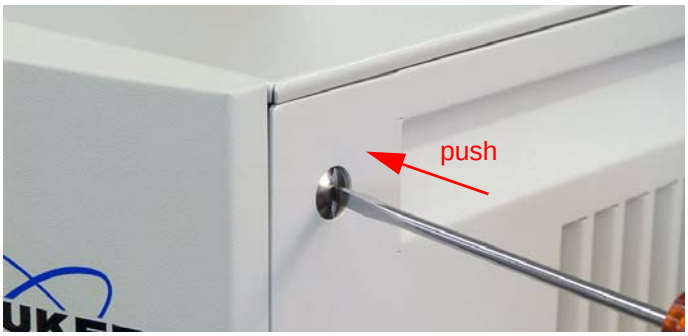


Figure 12.7 Attaching the side panels by pushing the snap in fasteings

The front panel fits at the bottom into the groove of the chassis. For mounting the panel, it has to be pushed at the upper part until it snaps in.

Figure 12.8 Attaching the front panel (snap in)

12.4.5 Maintenance of the Particle Filter for Compressed Gas

The particle filter[1)] must be clean (visible through transparent cover[2)]). It may be necessary to replace it (part number ***48290***), e. g. when it has been polluted:

NOTICE
Before servicing, make sure that the compressed gas supply is off and there is no pressure at the gas inlet.

Remove the transparent cover (screw it off)

Remove the particle filter which is attached by a crosshead screw. A short screw driver is required for this operation.

Accumulated liquids can be drained by a valve at the bottom of the filter[3)].

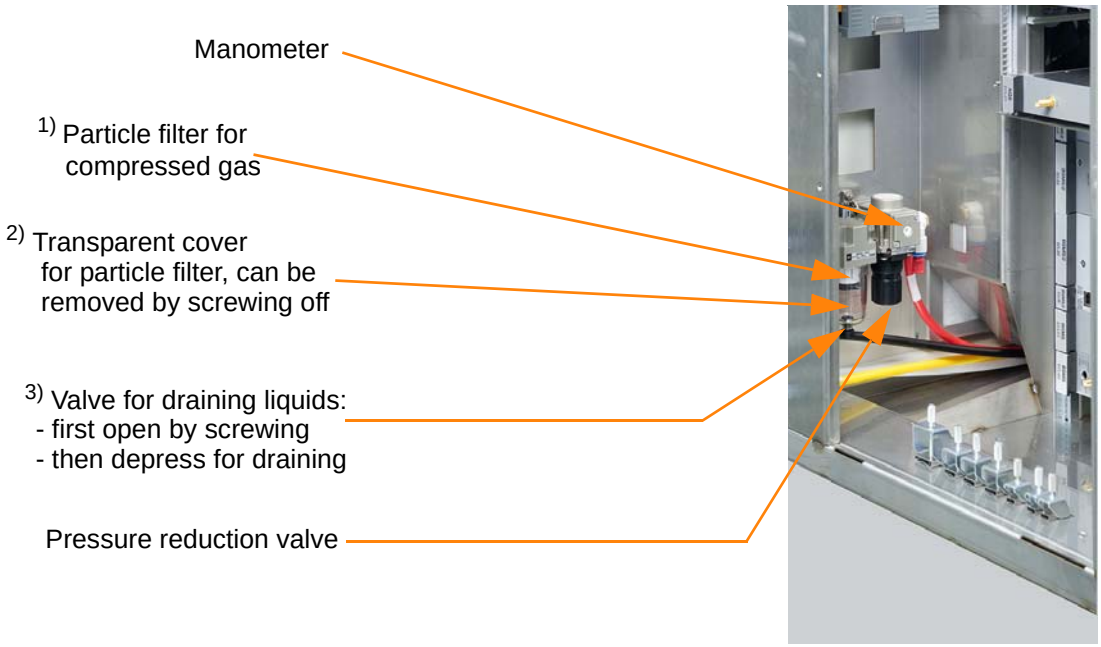


Figure 12.9 infrastructure for compressed gas

12.5 Maintenance of Console Version V3

The following pictures and instructions are valid for

▶ Z126037 AVANCE CONSOLE NB-E WIRED V3

12.5.1 Removing Covering Panels

1. Push the handle inside the blue dome

2. Detach the front panel a t the upper side

3. Lift the front panel carefully

4. Now it can be removed

Figure 12.10 Front panel removal

There is a simple quick fastening mechanism for removing the covering the *left* plate of the Nanobay console (quick snap-in fastening). *Open the two quick snap-in fastenings on the rear panel.* The fastening can be opened like a screw by a quarter-turn to the left or to the right, as indicated by the green arrow.

Figure 12.11 Quick snap-in fastening

Push the sidepanel to the right.

1. Loosen the 4 screws of the upper panel (complete)
2. Remove the upper panel
3. Open the screws of the lower panel

NOTE: Connectors and inlets shown on this picture may be different and depend on system configuration

Figure 12.12 Back panel removal

12.5.2 Fan Maintenance

The fan tray can be removed from the Nanobay console. First, the panel at the right side has to be detached (see description above). Remove the ribbon cable connector and then the five quick screws can be loosen and the fan tray can be pulled out.

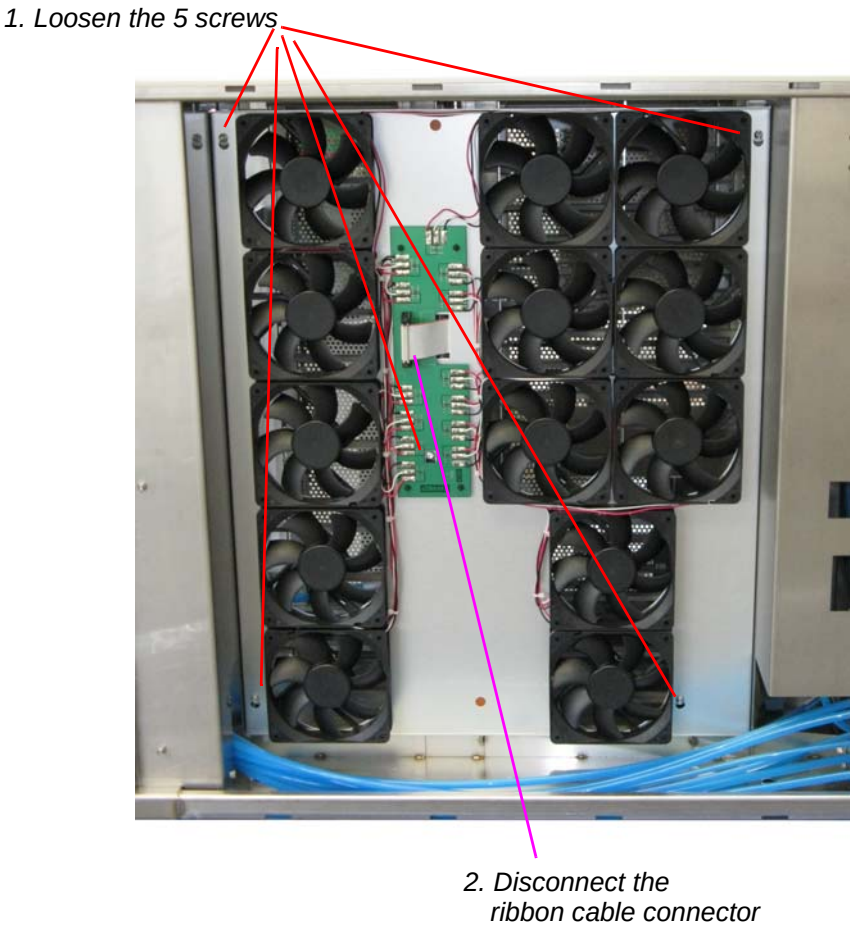


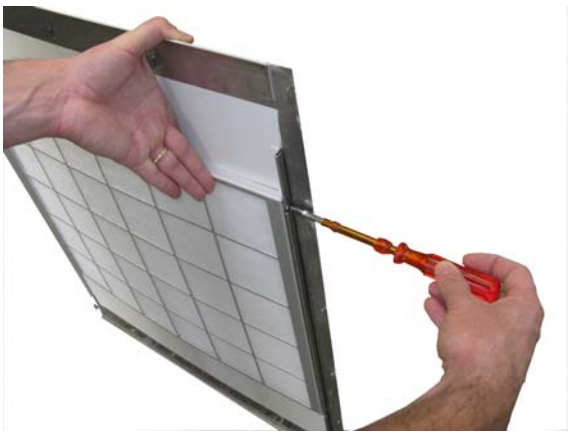
Figure 12.13 Fan maintenance (console version V3)

12.5.3 Fan Filter Mat Replacement

The filter is integrated in the covering panel. It can be taken out when the covering grid has been removed (open related fastenings).

Important: Check the filter in regular intervals. Replace dusty filters in order to provide correct fan operation (filter fleece part number ***Z104570***).

1. remove the grid covering the filter mat



2. replace the filter mat

Figure 12.14 Replacement of fan filter mat

12.5.4 Attaching the Covering Panels after Servicing

For attaching the side panel after servicing, move the grooves of the quick snap-in fastening into vertical position. In this position the fastening can be pushed until it snaps in.

Figure 12.15 Attaching the side panels by pushing the snap in fasteings

The front panel fits at the bottom into the groove of the chassis. For mounting the panel, it has to be pushed at the upper part until it snaps in.

Figure 12.16 Attaching the front panel (snap in)

12.5.5 Maintenance of the Particle Filter for Compressed Gas

The particle filter[1)] must be clean (visible through transparent cover[2)]). It may be necessary to replace it (part number ***48290***), e. g. when it has been polluted:

NOTICE
Before servicing, make sure that the compressed gas supply is off and there is no pressure at the gas inlet.

Remove the transparent cover (screw it off)

Remove the particle filter which is attached by a crosshead screw. A short screw driver is required for this operation.

Accumulated liquids can be drained by a valve at the bottom of the filter[3)].

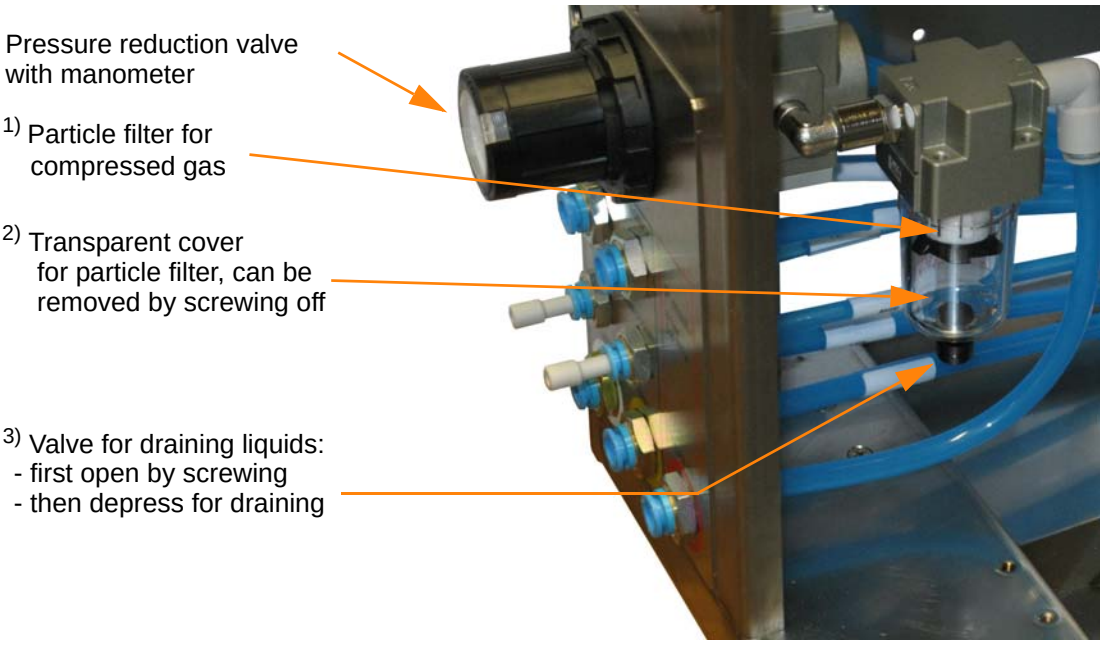


Figure 12.17 Infrastructure for compressed gas

13 Troubleshooting

13.1 General

The following chapter describes the possible causes of faults, and the work required to rectify them.

In the event of repeated faults, shorten the maintenance intervals in accordance with the actual load.

If a failure occurs during operation, the system interrupts the current procedure.

On the Topspin screen an error message, i. e. a code number with a corresponding text, is displayed. Take down the code number and complete error message. Furthermore have ready the following information:

- Part number and ECL (Engineering change level) of the units
- Spectrometer type and order number.
- Magnet Type

With this information contact the customer service. See "Contact" on page 9 for contact details.

Contact the manufacturer in the event of faults which cannot be rectified in accordance with the instructions below.

13.2 Nanobay Diagnostics

Each of these three sections (IPSO, AQS and BSMS) has its own service access (Bruker Service Web) providing maintenance, diagnostics and troubleshooting by using a standard web browser. Typing „ha“ on the TopSpin command line brings up a dialog, where each of the three Service Web Servers can be accessed.

Figure 13.1 TopSpin menu after typing command „ha“

The Nanobay infrastructure (BIS and fan supervision) can be accessed by the DRU service web. It is also on the list of units that are hosted by the DRU (on page „Main“->“Hosted Devices“->“AQS Control Overview“).

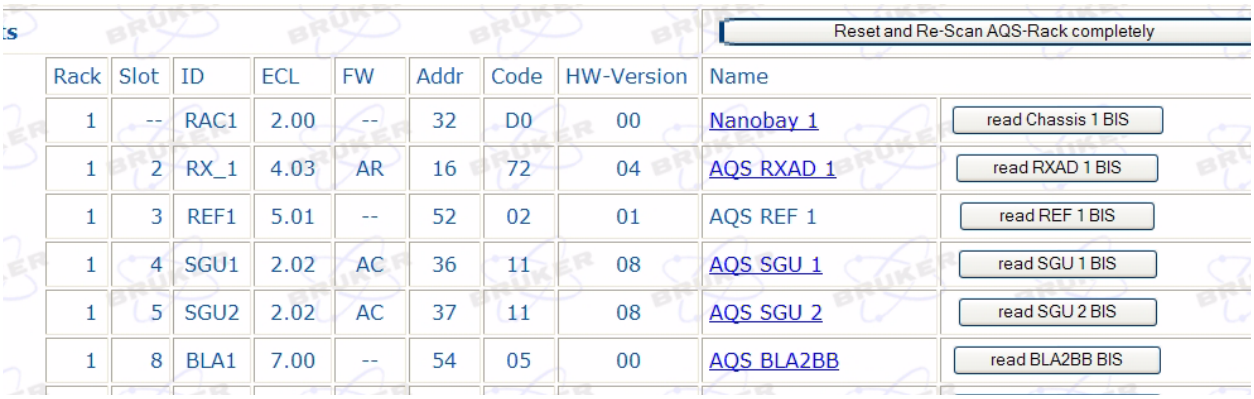


Figure 13.2 Units hosted by DRU, including Nanobay infrastructure

In addition to the Service web, the AQS units can be accessed by the Unitool for maintenance, diagnostics and trouble shooting. Accessing the AQS units is described in detail in the related manual **„AQS/3 with IPSO Systems“**.

Selecting the link „Nanobay 1“ in the diagram above opens the following window:

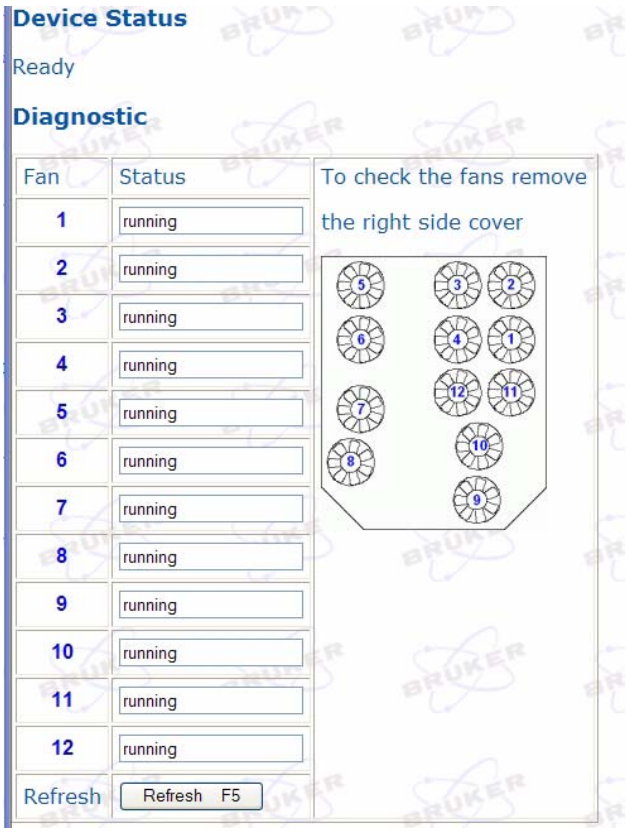


Figure 13.3 Fan status monitor for Nanobay

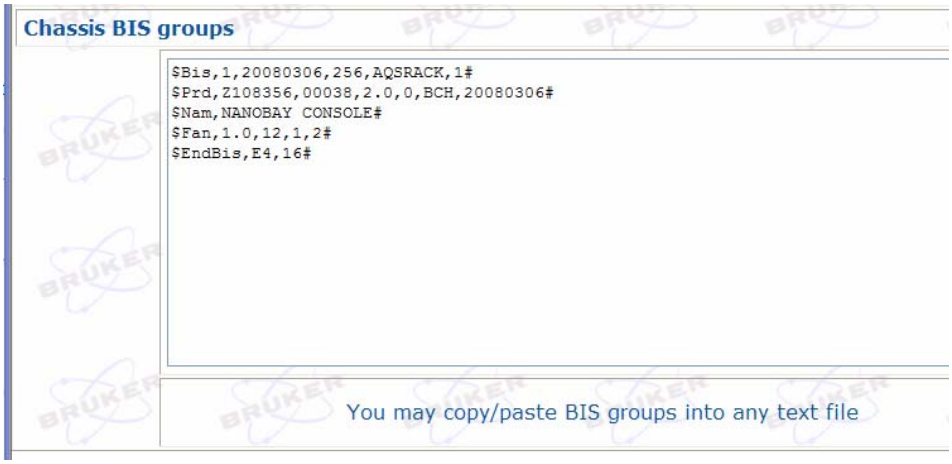


Figure 13.4 Reading BIS of Nanobay backplane

System or unit specific diagnostics and trouble shooting is described in the related manuals, which are separate for IPSO, AQS and BSMS units (see in the beginning of this manual).

14 Dismantling and Disposal

Following the end of its useful life, the device must be dismantled and disposed of in accordance with the environmental regulations.

i Installation, initial commissioning, retrofitting, repairs, adjustments or dismantling of the device must only be carried out by employees of the manufacturer or persons authorised by the manufacturer.

14.1 Safety

Electrical System

⚠ WARNING

Electrical hazard from electrical shock!

A life threatening shock may result when the housing is open during operation.

- ▶ Disconnect the device from the electrical power supply before opening the device. Use a voltmeter to verify that the device is not under power!
- ▶ Be sure that the power supply cannot be reconnected without notice.

Improper Dismantling

⚠ WARNING

Danger of injury due to improper dismantling!

Stored residual energy, angular components, points and edges on and in the device or on the tools needed can cause injuries.

- ▶ Ensure sufficient space before starting work.
- ▶ Handle exposed, sharp-edged components with care.
- ▶ Dismantle the components properly.
- ▶ Secure components so that they cannot fall down or topple over.
- ▶ Consult the manufacturer if in doubt.

14.2 Dismantling

Before starting dismantling:

- Shut down the device and secure to prevent restarting.
- Physically disconnect the power supply from the device; discharge stored residual energy.
- Remove consumables, auxiliary materials and other processing materials and dispose of in accordance with the environmental regulations.
- Dismantle the device by following the installation instructions in reverse.
-

Clean assemblies and parts properly and dismantle in compliance with applicable local occupational safety and environmental protection regulations.

14.3 Disposal Intructions

If no return or disposal agreement has been made, send the dismantled components for recycling.

- Scrap metals.
- Send plastic elements for recycling.
- Sort and dispose of other components in accordance with their material composition.

NOTICE

Danger to the environment from incorrect handling of pollutants!

Incorrect handling of pollutants, particularly incorrect waste disposal, may cause serious damage to the environment.

▶ Always observe the instructions below regarding handling and disposal of pollutants.

▶ Take the appropriate actions immediately if pollutants escape accidentally into the environment. If in doubt, inform the responsible municipal authorities about the damage and ask about the appropriate actions to be taken.

A Appendix

A.1 Warning Signs

CAUTION

This combination of symbol and signal word indicates a possibly hazardous situation which could result in minor or slight injury unless avoided. 13, 124

DANGER

This combination of symbol and signal word indicates an immediately hazardous situation which could result in death or serious injury unless avoided. .. 12

NOTICE

This combination of symbol and signal word indicates a possibly hazardous situation which could result in damage to property or the environment unless avoided. 13

WARNING

Risk to life for unauthorized personnel due to hazards in the danger and working zone! 24, 123

This combination of symbol and signal word indicates a potentially hazardous situation which could result in death or serious injury unless avoided. 12

Appendix

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A.3 Tables

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A.4 Index

Appendix

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