SWISSPHONE

Intelligent Transceiver Controller ITC2800

Operation and Maintenance Manual

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List of Abbreviations

AC	Alternating Current
AGM	Absorbent Glass Mat
AIuK	German Information and Communications Committee *(**A**usschuss für **I**nformations- **u**nd **K**ommunikationswesen)*
BSC	Base Station Controller
DAU	Generic term for ITC in german: Digital Alarm Converter (**D**igitaler **A**larm**u**msetzer)
DC	Direct Current
DME	Pager or Digital Alarm Receiver (***D**igitaler **M**elde**e**mpfänger*)
DSE	Digital Siren Control Receiver (***D**igitaler **S**irenensteuer**e**mpfänger*)
ECC	Emergency Control Center
ELS	Computer Aided Dispatch, Command & Control or Crisis Management Centre (***E**insatz**l**eit**s**telle*)
ESD	Electrostatic Discharge
FPGA	Field-Programmable Gate Array
GUI	Graphical User Interface
HE	Height/Rack unit (module height unit, 44.45mm)
IC	Grantee Code to identify Product FCC approval
ITC	Intelligent Transceiver Controller
MPE	Maximum Permissible Exposure
NA	North America
NTC	Negative Temperature Coefficient Thermistor
PNC	Paging Network Controller
RF	Radio Frequency
RIC	Radio Identification Code
Rx	Receiver
SBAS	Satellite Based Augmentation System
SC	Synchro Card
SMA	Sub-Miniature-A
TE	Pitch unit (module width unit, 5.08mm)
TR-BOS	German technical guidelines of the authorities and organizations with security tasks *(**T**echnische **R**ichtlinien der **B**ehörden und **O**rganisationen mit **S**icherheitsaufgaben)*
TRx	Transceiver (transmitter/receiver unit)
Tx	Transmitter
UHF	Ultra High Frequency
UI	User Interface
UPS	Uninterruptible Power Supply
VHF	Very High Frequency

1 Introduction

This manual is intended to provide the reader with the necessary knowledge for the installation, operation and maintenance of the Intelligent Transceiver Controller (ITC). The ITC is a digital alarm transceiver, according to the TR-BOS and AluK 2011. The ITC is thus only one of many components of a superordinate digital alerting network.

To ensure that the alarm network as a whole system covers the desired functionalities, the ITC must be considered in the overall context. Various detailed configurations are dependent on the overall network planning and should be consulted before planning an installation of the ITC.

The manual provides the necessary knowledge for the installation of an ITC, including the basic software configurations that ensure basic operation. Furthermore, the necessary information for maintenance during operation is explained.

1.1 Definition of Digital Alarm Converter

The ITC2800 is a digital alarm controller (ITC). The functioning of an ITC is described by the German Federal Network Agency as follows:

"Digital alarm converters (ITC) are stationary transmitting/receiving radio systems in radio networks for digital alarming, which process data supplied directly via direct IP connection by the PNC (e.g. PC) or radio transmissions of another ITC recorded by their receiving section, insert additional information and transmit it for reception by further ITC, digital message receivers (DME) and digital siren control receivers (DSE) as well as control their own digital outputs. "(Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway, 2009, p. 18).

This definition shows that the ITC forms the interface between a PNC and various DMEs or DSEs. The configurations at the PNC determine the majority of the subsequent network configuration. The configurations at the ITC should therefore always be made in consultation with the network operator.

Hint:
Always consult your network operator before changing the configuration of the ITC. This applies in particular in the run-up to an installation, in which you should receive the parameters to be configured from your network operator.

1.2 Structure of an alerting network

In order to simplify understanding, the structure and components of a network are described below using a generic example.
The alarms are usually fed into the alarm network on the PNC, which is located in an emergency control centre (ECC). From there, the alarm message is forwarded via TCP/IP connection to an ITC primary base station. When designing the network, different alarm rings are defined in which ITC base stations are arranged, depending on the area and topology of the area to be covered. The ITC primary base station is always located on ring 0, from where the signal is distributed via POCSAG to the surrounding rings, or ITC secondary base stations, as well as to the DME and DSE. While the PNC and ITC are stationary installations, the terminals (pagers) are mobile.

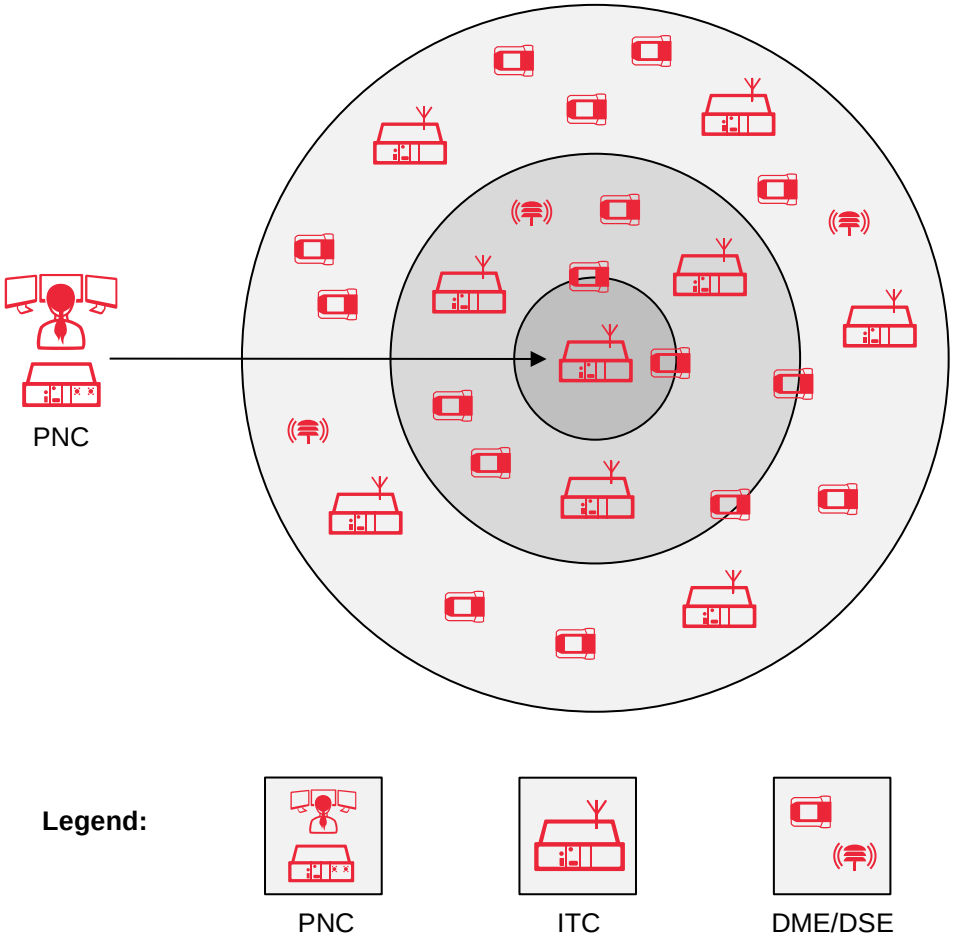


Figure 1 Network overview

Depending on the customer's requirements, the effective network configuration may differ greatly from the above example. In all cases, however, it is crucial that the basic configurations defined by the network operator are made correctly on the various ITC base stations. The other configurations for optimizing and stabilizing the network can be made at a later stage in the PNC.

1.3 Service concept for the ITC2800

The modular design of the ITC2800 makes it possible to replace any defective modules with little effort. Depending on the configuration of an ITC2800, different modules can be used. The available modules and their mode of operation are described in chapter 8. An overview of the available spare parts can be found in chapter 8.9.

2 Applicable safety instructions

The ITC2800 may only be opened by Swissphone or by personnel trained and authorized by Swissphone. The manufacturer accepts no responsibility for damage or injury caused by failure to observe these safety instructions or by improper operation of the device.

2.1 General safety instructions

In general, the following safety instructions must be followed when handling the ITC2800.

- The transmitter must not be put into operation if anyone is in the immediate vicinity of the antenna. Make sure that there are no people within a radius of two meters from the antenna when the transmitter is in operation.
- All units may only be serviced by a qualified service technician.
- The base station may only be commissioned by persons authorized by Swissphone or its contract and sales partners.
- Before commissioning, ensure that all open connections are properly terminated and the HF connections are connected.
- During installation, the unit must be positioned in such a way that all poles can be disconnected from the mains in case of service or emergency. Access to the mains/appliance plug must always be ensured. If access to the unit is not possible for structural reasons, a switch must be provided in the building installation near the unit.
  The permissible mains voltage or mains frequency with which your unit may be operated depends on your unit configuration. The permissible values can be found in the respective chapters of the manual.
- Operate the unit only inside lightning-protected buildings where it is also protected from water and sunlight (pollution degree 2 according to EN62368).
- Due to the risk of electric shock, the unit may only be opened if you have been authorized and trained to do so by Swissphone.
- Protect the unit from liquids, vapors and moisture. Do not store any liquids in the vicinity of the unit. When cleaning the unit, do not use liquid cleaning agents; these can damage the unit or cause an electric shock.
- The unit must not be operated in the vicinity of heaters.
- To prevent damage to the unit and/or persons, only original parts or components recommended by Swissphone or its contractual and sales partners should be used. Failure to comply with this recommendation will invalidate the guarantee on the unit. As a general rule, repairs and other interventions in the unit may only be carried out by authorized and qualified specialists.

2.2 Safety instructions for handling the battery

When handling the battery, the following safety instructions must be followed in addition to the generally applicable safety instructions (see chapter 2.1).

- Before using the battery, read the accompanying instructions.
- Keep the battery away from heat sources of any kind.
- Connection contacts must not be short-circuited.
- Mechanical manipulations of any kind on the battery are strictly prohibited.
- If the battery is damaged and substances leaking from it come into contact with skin or clothing, wash the affected areas immediately and extensively with water to avoid chemical burns or similar.
- If the battery is damaged and any substances that escape from it come into contact with the eyes, wash them out immediately under running water. Afterwards, a doctor must be consulted in any case.

3 Regulatory notices

3.1 Europe

3.1.1 Declaration of Conformity

The ITC2800 complies with the provisions of the European Directive RED 2014/53/EU ("Radio Equipment Directive"). You can request a copy of the declaration of conformity at info@swissphone.com.
The ITC2800-BOS has the following TR-BOS test number: DAU II 17/21
There are restrictions and requirements for the operation of this product in the following countries:

Belgium	Bulgaria	Denmark	Germany
Estonia	Finland	France	Greece
Ireland	Italy	Croatia	Latvia
Lithuania	Luxembourg	Malta	Netherlands
Austria	Poland	Portugal	Romania
Slovakia	Slovenia	Spain	Sweden
Czech republic	Hungary	United Kingdom	Cyprus
Iceland	Liechtenstein	Norway	Switzerland

Table 1 Nations with regulatory references

A license is required in each case for operation in one of the countries listed above. This frequency usage license can be applied for at the respective state regulatory authority.

Please note that the intended use of certain frequencies may change continuously. The continuously updated EU frequency usage plan can be viewed here, for example:
ECO Frequency Information System (cept.org)

3.1.2 Operating several transmitting stations at the same location

In the following applications, the ITC2800 may only be operated using a circulator:
- If several base stations are installed at the same local site (multi-site installation).
- When connecting multiple base stations to the same shared antenna.

Without a circulator, the ITC2800 is only compliant for single-site installations; this must be taken into account when planning and implementing installations. In the event that the network planning provides for / requires a multi-site base station, contact a specialist dealer.

⚠ **Attention:**
- Failure to comply with this point will result in non-compliance with the legal requirements (non-compliant operation of the base station).
- Furthermore, there is a high risk of mutual interference between the radio networks.

3.2 North America

NOTICE:
This device complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

According to FCC Rules

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

According to Industry Canada licence-exempt RSS standard(s)

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

FCC WARNING:
Changes or modifications made to this equipment not expressly approved by Swissphone may void the FCC authorization to operate this equipment.

FCC Radio Frequency Interference Statement:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Class A digital device: A digital device that is marketed for use in a commercial, industrial, or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.

NOTICE:
Changes or modifications made to this equipment not expressly approved by (manufacturer name) may void the FCC authorization to operate this equipment.

3.2.1 Operating several transmitting stations at the same location

The ITC2800 must not be co-located or operated in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. Where regulations allow for co-located transmitter installations, observe the following procedures.

In the following applications, the ITC2800 may only be operated using a circulator:

- If several base stations are installed at the same local site (multi-site installation).
- When connecting multiple base stations to the same shared antenna.

Without a circulator, the ITC2800 is only compliant for single-site installations; this must be taken into account when planning and implementing installations. In the event that the network planning provides for / requires a multi-site base station, contact a specialist dealer.

⚠ **Attention:**

- Failure to comply with this point will result in non-compliance with the legal requirements (non-compliant operation of the base station).
- Furthermore, there is a high risk of mutual interference between the radio networks.

3.2.2 Radio module product codes

Depending on the model and configuration, the ITC2800 can contain components which have their own FCC/IC listing:

Module	In version	Item No.	FCC ID	IC
Radio HK	UHF 40W	0723267	CASTMBHKB	737A-TMBHKB
Radio B1	VHF 50W	0723265	CASTMBB1B	737A-TMBB1B
Cellular Module	Global	0350173	2AJYU-8PYA007	23761-8PYA008

Table 2 FCC and IC listing IDs of the radio modules contained in the ITC2800

3.2.3 RF exposure information

This equipment does not contain any integrated antennas and is designed to be installed in a fixed indoor location and operated with suitable external antennas installed on outdoor fixtures. To ensure reliable and interference-free operation, the antennas must be installed by professionals in adherence to the local regulations. The antennas used as a basis for the MPE calculations are listed in the table below:

Module	Item No.	Suggested Antenna	Band	Gain		ERP
Radio B1	0723265	Kathrein 711 530	VHF	2.15dBi	0dBd	50W
Cellular Module	0350173	2J Antennas 2J2183B-B05H (all datasheet gains are peak values)	(3GPP) 2	4dBi	1.85dBd	0.385W
			4	4dBi	1.85dBd	0.385W
			5	3.9dBi	1.75dBd	0.596W
			12	3.9dBi	1.75dBd	0.473W
			13	3.9dBi	1.75dBd	0.299W
			25	4dBi	1.85dBd	0.385W
			26	3.9dBi	1.75dBd	0.473W
			41	4dBi	1.85dBd	0.385W
			66	4dBi	1.85dBd	0.385W
GPS card	0723169	Protempsis (Trimble) 57860-20	No emission, Rx only			

Note: For the ERP calculation of the radio, the nominal value is used; for the cellular module, the values from the RF exposure report of the module with FCC ID 2AJYU-8PYA007 are used.

Table 3 Antenna suggestions and antenna gains used for the third-party modules' MPE reports

Radiofrequency radiation exposure Information:
As stated in the Maximum Permissible Exposure (MPE) report, the antennas for paging and cellular connectivity (optional accessory) must be installed and operated with a minimum distance of 2.5m to any accessible area. By separating the antennas into separate mounting locations (separated by at least four times the longest wavelength → 10m), the MPE limits can be calculated for each antenna. This has no significant impact on the separation calculated for the paging antenna, while it allows to reduce the required separation for the cellular antenna down to 0.3m.

⚠ Warning: RF Exposure Hazard

To comply with FCC RF exposure limits, mount the antennas at a location where no person can come closer than:

- 2.5m to the antennas, when all the antennas are mounted on a common fixture/mast.
- 2.5m to the paging antenna and 0.3m to the cellular antenna in case the antennas are mounted at separate locations.

4 Planning the installation

To ensure that the on-site installation can be carried out without delays, some clarifications are necessary before the installation. The installation of the ITC2800 requires some conditions at the location of the future base station. The following describes the location and the requirements for the installer's equipment.

4.3 Site requirements

The following requirements for the location of the future base station are related to single-site base stations. Note that when installing more than one base station, the specifications in chapter 3 must be met.

Site Requirements Base Station (Single-Site)				
No.	Must	Recommendation	Location requirement	
01	X		Mains supply with 90-230V alternating voltage (AC) or -48V DC, depending on the model. The power consumption is max. 230VA and the maximum current consumption is 2.6A with the AC power supply. For DC supply, the figures are 230W and 4.8A respectively.	
02	X		The customary national installation regulations must be observed.	
03	X		The ITC2800 in the AC version is to be connected to the mains via a three-core cable.	
04		X	The width of the ITC2800 is adapted to the dimensions of a 19" rack. The space requirement is 3 height units (HE), the unit depth 335mm. Rack mounting is recommended.	
05	X		The temperature at the installation site of the ITC2800 is between -20°C and +55°C all year round.	
06	X		The relative humidity at the installation site of the ITC2800 is below the permissible maximum of 80% all year round.	
07	X		Integration of the ITC2800 incl. attachments into the existing grounding or lightning protection concept of the building *1. The intended earthing point on the ITC2800 can be found in chapter 8	
08			The following connections should be available:	
09	X		08.01	AC: Device cable with C13 coupling (IEC-60320). DC: Power supply cable with 3W3 connector.
	X		08.02	Antenna coaxial cable (impedance 50Ω / N connector according to IEC61169)

Table 4 Site requirements base station (single-site)

5 Installation

When installing an ITC2800 base station, a distinction must be made between a primary or a secondary system. Further differences in the installation process may result from the use of other optional modules in the base station.

*1 This manual does not provide comprehensive recommendations and guidelines regarding earthing and lightning protection. Please refer to the requirements and standards in effect in the country where the base station is being installed.

5.1 Installing the ITC2800 Base Station

The following table shows the process for installing an ITC2800 Primary with the use of all optional hardware components. The installation process of all other variants can be derived from the table, as some steps are omitted. In the two columns Primary / Secondary, **[X] (necessary)** or **[O] (if option available)** marks which installation steps are necessary for a primary or secondary base station. With the installation steps, a distinction is made between installation activities that can already be prepared in advance of the installation and the steps that are carried out on site.

5.1.1 Preparing the installation

No.	Primary	Secondary	Description		Chapter
01	X	X	Checking the delivery for completeness (according to delivery note)		-
02			ESD protection etc,		
03	X	-	Mounting the GPS interface card		
			03.01	ITC2800 is switched off and disconnected from the mains and the battery.	-
			03.02	Remove the blind plate next to the SC card.	-
			03.03	Insert and secure the GPS receiver card.	-
			03.04	Install and connect the GPS antenna.	5.2.2
			03.05	Connect the mains / DC plug and, if necessary, the battery and start the ITC2800.	6.1
			03.06	Carry out a function check (power LED)	8.7.1
04	O	O	Mounting the I/O card		
			04.01	ITC2800 is switched off and disconnected from the mains and the battery.	
			04.02	Remove the blind plate next to the SC card (for easier installation, remove all dummy plates following to the right).	
			04.03	Loosen the synchro card and pull it out about 10 cm.	
			04.04	Connect the synchro card and I/O card using a ribbon cable.	
			04.05	Mounting the connected sync/ and I/O card.	
			04.06	Connect the mains plug and, if necessary, the battery and start the ITC2800.	
			04.07	Carry out function check (power LED)	8.8.1
05	X	X	Definition of the antenna to be used: By default, the antenna switch is in the single antenna position. In this case, the same antenna is used for reception and transmission. If you use a separate receiving and transmitting antenna, the antenna switch must be operated.		5.2

Table 5 Checklist installation preparation

5.1.2 Installation on site

On-site installation checklist					
No.	Primary	Secondary	Description		Chapter
01	X	-	Connect LAN cable (min. Cat5) to RJ45 Ethernet interface.		tbd
02	X	-	Mount the GPS antenna on the interface of the GPS receiver card.		8.7.3
03	X/O	X/O	Connect the input and output lines to the synchro or I/O card (O) according to the diagram.		8.5.3 8.8.3
04	O	-	Connect local redundant alarm transmitter (if present) to one of the serial interfaces of the Base Station Controller (use MIP11+ communication protocol).		8.4.1
05	X	X	Connect the coaxial cable of the transmitting and/or receiving antenna.		5.2
06	X	X	Run the earthing cable from the earthing point of the ITC2800 to an earthing point permitted for this purpose in the building installation.		8
07	X	X	Connect fully charged battery (AC only)		5.3
08	O	O	Connect devices to be fed externally (if available).		5.4
09	X	X	Make sure that the mains switch of the ITC is in position 0. Then connect the mains cable.		tbd
10	X	X	Switch on the ITC2800		6.1
11	X	X	Connect the laptop to the ITC via the RJ45 Ethernet interface.		9.1
12	X	X	ITC software configuration in the service web interface		
			12.01	Login with default user, then set your own password.	9.2
			12.02	Enter base station ID (according to planning of the overall network)	9.4.1
			12.03	Define standard frequency; channel spacing and baud rate for base station. (according to the configuration of the overall network)	9.4.1
	O	O	12.04	Define alternative frequency, channel spacing and baud rate for base station. (if available)	9.4.1
	X	X	12.05	Set the transmitting power of the base station	9.4.1

Table 6 On-site installation checklist

The ITC software configurations listed up to this point correspond to the absolute minimum required configurations in a network managed by a PNC.

5.2 Antenna installation

⚠ Attention:
To ensure a safe and interference-free operation in compliance with the applicable regulations, only let qualified professionals install the antennas, taking the following aspects into account:

- When connecting the antennas, always follow the installation instructions provided by the antenna's manufacturer.
- Provide for the installation of a lightning protector on the antennas to minimize the risk of death, injury, or damage to the base station.
- Ensure sufficient spacing between the individual antennas connected to the ITC2800 to avoid coupling issues. Aim for an isolation of >20dB between antennas of different subsystems, refer to the chapters specific to each type of antenna for values within the same subsystem. If no measurement is available, ensure a distance of at least one wavelength of the lowest frequency involved.

5.2.1 Paging antenna(s)

To ensure that the base station can be reached within the alarm network as desired, some points must be observed when installing the antenna(s). The ITC2800 offers the possibility to use one antenna for transmitting and receiving (single antenna use), as well as the possibility to use a separate antenna for transmitting and receiving (dual antenna use). The ITC2800 is delivered from the factory for single antenna use.
Prior to installation, clarify with the responsible radio network planner which antenna concept is intended for the base station. If separate transmitting and receiving antennas are to be used, the operating mode of the antenna connections can be changed to "dual antenna use" using the slide switch on the rear panel of the ITC2800. The exposed coaxial connector used in "single antenna use" serves as the connector for the Tx antenna (transmit antenna) in dual antenna mode. The optional coaxial connection of the Rx antenna (receive antenna) is used exclusively in dual antenna operation.

Tx antenna (transmitting antenna):

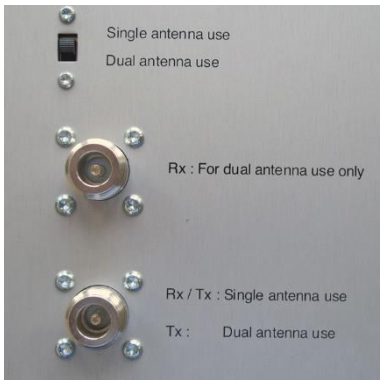


Figure 2 Antenna connections

The Tx antenna should be installed as free-standing as possible. In particular, it should be kept away from electrically conductive objects and walls. The absolute distance to surrounding objects should be at least 6cm and whenever possible 70cm. Otherwise, the surrounding objects absorb the power of the radiation field. This affects the transmission power and thus the range of the base station. The antenna must always be aligned

vertically to ensure the highest possible omnidirectional radiation power. The exception is a directional antenna, which must be installed horizontally in the direction of the receiver.

Rx antenna (receiving antenna):
If possible, the Rx antenna should also be installed free-standing and kept away from electrically conductive objects, walls and especially electronic devices (PCs, monitors, LED lights, etc.). Again, the absolute minimum distance is 6cm, but whenever possible 70cm or more should be provided. Failure to comply will result in the directivity of the receiving antenna being affected or the receiver suffering from an increased noise level. When choosing a location, make sure that the receiving antenna is not placed near transmitting devices (mobile phones, wireless devices, etc.). At elevated locations (high-rise buildings or towers), the receiver may suffer from interference and intermodulation from high-power transmitters (digital radio, TV, etc.), even at a distance of several kilometers.

5.2.2 GPS antenna (optional)

The GPS receiver is located on the print of the GPS receiver card (see chapter 8.7.1). The GPS signal is a mandatory requirement for a primary base station and is needed to synchronize the network. The signal of the GPS antenna is forwarded to the GPS receiver by means of a coaxial cable via the SMA socket of the receiver card. The following points must be observed when selecting the GPS antenna:

- Only active GPS antennas may be connected.
- The use of combined GPS/mobile data antennas should be avoided.
- The operating voltage of the GPS antenna must be 3.3V or 5V.
- The antenna has a bandwidth of 1575MHz ±5MHz.
- The GPS signal must have a gain of at least 5dB after deduction of the attenuations between GPS antenna and GPS receiver.

For the calculation, exemplary products available on the market were selected and calculated using the information available on the data sheets. By specifying the antenna gain of the selected antenna and its tolerance range, the maximum permissible total attenuation of the cable can be determined. For the various cables, the attenuation per meter is given in each case, so that the maximum length of the coaxial cable can be determined. Cables with larger diameters are also permissible, but a corresponding adapter plug must be available to enable connection to the SMA socket of the receiver card.

Antenna:			**Antenna gain**
Protempis Bullet 360TNC 3V-5V (formerly Trimble Bullet)			35.4dB ±3.0dB
Coaxial cable type:	**Attenuation [dB/m]**	**Max. Length**	**Total loss**
RG-316/RG-188	1.20	22.83m	
RG-58 PE	0.95	28.84m	27.4dB
RG-142	0.65	42.15m	
LowLoss240flex	0.41	66.83m	
			min. 5dB / max. 11dB

Place the antenna in such a way that it has an unobstructed view of the sky, with as few blockages as possible in the hemisphere spanning around the top of the antenna, possibly on top of the pole. If it needs to be mounted on the side of a pole, it is desirable to have it on that side of the pole facing towards the equator (south in the northern hemisphere). Place the antenna as far away from transmitting antennas as the site allows.

> ⚠ **Attention:**
> When connecting the GPS antenna, follow the installation instructions provided by the manufacturer. Also provide for the installation of a lightning protector on the GPS antenna to minimize the risk of damage to your base station.

5.2.3 Cellular antenna(s) (optional)

The optional cellular module, located inside the Base Station Controller (BSC), provides two antenna connectors, one for a main and one for an optional diversity antenna. In principle, the cellular module is fully functional when only the main antenna is connected.

An appropriate diversity antenna can however increase performance, particularly when used in areas with poor coverage. Having a second antenna in an even slightly different location, possibly with a different radiation pattern and/or different polarization reduces the influence of fading, scattering and similar phenomena.

If a diversity antenna is used, the isolation between the two antennas must be at least 8dB. This can be achieved by spatial separation and by polarization diversity (mounting the antennas perpendicular to each other).

> ⚠ **Attention:**
> When connecting the cellular antenna(s), follow the installation instructions provided by the manufacturer. Also provide for the installation of a lightning protector on the cellular antenna(s) to minimize the risk of damage to your base station.

5.3 Connection of the battery (AC only)

To ensure that the base station continues to function even in the event of mains faults or longer outages, it is recommended to connect a battery to the ITC. The intended connection for the battery is located on the rear panel (see chapter 8.1.2). The cable cross-section to be used for the power cable depends on the maximum charging current supplied by the battery.

Figure 3 Connection battery

The charging control of the ITC power supply (PS19) is optimized for the type-specific charging control of 12V lead-acid batteries with AGM technology (Absorbent Glass Mat); in general, only lead-acid batteries may be connected to the unit. The type-specific charging supported by the PS19, as well as the possibility of configuring the charging current according to the battery manufacturer's data sheet, allow the battery service life to be maximized and thus the running operating costs to be reduced to a necessary minimum.

⚠ Attention:

- Before connecting an accumulator, make sure that the power supply unit (PS19) is always switched off. The main power switch must be in position 0 (see chapter 8.3.1).
- The outgoing battery voltage must never exceed 16V, otherwise there is a risk of damage to the unit. If the battery voltage of a newly connected battery is below 12V, it will be detected as a defect by the power supply unit. Only in battery mode will the battery be discharged to a maximum of 10.6V.

ℹ Hint:

- Instead of several accumulators with small capacity, it is preferable to connect one accumulator with large capacity. This is for reasons of the longevity of the accumulators.
- After discharging the accumulator, it must be recharged as soon as possible.
- When storing the battery, make sure the ambient temperature is cool (not < 0°C).
- Fully charge the battery at least once every six months.
- Do not store partially discharged accumulators.
- The self-discharge of a lead-acid battery is approx. 3 to 5% per month. It is recommended to charge the battery when the charge level falls below 60% (approx. voltage 12.4V). If available, follow the instructions of the battery manufacturer.
- In case of storage of the base station, the accumulator should always be disconnected from the ITC to delay discharge.

5.3.1 Connecting the Sense Line (AC only)

The power supply unit (PS19) offers the option of monitoring various data on the condition of the connected battery. For this to be possible, in addition to the two power lines, the sense lines must also be connected to the connection provided for this purpose on the rear panel of the ITC (see chapter 8.1.2). The minimum cable cross-section of the sense line is 0.14mm^2. If connected, the battery temperature sensor is used to adjust the charging parameters to the temperature. For this, the sensor must be placed directly on the battery housing. To obtain correct temperature readings, a 10kΩ (±1%) NTC with B=3984 must be used.

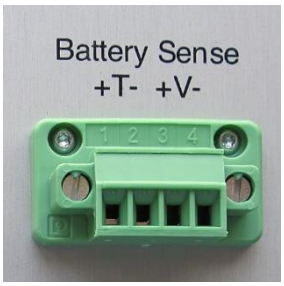


Figure 4 Sense line connection

5.3.2 Connection of the temperature sensor

Another option for monitoring the operating status is to connect an external temperature sensor, which can be used, for example, to measure the temperature of the cabinet. The cables of the temperature sensor can be connected to the connection provided for this purpose on the rear panel of the ITC (see chapter 8.1.2).

Figure 5 Temperature sensor connection

For this purpose, an NTC thermistor (Negative Temperature Coefficient Thermistor) available on the market can be procured and connected to the ITC. In order for the operating temperature to be calculated correctly, the thermistor applied must have base resistance of 10kΩ and a material constant [B] of 3984K. This temperature value has no effect on any of the ITC's functions.

5.4 Power supply for external devices

The ITC2800 offers the possibility of feeding external devices. For this purpose, the external device can be connected to the connection terminal labelled 13.5V/1A max. on AC versions and 12V/1A max. on DC versions on the rear panel of the ITC (see chapter 8.1.2). The cable cross-section to be used must be at least 1.5mm^2. The unit can be supplied with a maximum of 1A. On AC versions, the output has to be enabled via web interface to be continuously operational. When this is done, the Lowe-Power-Mode is deactivated.

Figure 6 Connecting external devices

⚠ Attention:
The 12V/13.5V output is not short-circuit proof!
If an external device is powered, the battery will be additionally loaded in the event of a power failure and will be able to feed the ITC for a correspondingly shorter time.

6 Operating the unit

The common operating scenarios of the ITC2800 are described below. The sequence for the various activities is presented in the form of a tabular checklist. This describes the actions to be carried out from the user's point of view, as well as the respective reaction of the ITC2800. For detailed information on the ITC elements to be activated or observed, please refer to the respective chapters.

6.1 Switching the ITC2800 on and off

After you have successfully installed the ITC2800 as described in chapter 5, you can carry out the initial commissioning. With regard to the switching on/off procedure, the initial start-up does not differ from later start-ups or unit shutdowns.
Follow the procedure below to switch on the unit:

Switch on checklist			
No.	Action	Reaction	Chapter
01	Set the main power switch to position 1.	Wait until the ITC2800 has completely booted up. This can be recognized by the LEDs of the RC or SC card, which all light up twice in succession.	8.3.1/ 8.5.1/ 8.6.1

Table 7 Checklist unit start-up

If you need to disconnect the ITC2800 from the mains for maintenance or similar purposes, be sure to shut down the unit properly beforehand. Follow the procedure below to switch off the unit:

Switch off checklist			
No.	Action	Reaction	Chapter
01	Press and hold the shutdown button on the SC card for at least 7 seconds.	Wait until the transmit and status LEDs of the SC card flash briefly. If this is not the case, repeat step 01.	8.5.1
		As soon as Transmit and Status LED both light up constantly, continue with step 02.	
02	Set the main power switch to position 0	ITC2800 is switched off.	8.3.1

Table 8 Shutdown unit checklist

6.2 Overview status lights

Status lights						
PS19		**BSC**	**GPS**(optional)	**RC09**	**SC**	**I/O**(optional)
see chapter 8.3		see chapter 8.4	see chapter 8.7	see chapter 8.6	see chapter 8.5	see chapter 8.8
AC	Power OK	PWR	Power	Power	Power	Power
	Battery Operation	IDE	Synch	Receive	Transmit	
	Battery Low			RSSI+	Status	
	Battery Charging			Primary		
	Wire Break			RSSI-		
	Fuse Alarm			Status		
DC	5V Power OK					
	5V Overload					
	12V Power OK					
	12V Overload					

Table 9 Overview of status lights

The following tables show the status light colors during normal operation and when the power cable is not correctly connected to the battery,

Operating mode	PS19						BSC		GPS		RC09						SC			I/O
	Power OK	*Battery Operation	*Battery Low	*Battery Charging	*Wire Break	*Fuse Alarm	PWR	IDE	Power	Synch	Power	Receive	Status	RSSI+	RSSI-	Primary	Power	Transmit	Status	Power
Mains operation																				
Normal operation	ON (*2)	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	ON/ OFF	OFF	ON	ON/ OFF	(*3)	ON	ON/ OFF	OFF	ON
*Power cable not correctly connected to the battery (AC only)	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	OFF	ON	ON/ OFF	OFF	ON	ON/ OFF		ON	ON/ OFF	OFF	ON

Table 10 Overview of operating mode

* AC versions only.
(Work in Progress) => Addition to sub-chapters (see chapter 8)

2 On DC versions, both the 5V- and the 12V power OK LEDs are on.

3 For base stations that are operated as primarys, the LED is ON, otherwise OFF.

7 Maintenance and upkeep

During the development of the ITC2800, criteria such as durability and low maintenance intensity were also given high priority due to the safety-critical application area of the device. In many cases, the base stations are located in places that are only sporadically visited by service technicians or maintenance personnel. In order to maintain the reliability and quality of the alarm network, Swissphone recommends carrying out various checks and preventive maintenance measures on the ITC2800 at least once every two years, but preferably once a year.

Especially for alerting networks with a large number of base stations, it is advisable to manage the information on the various base stations in a centralized manner and to make the documentation accessible to all persons involved. Swissphone recommends documenting the following information on the various locations as a minimum:

- Meaningful and unique name of the base station, as well as one unique ID
- Address and coordinates of the base station (incl. directions)
- Access information to the venue (key, badge, etc.)
- Documentation of the configurations specific to the base station (segment allocation, ring configuration, etc.)
- System data (serial number, supply, earthing, ...)
- Documentation of the maintenance history

7.1 Status monitoring ITC2800

The ITC2800 is modular and can be equipped with different modules according to customer requirements. The Graphical User Interface (GUI) of the ITC2800 monitors various operating data of the individual modules and displays their operating status. Since in most cases the GUI of the ITC is only used for configuration or possible error cause analysis, the ITC regularly sends a status feedback to the PNC via POCSAG or TCP/IP. The entity responsible for the operation of the alerting network can thus query the status of the individual base stations at any time and, if necessary, react to it. In addition, the detailed operating data of a station can be queried in order to plan a possible intervention. It is therefore not absolutely necessary to check the status.

7.2 Maintenance procedure

Checklist for maintenance and servicing of the ITC2800		
No.	Maintenance step	Chapter
01	Visual inspection of the system:	
02	Check the user interface (signal lights) for displayed errors.	1.1
03	Check the fit of the various electrical connections	
04	Check the GUI status page	
05	Check the GUI message journal	

Table 11 Checklist maintenance procedure

8 Hardware components ITC2800

This chapter describes the various hardware components of the ITC2800. In the further subchapters, the modular plug-in units or their functionality are described.

8.1 ITC2800 hardware

8.1.1 Front view

Figure 7 Front panel mix ITC2800

The figure above shows the front view of the ITC2800 fully equipped. The actual scope of delivery may vary, as some of the modules may be omitted depending on the customer's requirements. The two plug-in modules BSC and RC09 also offer the possibility of retrofitting with additional functionalities. The various plug-in modules and their expansion options are listed below and described in detail in the following chapters.

No.	Plug-in module	Extension possibility
1	Power supply unit (PS19 – AC or DC)	
2	Base Station Controller (BSC)	LTE modem
3	GPS receiver card (optional)	
4	Digital decoder card (RC09)	Additional print for transmission control
5	Synchro card (SC2000)	
6	I/O card	
7	Blank plate, free space for optional slide-in units	
8	Blank plate, free space for optional slide-in units	
9	Transmitting/receiving unit (TRx19)	

Table 12 Plug-in Modules - Front view

8.1.2 Rear view

On the rear panel of the ITC2800 there are various connections, as well as a switch for defining the antenna operation. These various connections are listed below.

AC Version

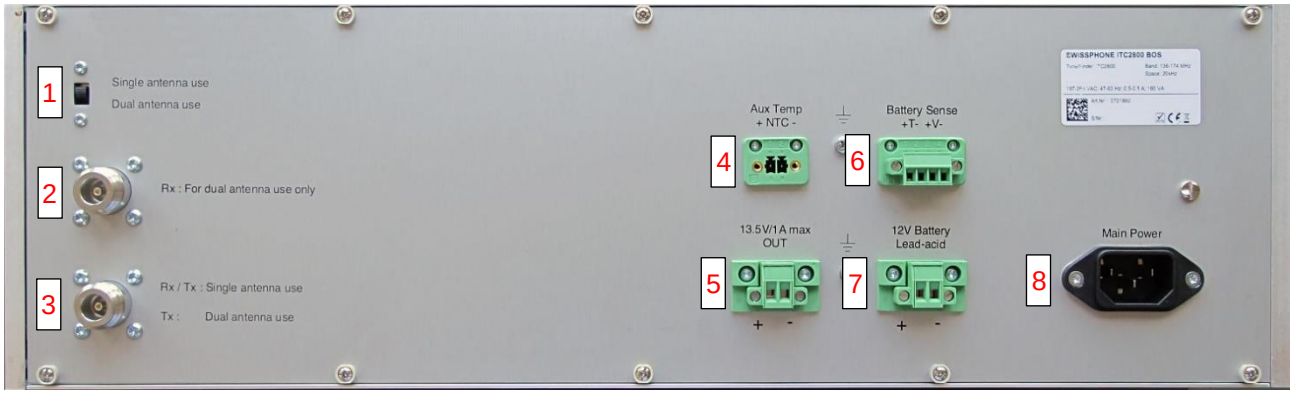


Figure 8 Rear view of the ITC2800 in the AC version

No.	Connection	Description
1	Antenna switch	Setting single or dual antenna operation
2	Coaxial connection type N 50Ω	Single antenna operation: Inactive
		Dual antenna operation: Rx (receiving antenna)
3	Coaxial connection type N 50Ω	Single antenna operation: Tx/Rx combination antenna
		Dual antenna operation: Tx (transmitting antenna)
4	Aux Temp NTC (AC only)	Connection for temperature sensor
5	13.5V/1A (or 12V/1A) max. OUT	Connection for feeding external devices
6	Battery Sense (AC only)	Connection for battery temperature measurement
7	12V Battery (AC only)	Connection for the power cables of the battery
8	Power grid main connection	IEC-60320 C13 cold appliance plug

Table 13 AC Version - Rear view interface

DC Version

Figure 9 Rear view of the ITC2800 in the DC version

No.	Connection	Description
1	Antenna switch	Setting single or dual antenna operation
2	Coaxial connection type N 50Ω	Single antenna operation: Inactive
		Dual antenna operation: Rx (receiving antenna)
3	Coaxial connection type N 50Ω	Single antenna operation: Tx/Rx combination antenna
		Dual antenna operation: Tx (transmitting antenna)
4	Relay interface	Interface to connect **P**ower **A**mplifier - **R**elay **I**nterface.
5	13.5V/1A (or 12V/1A) max. OUT	Connection for feeding external devices
6	Power grid main connection	DC Power Main Connection. Note: + is the higher voltage coming from the supply line, - the lower voltage. The difference of potential between + and – needs to be positive.

Table 14 DC Version - Rear view interface

Details on the use of the different connections are described in chapter 5.1 (Installation of the ITC2800 base station).

8.2 Transmitting/receiving unit (TRx19)

8.2.1 Module description

The transmitter/receiver unit (TRx19) is responsible for transmitting as well as receiving POCSAG messages. Depending on the geographical market and its applicable regulations, different frequency bands and permissible transmission powers are specified. In particular, frequencies for the North American market are restricted via software to the ranges allowed by FCC and ISED regulations. By using the respective TRx19 plug-in module, the ITC2800 can be made permissible for the respective situation. A distinction is made between the following variants of the TRx module:

Frequency band: UHF (Ultra High Frequency) 400-470MHz or 378-470MHz
SW limited to 421-430MHz and 450-470MHz for USA and Canada

Transmitting power: Range 1W to 25W configurable in 1 watt steps
NA: Range 10W to 40W configurable in 1 watt steps

Frequency band: VHF (Very High Frequency) 136-174MHz
SW limited to 150-174MHz for USA and Canada

Transmitting power: Range 1W to 25W configurable in 1 watt steps
NA: Range 10W to 50W configurable in 1 watt steps

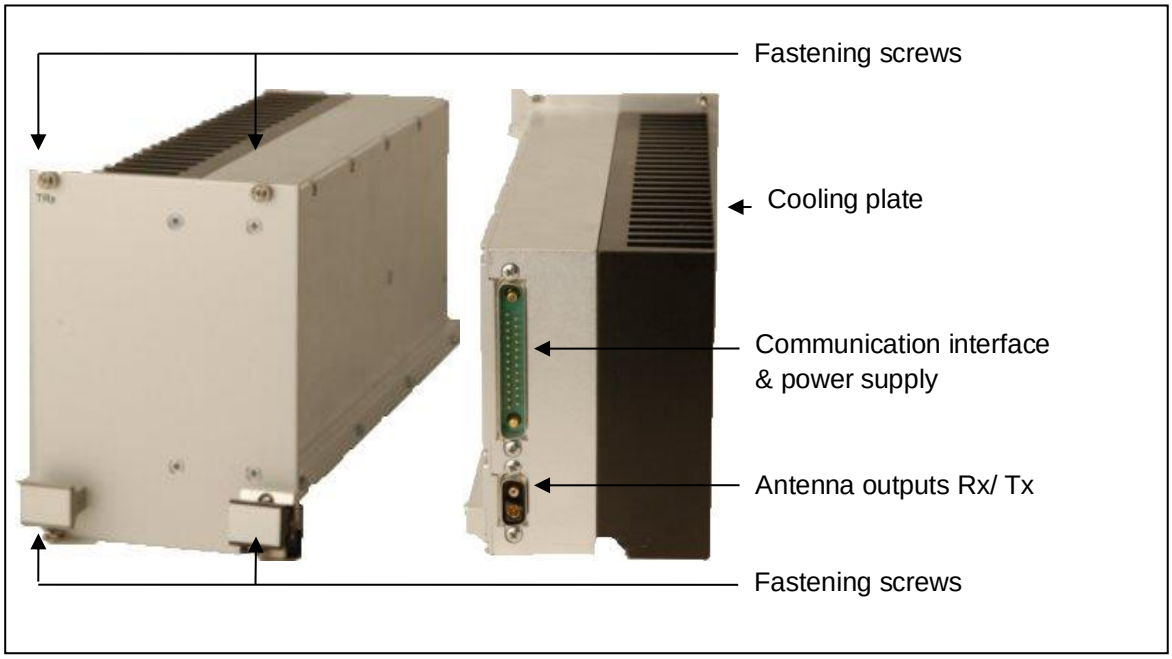


Figure 10 Component view TRx19

8.2.2 Technical specifications

General radio data for the ITC2800	
Frequency bands (variants)	Europe TRx19 25W-VHF: 136-174MHz radio board TRx19 25W-UHF: 400-470MHz radio board North America TRx19 50W-VHF: 136-174MHz radio board Software limited to 150-174MHz TRx19 40W-UHF: 378-470MHz radio board Software limited to 421-430MHz and 450-470MHz
Frequency stability (carrier):	±0.5ppm
Channel spacing:	Configurable: 12.5kHz; 20kHz; 25kHz
Modulation/demodulation type:	DFSK with 2.2kHz deviation (at 12.5kHz channel spacing) DFSK with 4.2kHz deviation (at 20kHz channel spacing) DFSK with 4.7kHz deviation (at 25kHz channel spacing)
Switching bandwidth:	Corresponds to the entire frequency range of the frequency band.
Audio bandwidth	300-3000Hz (flat or with de-emphasis)
Antenna connection:	2x 50Ω, directly on N sockets on rear wall
Signal direction (Rx/Tx)	Alternating mode (half duplex)
Temperature amplifier stage (PA)	Max. 110°C

Table 15 General radio data ITC2800

Transmitter (Tx)	
Power (variants)	TRx19 25W: 1-25W in 1 watt steps TRx19 40W: 10-40W in 1 watt steps TRx19 50W: 10-50W in 1 watt steps
Frequency offset	Configurable: 0Hz; ±150Hz; ±300Hz; ±450Hz; ±600Hz
Antenna mismatch detection	TRx19 25W: 5-25W TRx19 40W: 10-40W TRx19 50W: 10-50W
Intermodulation attenuation (* 4):	TRx19 25W-VHF: >48.6dB (+/-2.5dB inaccuracy) TRx19 25W-UHF: >48.0dB (+/-2.5dB inaccuracy)
Adjacent channel power:	Europe VHF: 66dBc; UHF: 65dBc North America t.b.d.
Spurious emissions < 1GHz:	no spurious waves > -36dBm

Table 16 Technical specifications TRx19 (transmit)

Receiver (Rx)	
Sensitivity:	<-110dBm at 1200Bd Pocsag
Frequency offset	No frequency offset
Adjacent channel attenuation:	Europe TRx19 25W-VHF: > 66.6dB (at 12.5kHz channel spacing) TRx19 25W-UHF: > 66.6dB (at 12.5kHz channel spacing) North America TRx19 VHF: 65dB (at 12.5kHz channel spacing) TRx19 UHF: 64dB (at 12.5kHz channel spacing)
Intermodulation attenuation:	Europe TRx19 25W-VHF: > 74.4dB TRx19 25W-VHF: > 70.5dB North America TRx19 VHF: 72dB TRx19 UHF: 66dB
Adjacent channel power:	TBD
Spurious emissions < 1GHz:	no spurious waves > -36dBm

Table 17 Technical specifications TRx19 (receive)

8.3 Power supply unit (PS19)

8.3.1 Module description (AC)

The AC power supply unit provides an uninterruptible power supply (UPS) function for the base station. It supplies the base station with the following system voltages both in mains operation and in emergency power operation (battery):

- Output 1 +13.8V (mains operation) or battery voltage (battery operation)
- Output 2 +5.1V (idle 5.15V)

4 Due to the intermodulation attenuation, a multi-site installation without circulator is not permissible

In emergency power mode (supply from the battery) and during charging, the voltage at output 1 corresponds to the voltage of the battery. The power supply unit is designed as a plug-in module.

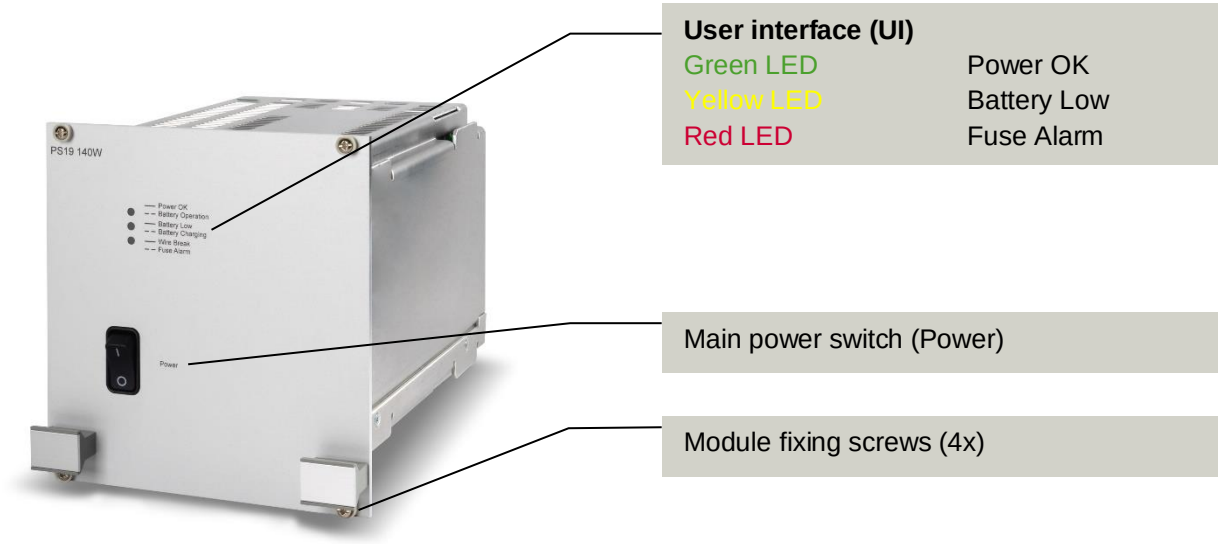


Figure 11 Component view PS19 AC

The user interface of the power supply unit consists of three LED lights that indicate the different statuses. The meaning of the different light signals is described in the table below.

LED indicators		
Green	on	The base station is switched on in mains operation (Power OK).
	flashing	Mains interruption, power supply from battery (Battery Operation).
	off	The base station is switched off / not connected to any power supply.
Yellow	on	The battery voltage has fallen below the critical value of 10.6V (Battery Low) - alarm is no longer possible. The controller is shut down and approx. 30 seconds later the power supply unit switches off to prevent deep discharge of the battery. The LED lights up until the power supply unit is switched off.
	flashing	The battery is being charged (battery charging, only when powered from the mains).
Red	on	Wire Break: A battery that was connected when the power supply unit was switched on is no longer connected / can no longer be detected.
	flashing	Defective power supply fuse (fuse alarm).

Table 18 LED assignment PS19

As soon as the voltage of the battery drops below 10.6V in emergency mode, the base station is shut down and taken out of operation. It remains out of operation until mains power is supplied. When the power supply unit receives mains voltage again after a battery low condition, this charges the battery for approx. 70s before the system voltages are restored and the base station starts up again. The battery is then charged during operation.

Hint:
If there is no mains supply and the battery voltage is also below 10.6V, the battery can be replaced and the ITC can be put back into operation. The new battery must have a voltage of at least 11.8V.

8.3.2 Module description (DC)

The DC power supply unit supplies the base station with the following system voltages:

- Output 1 +12.0V
- Output 2 +5.1V (idle 5.15V)

The DC version works with a -48VDC input voltage and has no UPS function. The power supply unit is designed as a plug-in module with the same front plate layout as the AC version.

The user interface in this case consists of two LED lights that indicate the statuses of the two output voltages. The meaning of the different light signals is described in the table below.

LED indicators		
Green (5V)	on	The 5V output is active (Power OK).
	flashing	Overload on the 5V output.
	off	The 5V output is off (fault).
Green (12V)	on	The 12V output is active (Power OK).
	flashing	Overload on the 12V output.
	off	The 12V output is off (fault).

Table 19 LED assignment PS19 DC

8.3.3 Technical specifications

Depending on the input voltage and the mains frequency of the customer, different power supply units with different power ratings are available. The table in Chapter 8.9 shows the available options. Below you will find the specifications of the direct current (DC) and alternating current (AC) power supply units.

8.3.4 Specifications AC power supplies

Technical data PS19 (AC versions)		
Type	**PS19 140W**	**PS19 200W**
Input voltage:	197…265VAC / 47-63Hz	90…265VAC / 47-63Hz
Output power:	140W	200W
Output 1 (mains operation)	13.8V +0.1V/-0.2V, 8A	13.8V +0.1V/-0.2V, 12.5A
Output 1 (charging mode)	10.8V...14.4V	10.8V...14.4V
Output 1 (battery operation)	10.6V...14.4V	10.6V...14.4V
Overcurrent protection output 1	9A typ., non latching	14A typ., non latching
Output 2	5.1V, 5.5A	5.1V, 5.5A
Overcurrent protection output 2	6A typ., non latching	6A typ., non latching
Deep discharge protection:	Yes, at 10.6V	Yes, at 10.6V
Charging current	1A...5A (configurable)	1A...10A (configurable)
Protection battery connection	Overcurrent and reverse polarity protection electronic, fuse 20AT	
Autonomy in battery mode:	>5h, with battery 12Ah (transmitting power 15W and Tx:Rx=1:4min)	
Efficiency:	>90% (load: 5A at output 1, 2A at output 2)	
Form factor	3 U x 24 TE	3 U x 24 TE

Table 20 Technical specifications PS19 AC

8.3.5 Specifications DC power supplies

Technical data PS19 (DC version)	
Type	**PS19 -48VDC**
Input voltage:	-43.5…-57.6VDC
Output power:	177.5W
Output 1	12.0V ±0.6V, 12.5A
Overcurrent protection output 1	13.5A typ., 3 restart attempts after 10s each → perman. off if failed
Output 2	5.1V ±0.1V, 5.5A
Overcurrent protection output 2	5.8A typ., non-latching
Efficiency:	92% (load: 4.8A at output 1, 2.1A at output 2)
Form factor	3 U x 24 TE

Table 21 Technical specifications PS19 DC

8.4 Base Station Controller (BSC)

8.4.1 Module description G-T16R

The Base Station Controller (BSC) is a single-board computer or embedded PC that has a flash disk as a storage medium. In addition to data processing, the BSC also controls the various inputs and outputs. Furthermore, the BSC hosts the ITC-GUI (Graphical User Interface) on which the software configurations can be made. The BSC (G-T16R) is optionally available with an internal LTE modem. Base stations without LTE connectivity can be upgraded using an LTE upgrade kit (see chapter 8.9). The BSC is designed as a plug-in module, the components are described in the following diagram. All components shown in blue are only available for the BSC with internal LTE module or are part of the upgrade kit.

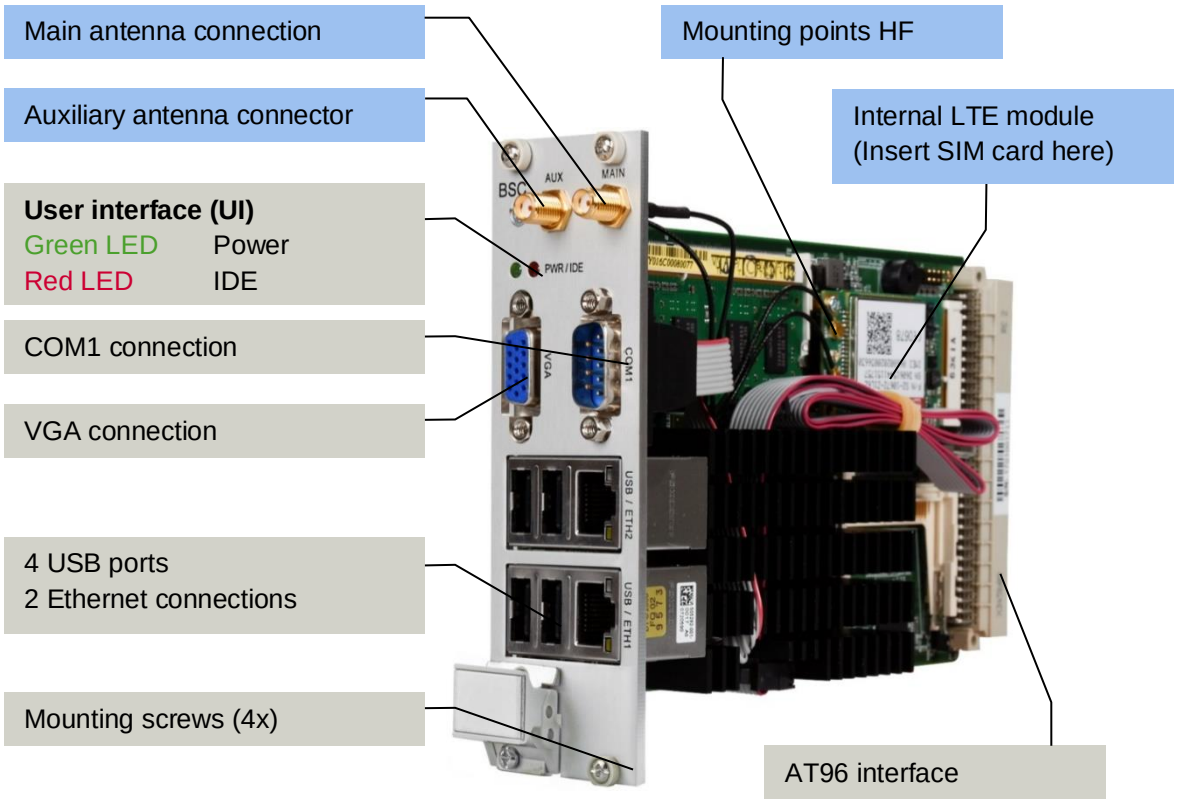


Figure 12 Component view BSC G-T16R

The user interface of the BSC consists of two LED lights that indicate the different statuses. The meaning of the different light signals is described in the table below.

LED indicators		
Green	on	In normal operation
	off	Base station switched off or BSC not supplied with voltage (5V)
Red	flashing	When accessing the card
	off	In normal operation and in the absence of a power supply

Table 22 LED assignment BSC G-T16R

8.4.2 Technical specifications G-T16R

The embedded PC installed in the BSC has the following hardware and software features:

Technical data BSC (G-T16R)	
CPU	615MHz, 64-bit
RAM	2GB (1GB up to Q3/2023)
Flashdisk	2GB
Operating system	Linux
Peripheral connections	1x VGA 1x COM1 2x Gigabit Ethernet RJ45 4x USB 2.0

Table 23 Technical specifications BSC G-T16R

8.4.3 Module description V8/103 512MB

The BSC V8/103 512MB is an alternative controller module that can be used interchangeably with the G-T16R. It is also available with an optional internal LTE modem. Base stations without LTE connectivity can be upgraded using an LTE upgrade kit (see chapter 8.9). The BSC is designed as a plug-in module, the components are described in the following diagram. All components shown in blue are only available for the BSC with internal LTE module or are part of the upgrade kit.

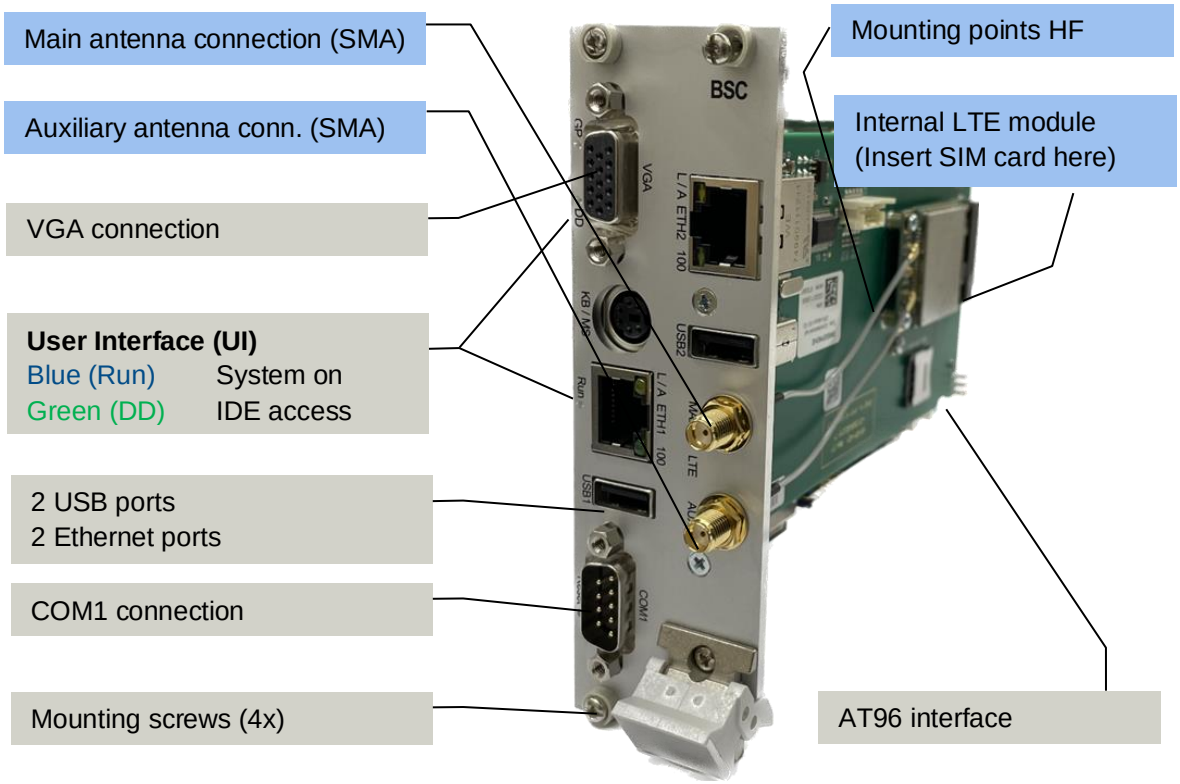


Figure 13 Component view BSC V8/103

The user interface of the BSC consists of two LED lights that indicate the different statuses. The meaning of the different light signals is described in the table below.

LED indicators		
Blue	flashing	During the boot process the LED flashes
	on	Normal operation
	off	BSC turned off or missing power suppy
Green	flashing	Access to the IDE interface (read/write to CF card)

Table 24 LED assignments V8/103 512MB

8.4.4 Technical specifications

The embedded PC installed in the BSC has the following hardware and software features:

Technical data BSC (V8/103)	
CPU	500MHz, 32-bit
RAM	512MB
Flashdisk	2GB
Operating system	Linux
Peripheral connections	1x VGA 1x COM1 2x Gigabit Ethernet RJ45 2x USB 2.0

Table 25 Technical specifications BSC V8/103

8.4.5 Connecting antennas to the BSC

In the case that the BSC is equipped with a cellular module, appropriate antenna(s) have to be connected for the functions to become available. See chapter 5.2.3 for more information. If the BSC does not have an internal LTE module, this can be retrofitted (for the item number, see chapter 8.9).

8.5 Synchro card (SC2000)

8.5.1 Module description

The synchro card (SC) controls the time-synchronous forwarding of data to the transmitter. The following functions are integrated in the synchro module:

- Sync pulse detection (a pulse is sent via the AT96 bus to synchronize the data from the RC card)
- Optocoupler connections for input and output. (Voltages of 10V to 20V can be applied to the inputs.

The core of the Synchro module consists of a µs-counter and a buffer for the transmit data. Standard components and FPGA logic (field-programmable gate array) are used. The counter runs for 2^{28} µs (approx. 4.5 minutes) and then starts from zero again. It can be queried from the BSC via a register. Various registers are available to set start, stop and changeover reference times. The transmit data memory is large enough to transmit continuously at 2400 bit/s for at least 1 minute. The Synchro module has a 3U Eurocard format and is plugged into the AT96 bus. The following sockets, keys and displays (except for the AT-96 interface) are located on the front:

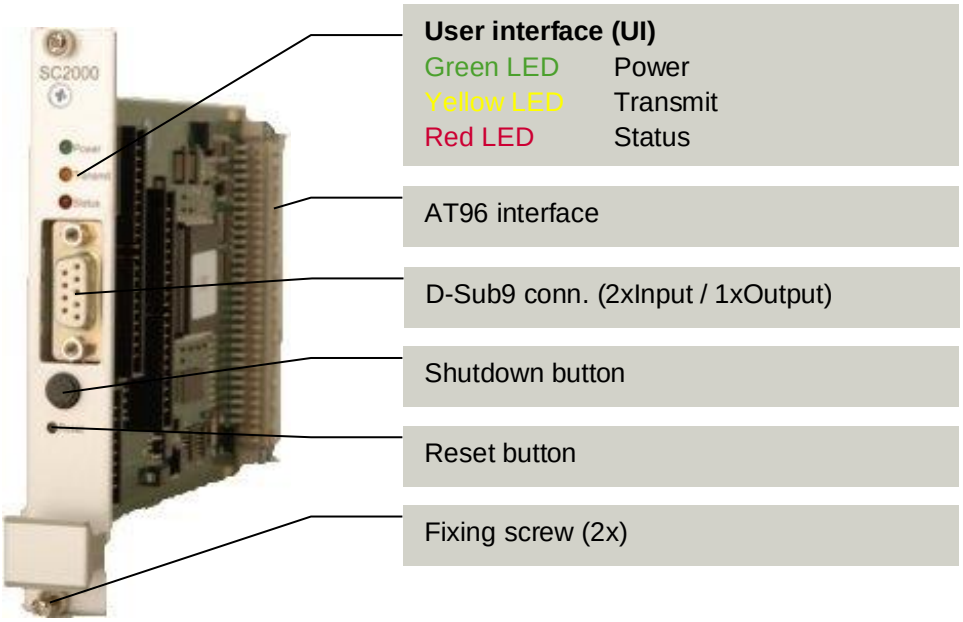


Figure 14 Component view SC2000

The two control buttons have the following functions:

Shutdown button: To ensure that the ITC2800 shuts down properly, press and hold the shutdown button for 7 seconds. Do not operate the main power switch on the PS19 (see chapter 8.3.1) until the SC card has been shut down correctly.

Reset button: The reset button can be used to reset an error that is displayed on the SC2000. Please note that the reset button may only be pressed when the SC2000 is not in "transmit mode". If a problem cannot be corrected, the ITC2800 must be restarted via the shutdown button on the SC2000.

The user interface of the SC consists of three LED lights that indicate the different statuses. The meaning of the different light signals is described in the table below.

LED indicators		
Green	on	The synchro card is supplied with voltage.
Yellow	on	Lights up as long as a message is sent from the synchro card to the transmitter (Transmitt).
Red	on	A status of the base station is not OK (e.g. output line too low, return power too high, etc.)
	flashing	The battery voltage drops below a critical value and the base station is brought into a safe system state (BSC shuts down the individual processes).
All	on	The base station is completely shut down and can now be switched off.
	flashing	The base station is fully powered up.

Table 26 LED assignment SC2000

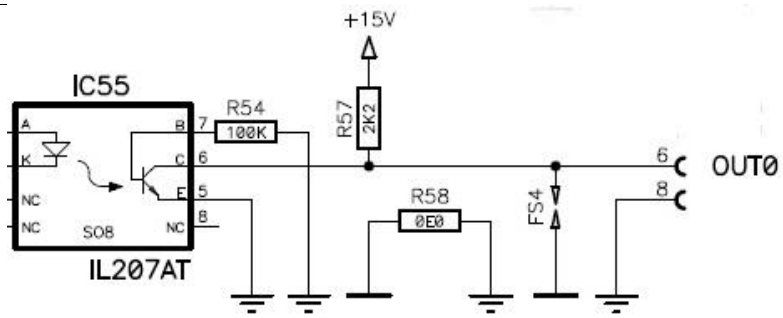
8.5.2 Technical specifications

The SC card has two inputs and one output. Together with the optional I/O card, the total number of inputs can be increased to seven and the total number of outputs to eight. The inputs and outputs of the SC card have the following technical specifications:

Technical data SC2000	
Number of inputs	2
Current/voltage range at the opto inputs:	5-25mA, 5-15V
Number of outputs	1
Maximum current/voltage at the opto output:	25mA, 13.8V
Connection plug type	D-Sub 9

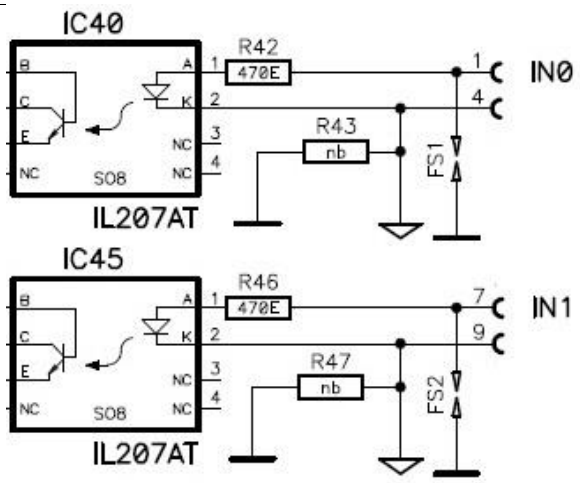
Table 27 Technical specifications SC2000

8.5.3 Synchro-Card Connection diagram



Designation in service interface	Pins	D-Sub9 connection	Description
Channel 1	6/8	Out 0 / GND	Voltage-containing output 12V/13.8V; R58 is fitted as standard. This means: Pin 8 is on ITC ground.

Table 28 Connection diagram pin 6&8 SC2000



Designation in service interface	Pins	D-Sub9 connection	Description
Channel 1	1/4	In 0 / GND 0	Galvanically isolated inputs (potential-free). R43 and R47 are not equipped as standard. Note: - If R43 or R47 (0 ohm) is fitted, GND 0 (pin 1) or GND 1 (pin 9) are connected to the ITC ground and are therefore no longer potential-free. - Input 0 (pins 1/4) is used as a "local alarm". - Input 1 (pins 7/9) is used as a "digital input". - VCC 5V can be used on pin 3 if R49 (0 Ohm) is populated. Then populate R43 or R47 (0 ohm) so that GND 0 (pin 1) or GND 1 (pin 9) is connected to ITC ground.
Channel 5	7/9	In 1 / GND 1	

Table 29 Connection diagram pin 1;4;7&9 SC2000

8.6 Digital decoder card (RC09)

8.6.1 Module description

The decoder card (RC09) is responsible for decoding the received data. The baud rate is detected automatically. The following baud rates are automatically recognized by the RC09:

- 512Bd
- 1200Bd
- 2400Bd
- 4800Bd

After decoding, the data is forwarded to the BSC. In addition, the receiver is programmed via an I2C connection. The receiver card has a 3U Eurocard format and is plugged into the AT96 bus. The following displays or keys are located on the front panel (except for the AT-96 interface):

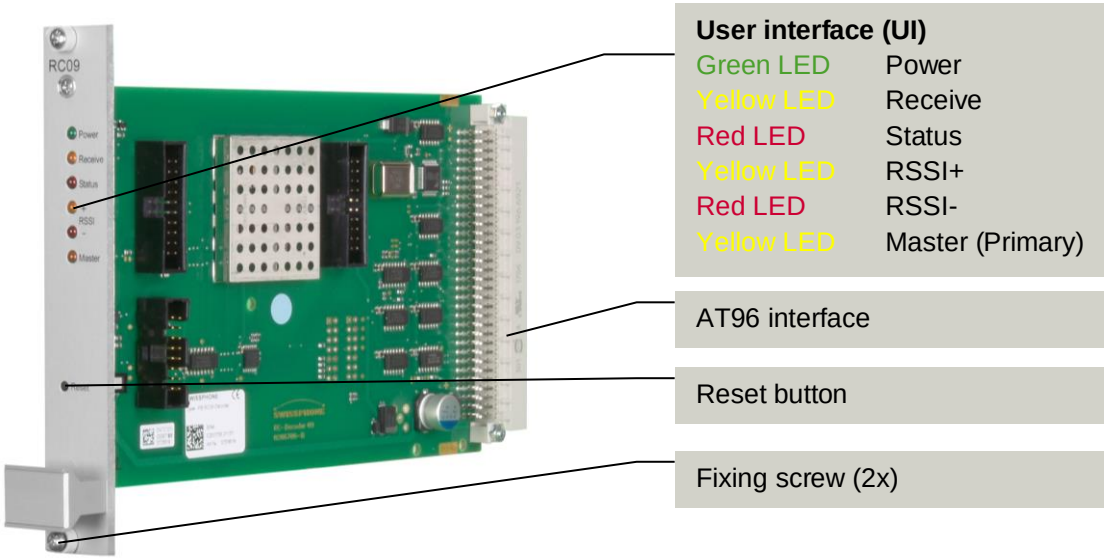


Figure 15 Component view RC09

The button has the following function:

Reset button: The reset button allows the card to be reset separately from the other modules of the ITC2800 in the event of an RC09 error. If pressing the reset button is not sufficient to solve the problem, the base station must be shut down and restarted using the shutdown button on the SC2000 8.5.1

LED lighting		
Power	on (green)	The receiver card is supplied with voltage.
Receive	on (yellow)	Receiver detects a synch word from the air.
Status	on (red)	Status of the receiver is not OK.
RSSI+	on (yellow)	Receiver field strength OK (good to very good). If on in combination with RSSI- , then the reception is still sufficient, but the reception setup should be checked.
RSSI-	on (red)	Receiver field strength too low. If on in combination with RSSI+, the reception is still sufficient, but the receiving equipment should be checked.
Primary	on (yellow)	The base station is operated as a primary.

Table 30 LED assignment RC09

Hint:
The LEDs of the RSSI measurement (RSSI + and RSSI -) do not function after a restart of the base station until after a broadcast message. The reception field strength of a message should be above -90dBm at the antenna connection. This is necessary to ensure that there is a sufficiently high margin (min. 20dB) for the transmission link. The measured RSSI value can be read on the service interface (see chapter 9.3.1).

8.6.2 Additional print for transmission control (RC09 subprint)

Optionally, the decoder card (RC09) can be equipped with an additional print. This is for the purpose of real HF transmission control and message comparison. The logging can then show whether a message was heard without errors, with character errors or not at all.

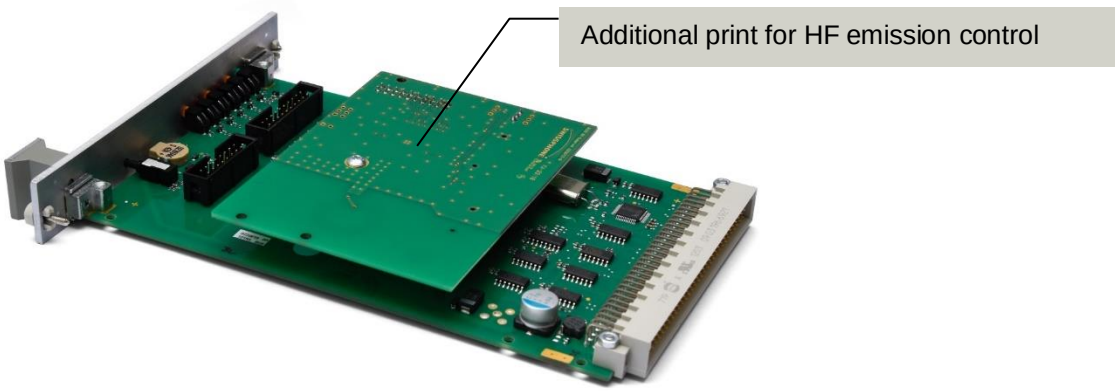


Figure 16 Component view RC09 Subprint

8.7 GPS receiver card

8.7.1 Module description

The GPS receiver card is a 3U plug-in card that is connected to the controller card via the AT96 bus. It has a GPS chipset of the type LEA-6H from uBlox. In interaction with the sync card, the GPS receiver card is responsible for time-synchronous data transmission (to neighboring base stations). The yellow sync LED flashes each time the GPS chip has generated a time pulse. The cable delay compensation is fully configurable down to the microsecond range.

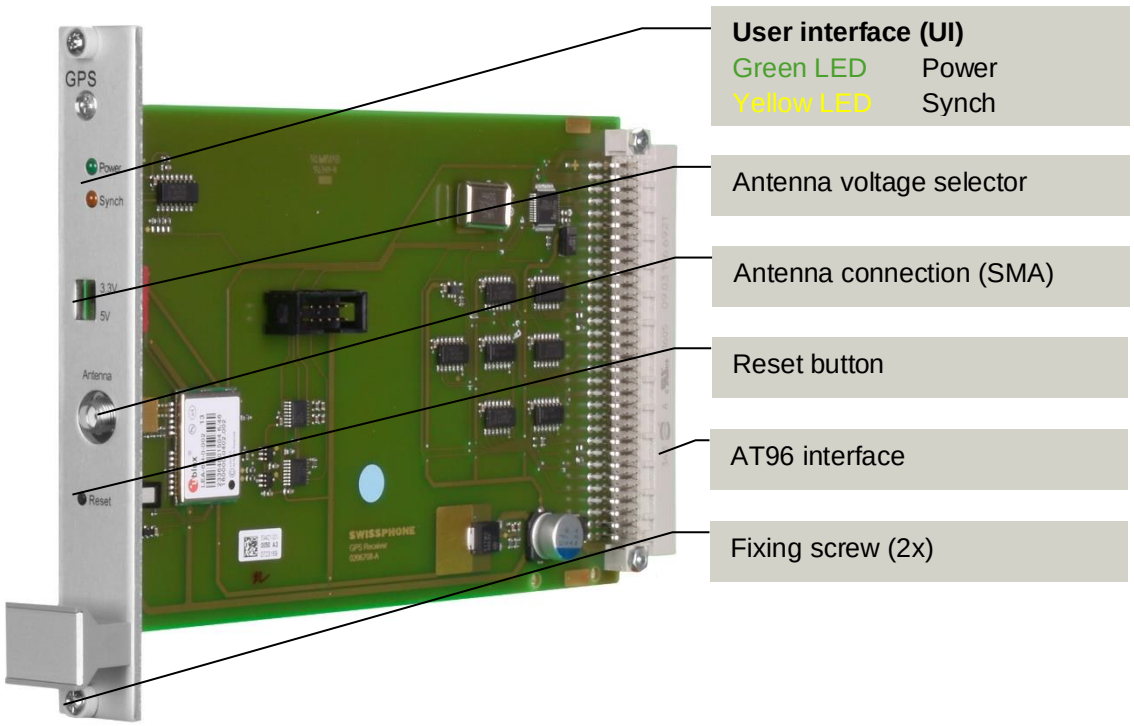


Figure 17 Component view GPS receiver card

The button has the following function:

Reset button: The reset button allows the card to be reset separately from the other modules of the ITC2800 in the event of a GPS error. If pressing the reset button is not sufficient to solve the problem, the base station must be shut down and restarted using the shutdown button on the SC2000 8.5.1.

LED lighting		
Power	on (green)	Supply available
Synch	on (yellow)	GPS signal is synchronised

Table 31 LED assignment GPS receiver card

8.7.2 Technical specifications

The technical specifications of the GPS receiver card can be found in the table below.

Technical data GPS receiver card		
Type	Swissphone GPS receiver card	
Dimensions (WxHxD)	20.32mm (4HP) x 133.35mm (3U) x 185mm	
Power supply	5VDC	
Antenna connection	SMA socket	
GPS receiver	uBlox LEA-6H 50 channels GPS L1 Frequency, C/A Code GALILEO Open Service L1 Frequency	
Time-to-first-fix	Cold start (autonomous): Warm start (Autonomous): Hot start (Autonomous):	26s 26s 1s
Sensitivity:	Tracking & navigation: Acquisition: Cold start (autonomous):	-162dBm -160dBm -148dBm
Horizontal position accuracy	Autonomous: SBAS:	2.5m 2m
Max. Navigation update rate	5Hz	

Table 32 Technical specifications GPS receiver card

8.7.3 Connecting antennas to the GPS receiver card

In order for the GPS module to be functional, a GPS antenna must be attached to the SMA antenna connection provided for this purpose. The points to be observed when connecting the GPS antenna are described in detail in chapter 5.2.2.

8.8 I/O card

8.8.1 Module description

The I/O card has 5 inputs and 7 outputs. Together with the SC card, this increases the total number to 7 inputs and 8 outputs.

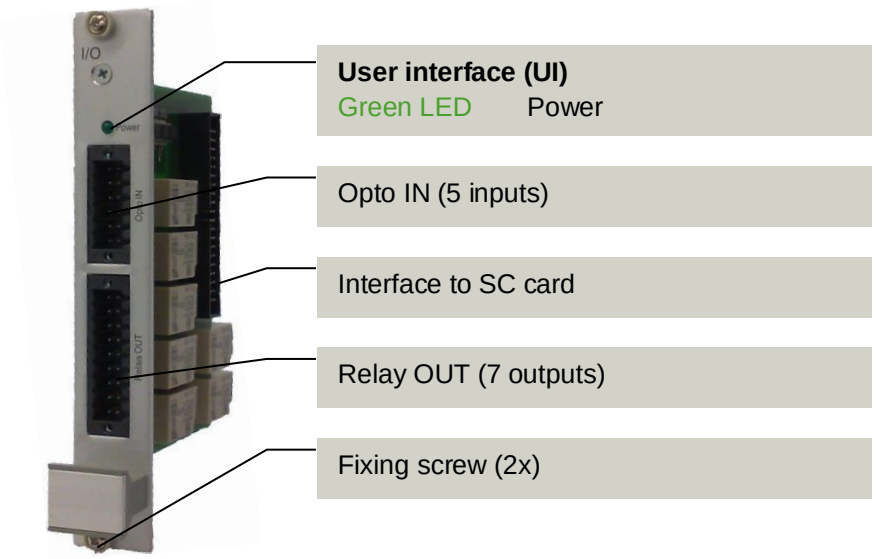


Figure 18 Component view I/O card

8.8.2 Technical specifications

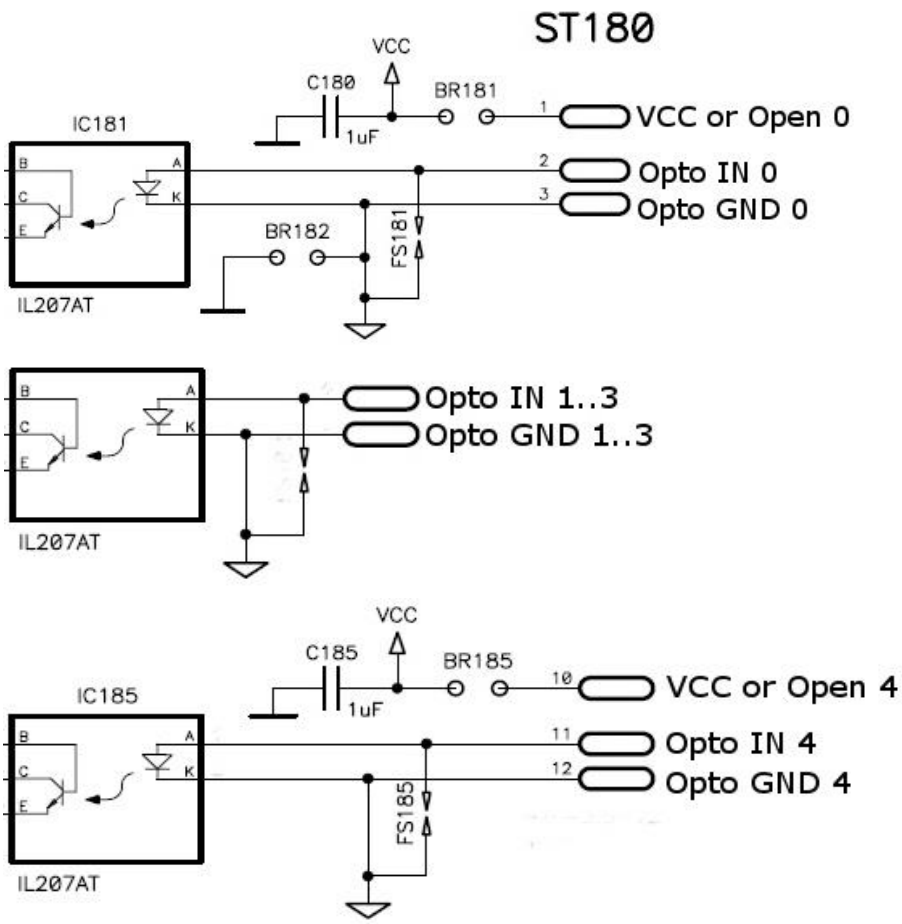
The technical specifications of the I/O card can be found in the table below.

Technical data I/O card	
Number of inputs	5
Current/voltage range at the opto inputs:	5-25mA, 5-15V
Number of outputs	7
Nominal current/voltage at the relay outputs:	40mA, 5VDC
Maximum voltage at the relay outputs:	6.5VDC
Connection plug type	Weidmüller S2L 3.5 - 18
Diameter connecting wire	Without ferrule 0.2mm^2 to 1.0mm^2 With wire end ferrule 0.13mm^2 to 0.34mm^2

Table 33 Technical specifications I/O card

The inputs are assigned according to the description on the following page. For Opto IN 0 and 4, the 12V/13.8V supply of the I/O board can be used for the operation of external circuits thanks to a mounting variant. The maximum cross-section of the connecting wire is 1mm^2.

8.8.3 Connection diagram



Designation in service interface	Pins	D-Sub9 connection	Description
Channel 2	2/3	Opto IN 0 / Opto GND 0	Galvanically isolated inputs, potential-free. - If VCC (12V/13.8V) or GND of the IO card is used for external connection of the input, the input is no longer electrically isolated. - If BR182 (0 Ohm) is fitted, Opto GND 0...4 (Pin 3,5,7,9,12) are connected to ITC ground. If nothing is fitted, all these pins are potential-free.
Channel 3	6/7	Opto IN 2 / Opto GND 2	
Channel 4	8/9	Opto IN 3 / Opto GND 3	
Channel 6	11/12	Opto IN 4 / Opto GND 4	
Channel 7	4/5	Opto IN 1 / Opto GND 1	
Channel 2	2/1	Opto IN 0 / VCC or Open 0	No function as standard, i.e. pin 1 and pin 10 are open, i.e. BR181 and BR185 are unpopulated. If BR181/185 is fitted, pin 1/10 is connected to VCC (13.8V) and is therefore no longer potential-free.
Channel 6	11/10	Opto IN 4 / VCC or Open 4	

Table 34 Connection diagram I/O card

8.9 Replacement modules

X: Standard O: Optional

8.9.1 Europe

		Article designation	Art. No.	Compatibility		
				ITC2800 25W-VHF 230VAC	ITC2800 25W-UHF 230VAC	ITC2800 25W-VHF -48VDC
Transceiver unit		TRx19 25W-VHF (136-174MHz)	0721830	X	-	X
		TRx19 25W-UHF (400-470MHz)	0721831	-	X	-
Power supply unit		PS19 140W 230VAC 13.8V/5.1V	0721825	X	X	-
		PS19 200W -48VDC 13.8V/5.1V	0721827	-	-	X
Base Station Controller	without LTE	Controller card CPU modules G-T16R	0721724	X	X	X
	with LTE	Controller Card CPU Modules G-T16R LTE 4G	0721736	O	O	O
Base Station Controller V8/103	without LTE	Controller card CPU modules V8/103	0721738	X	X	X
	with LTE	Controller card CPU Modules V8/103 LTE 4G	0721739	O	O	O
Synchro card		PB AT Synchro SC2000	0721725	X	X	X
Digital decoder card		RC09 decoder card	0722196	X	X	X
HF emission control		PB RC09 RX Subprint	0720515	O	O	O
GPS receiver card		PB GPS receiver card uBlox	0721718	O	O	O
LTE Retrofit Kit		LTE module HWset for ITC (backfitting)	0721740	O	O	O
I/O card		PB I/O card	0721706	O	O	O
Accumulator (Battery)		ACCU Pb 12V 12Ah	0330095	O	O	O

Table 35 Overview of replacement modules – Europe

8.9.2 North America

		Article designation	Art. No.	Compatibility			
				ITC2800 50W-VHF 120/230VAC	ITC2800 50W-VHF -48VDC	ITC2800 40W-UHF 120/230VAC	ITC2800 40W-UHF -48VDC
Transceiver unit		TRx19 40W-UHF (378-470MHz)	tbd	-	-	X	X
		TRx19 50W-VHF (136-174MHz)	0721835	X	X	-	-
Power supply unit		PS19 200W 110-230VAC 13.8V/5.1V	0721826	X	-	X	-
		PS19 200W -48VDC 13.8V/5.1V (to be corrected)	0721827	-	X	-	X
Base Station Controller G-T16R	without LTE	Controller card CPU modules G-T16R	0721724	X	X	X	X
	with LTE	Controller card CPU Modules G-T16R LTE 4G	0721736	O	O	O	O
Base Station Controller V8/103	without LTE	Controller card CPU modules V8/103	0721738	X	X	X	X
	with LTE	Controller card CPU Modules V8/103 LTE 4G	0721739	O	O	O	O
Synchro card		PB AT Synchro SC2000	0721725	X	X	X	X
Digital decoder card		RC09 decoder card	0722196	X	X	X	X
HF emission control		PB RC09 RX Subprint	0720515	O	O	O	O
GPS receiver card		PB GPS receiver card uBlox	0721718	O	O	O	O
LTE Retrofit Kit		LTE module HWset for ITC (backfitting)	0721740	O	O	O	O
I/O card		PB I/O card	0721706	O	O	O	O
Accumulator (Battery)		ACCU Pb 12V 12Ah	0330095	O	-	O	-

Table 36 Overview of replacement modules – North America

9 ITC2800 Service Web Interface

9.1 Connection setup

The ITC2800 is configured via a web interface that can be accessed with a common internet browser, such as Firefox. First, a PC or laptop is connected to the Ethernet port of the ITC2800 with an RJ45 network cable (LAN). The PC or laptop must have a network card with at least 10Base-T. The main page of the ITC2800 can be reached after entering the ITC IP address in the browser.

To ensure communication between the PC and ITC, the PC and ITC IP addresses must be in the same segment with the same subnet mask. These settings are made e.g. in Windows 10: in the menu Settings / Network and Internet / Ethernet. The default IP address of a flash card with ITC software 5.x is **192.168.1.2**. The following values must therefore be entered in the settings of the network adapter of the PC/laptop:

IP address: **192.168.1.[≠2]; e.g. 192.168.1.10**
Subnet mask: **255.255.255.0**

Then close all windows by pressing the OK buttons. The PC is now set up and the configuration can be started.

9.2 Login and menu navigation

The first time the IP address of the ITC is entered in a browser window, a login prompt appears on the left-hand side of the screen. The default access for the service technician is as follows:

User: **service**
Password: **service**

The password should then be changed (see Service; chapter 9.7)

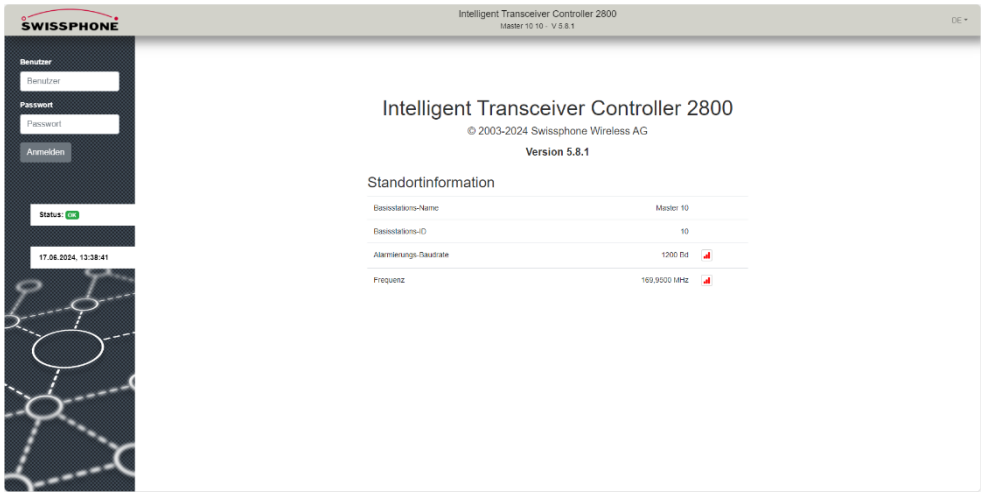


Figure 19 Login interface

Before logging on to the ITC, the elementary information is displayed in the main area of the window. These values are informative and can be changed under **Configuration** -> **ITC.** In the upper right area of the window, you can choose between German (DE), French (FR) and English (EN) language.

If a new G-T16R in combination with the PS19 power supply or a V8/103 controller is fitted, the software automatically recognizes this and displays "ITC2800".

Symbol	How it works
OK ERROR	ITC status displays
	Showing and hiding menus
...	Access to selection lists with stored values
Save changes	To save configuration changes made on the ITC
Hz	Display of the physical unit behind input fields

Figure 20 GUI Symbols

Various input fields are validated after the input is saved. If the validation of the values results in an error, an error message appears:

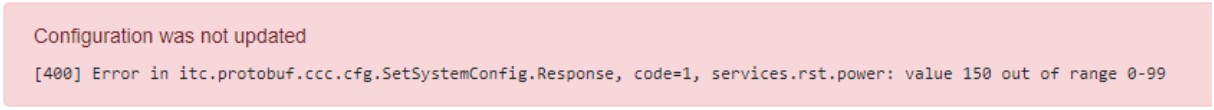


Figure 21 Error message

9.3 Monitoring

9.3.1 Status

The states of the individual components of the ITC as well as other states (resets, local alarms) are displayed here. The values are basically informative; errors cannot be reset here.

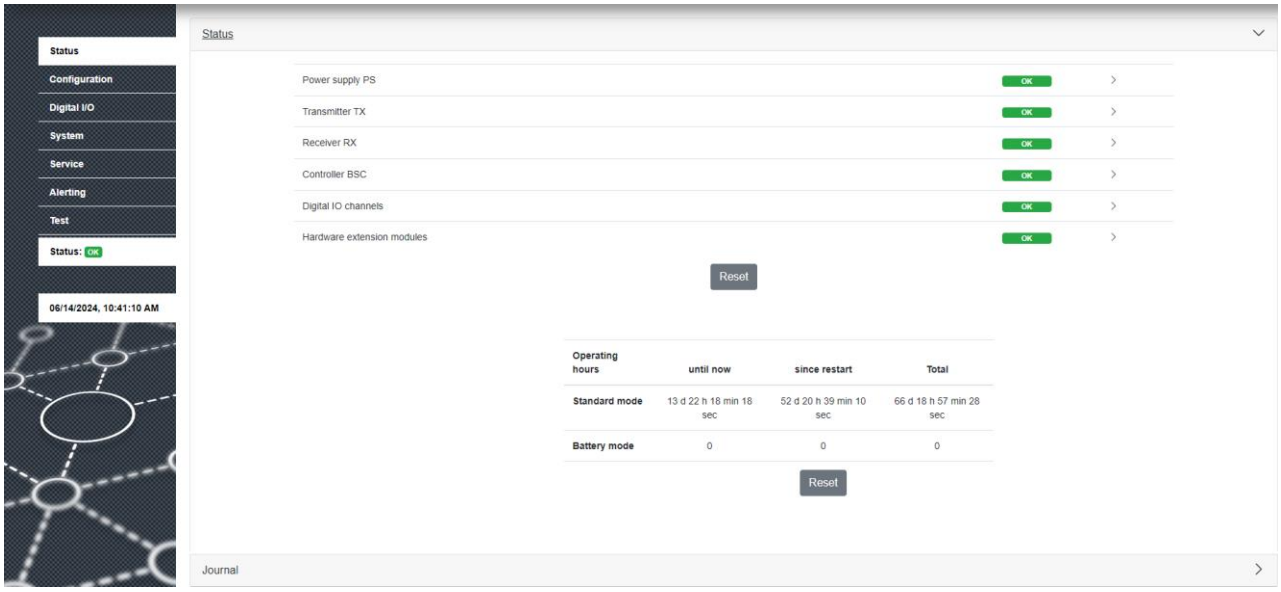


Figure 22 Status display

Standard (without extension modules)		
Status	**Substatus**	**Meaning**
Power supply PS	Mains	Power supply of the power supply.
	Battery	Power supply of the back-up battery (optional). If the voltage is too low, the ITC is shut down within 30 seconds. A restart is only carried out when mains voltage is applied.
	Operating voltage [V]	Voltage of the power supply unit for components. If a battery is connected, the battery voltage is displayed.
TX transmitter	Reverse Power	Error when too much HF power is reflected.
	Forward Power	Error if too little HF power is at the output.
	SC Device	State of the synchronization card.
	Temperature [°C]	Transmitter temperature.
Receiver RX	Communication	Communication with the transceiver.
	PLL Locking	Indicates whether the transceiver can set the channel (frequency).
	Programming	Indication whether the transceiver could be programmed successfully.
	RC Device	Receiver card condition.
	RSSI	Indicates whether the received level (RSSI 90) is sufficiently strong.
	RSSI Level	Power at the HF receiver in [dBm] (measurement at alarm reception on the ITC's own ring).
	RSSI adjustment	RSSI adjustment takes place in production - checks presence of the values.[$RSSI_{low}$ and $RSSI_{high}$]
Controller BSC	Temperature [°C]	Status and temperature of the controller.
Digital I/O channels	1 Local alarm	Binary state I/O channel (0=low; 1=high)
	5 Local alarm	Binary state I/O channel (0=low; 1=high)

Table 37 Legend for status display

Extension modules		
Status	**Substatus**	**Meaning**
Extension modules	GPS accuracy	Indication of whether the GPS accuracy is sufficient.
	GPS communication	Indication whether the GPS communication is working.
	GPS Sync Pulse	Shows that the GPS Synch-pulse is active.
	GPS Number of satellites	Number of available GPS satellites.
Digital I/O expansion card	-	-
LTE modem	-	-

Table 38 Legend for extension modules

Operating hours counter	
Standard Mode Time	Counter for the number of hours in operation with PowerSupply (since the last restart).
Battery mode	Counter for the number of hours in operation with battery (since the last restart).

Table 39 Legend for the operating hours meter

Counter	
Battery	Counter for the number of events from the battery.
System failure	Counter for the number of system failures.
Reset	Counter for the number of process resets.

Table 40 Counter legend

9.3.2 Logging

The logging allows a comprehensive view of the entire message traffic as well as numerous system and monitoring commands. Furthermore, numerous filters can be set to make the analysis and possible troubleshooting even more effective and efficient. The meaning of the various error messages as well as the recommended procedure when an error occurs in the logging interface is described in Chapter 9.10.

Attention:

- When updating to a new version, the current journal is migrated.
- The journal is lost during the downgrade. It is recommended to create a snapshot beforehand or to save the journal.

Hint:

The detailed information displayed (telegrams) is usually not completely visible. To read it, click on the entry and scroll to the right with the arrow keys.

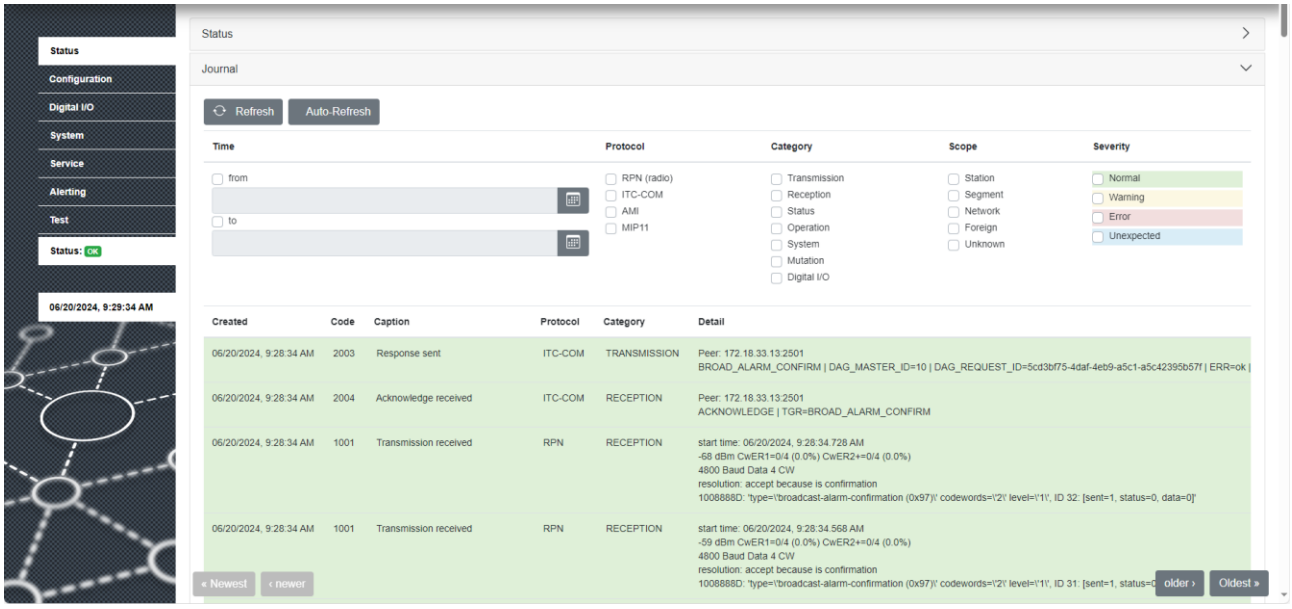


Figure 23 Monitoring display

Button	Functionality
Update	One-time manual updating of the log data.
Update automatically	Setting for permanent log data update.

Table 41 Functional description of buttons Monitoring user interface

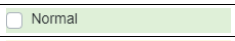
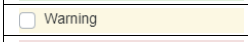
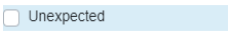
Checkbox		Functionality
Time	From	Set the start time of the log data display.
	Until	Set the end time of the log data display.
Protocol	RPN (radio)	Filter log entries for ITC-to-ITC telegrams.
	ITC-COM	Filter log entries for PNC-to-ITC telegrams.
	MIP 11	MIP11: Filter log entries that arrive via serial interface (e.g. Swissphone Touch Client).
	AMI	Filter Log entries from Alerting and Management Interface.
Category	Transmission	Filter log entries for ITC emitting telegrams.
	Reception	Filter log entries for ITC receive telegrams (can originate from ITC or PNC).
	Status	Filter by status messages.
	Operation	Filter for jobs that were executed by the services (entries 5xxx; see chapter 9.10).
	System	Filter for jobs that were executed by the system (entries 7xxx; see chapter 9.10).
	Mutation	Filter by changes to configuration parameters.
	Digital In/Out	Filter for events that occurred at the HW inputs and outputs.
Scope	Base station	Filtering for entries which are only intended for the present ITC, i.e. which concern the own ID or the own ring.
	Network segment	Filter for entries which apply to a network segment in which this ITC is active.
	Total network	Filter for entries which apply to a network segment of this network in which this ITC is not active.
	Foreign network	Entries originating from a third-party network (POCSAG-based) that uses an unknown network RIC.
	Unknown	Entries which originate from faulty messages whose network RIC could not be determined.
Severity		Display of events in normal operation.
		Display of events that may indicate a problem.
		Mains error / event that makes normal operation impossible.
		Unexpected events whose error codes are not listed in the manual.

Table 42 Legend for the checkboxes

9.4 Configuration

9.4.1 ITC configuration

In order to make the ITC correctly available in a network, at least the base station ID, standard frequency and baud rate, as well as the transmission power must be set. At least one net-wide segment must also be defined.

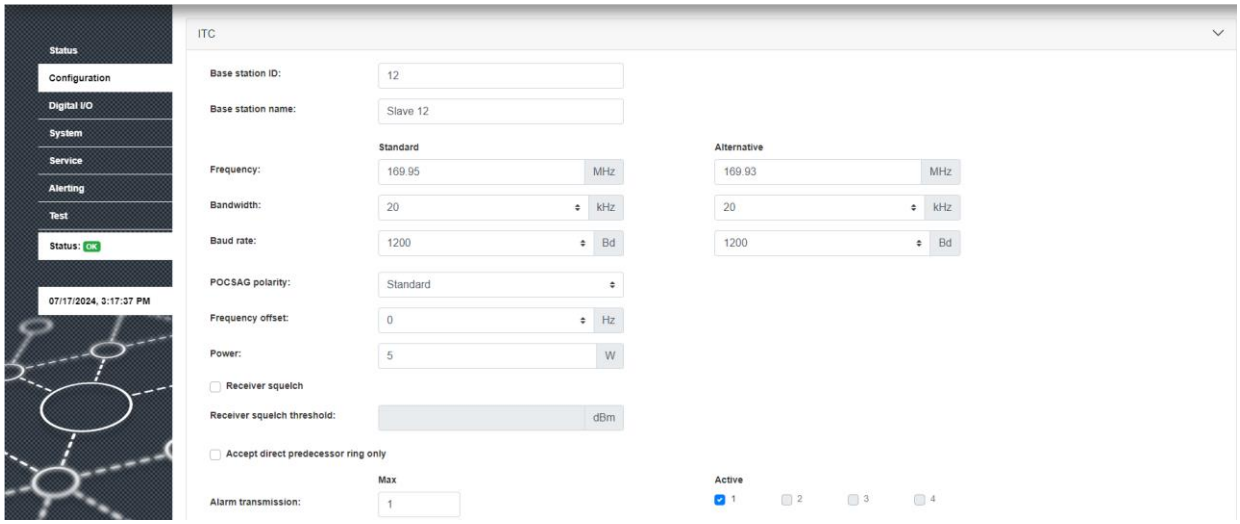


Figure 24 Configuration view

Input field	Function and input value	Required	Optional
Base station ID	Unique ID for the base station. Numeric value in the range {0...127}	X	
Base station name	Meaningful term for the ITC.		X
Standard frequency	Standard carrier frequency.	X	
Standard baud rate	Standard alarm baud rate (512; 1200; 2400; 4800)	X	
Standard bandwidth	Standard bandwidth	X	
Alternative frequency	Alternative carrier frequency		X
Alternative baud rate	Alternative alarm baud rate		X
Alternative bandwidth	Alternative bandwidth		X
Frequency offset	Used to reduce interference to improve the reception probability.		X
Transmitting power	Can be adjusted in 1W steps from 0-25W. In North America also the ranges 10…40W or 50W are available.	X	
Receiver squelch	Activates the receiver squelch (secondary ITC only).		X
Squelch frequency	Threshold signal strength for squelch (secondary ITC only).		X
Accept direct predecessor ring only	If active, this ITC will only accept messages from an ITC from the predecessor ring during a broadcast (secondary ITC only).		X
Multiple transmission	This allows alarm calls to be sent out several times in order to increase the coverage probability. Values in the range {1...4} are possible. The maximum value must be set to the same value throughout the network	X	
Active	Definition of which of the multiple transmissions must be executed by the ITC.	X	

Table 43 Legend for input fields

9.4.1.1 Mesh segments

Furthermore, segments and feedback scenarios must be correctly created or defined, so that the alarm can be sent to the appropriate areas and the status feedback can be used.

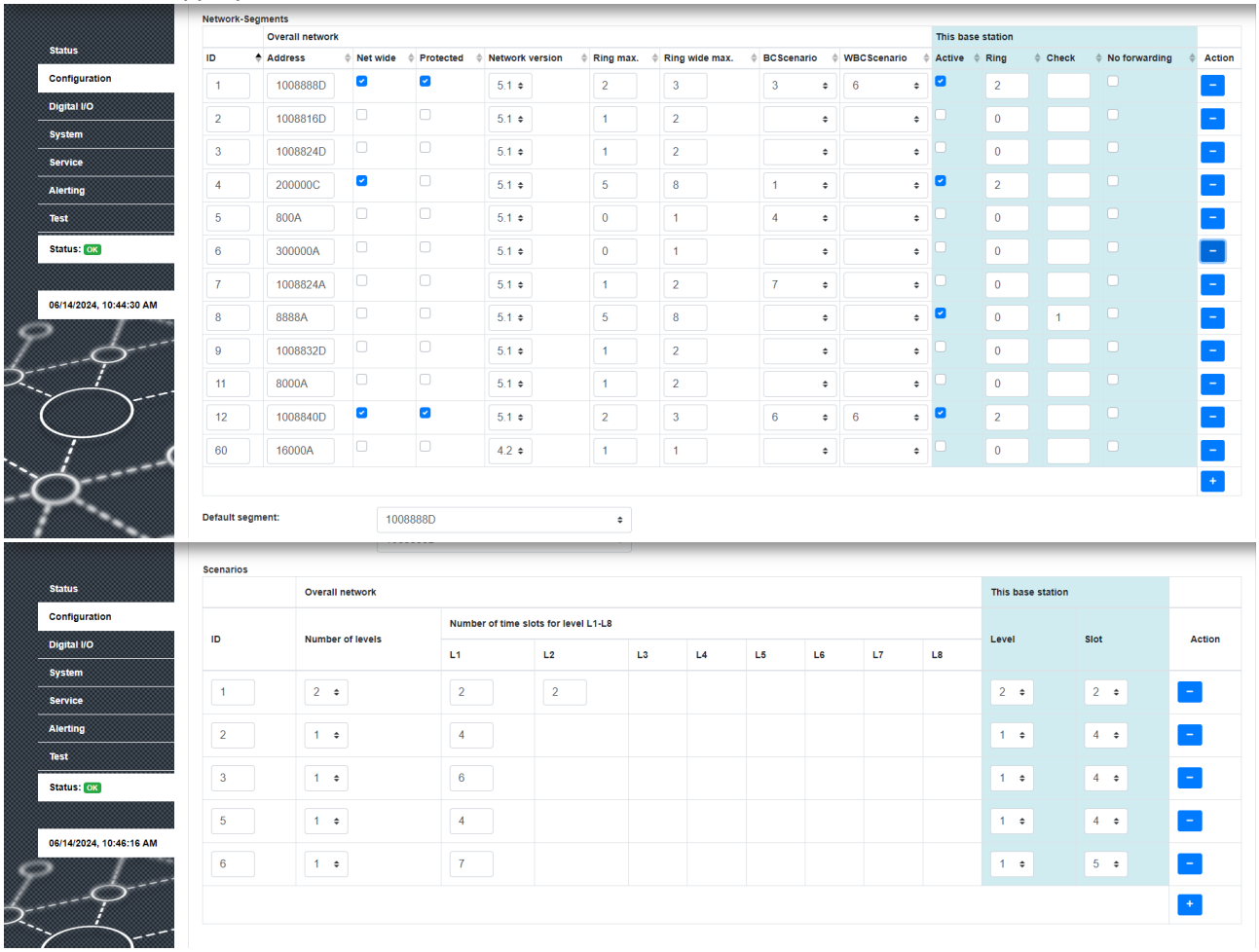


Figure 25 Segment/ and scenario configuration

Overall network segment:
A functioning paging network consists of at least one segment to which all ITCs of the network belong. This segment is active on every ITC and marked as network-wide and should definitely be protected so that it cannot be accidentally deleted via the air interface. In this overall network segment, the network-wide alarming and the network management are carried out via the air interface. If necessary, all other segments can be added, reconfigured or deleted via this overall network segment.

Subnetwork segments:
A paging network can have additional - usually local - segments to which not all ITCs belong. These segments can be used to alert a sub-network. All segments used in a network should be configured on all ITCs, regardless of whether the ITCs themselves are active in these segments or not.

Local segment:
One segment (preferably segment 60) can be configured on each ITC as a local segment that allows broadcasting on only that ITC if required.

Input field	Function and input value	Required	Optional
ID	Segment ID: Numeric digits in the range {1...60} can be assigned.		X
Address	Segment address: of type 'RIC' with sub-address, must be in frame 0 (i.e. divisible by 8 without remainder).	X	
Network-wide	At least 1 segment must be active on all ITCs and thus marked as 'network-wide'.		X
Protected	The overall network segment should definitely be marked as protected.		X
Network version	Refers here to the network timing version, it must be identical for each ITC in a specific segment. - 4.2 is necessary for backwards compatibility with the older ITC 3 or ITC 4. - 5.1 can be selected if there is only ITC 5 in the network	X	
Do not forward	The forwarding of a broadcast alert can be suppressed - exclusively on the transport layer - for radio optimization purposes.		X
Active	In any case, only segments set 'active' are used for alarm transmission. For test purposes, the GUI allows no segment to be marked as 'active'; however, at least 1 net-wide segment must be set 'active' for alarm transmission.		X
Ring	Ring number belonging to the ITC.	X	
Check	The ITC evaluates messages with this ring number.		X
Ring Max.	Maximum number of rings that can be defined for the broadcast.	X	
Ring Wide Max.	Maximum number of rings that can be defined for Wide Broadcast.	X	
BC Scenario	Feedback scenario ID for broadcast	X	
WBC scenario	Feedback Scenario ID for Wide Broadcast	X	
	Adding a new network segment		
	Removing an existing network segment		

Table 44 Legend for input fields Network segments

Hint:

ID: For reasons of clarity, define the overall network segment with '1'; number subnetworks consecutively with '2'...'x'.

Protected: Local segments can be deleted via the air interface if they are not protected.

Check: For primary ITCs, the check ring defines the ring on which it monitors the transmission.

Note: After editing the segment, the user must confirm with “Save Changes”.

9.4.1.2 Scenario

In the field "Default segment", the address including the sub-address from the primary ITC on ring 0 is to be entered. If needed, Swissphone can configure this part, base on RSSI values.

Segment address (type 'RIC' with sub-address) must necessarily be in frame 0 (i.e. divisible by 8 without remainder). The default segment designates the RIC of the segment used by this ITC to send alarms. This concerns alarms which are triggered via ITC-COM (if no other segment is specified), via the user interface or a digital input. The ITC must be the (local) primary in this segment, i.e. it must be on ring 0.

Input field	Function and input value	Required	Optional
ID	ID of the feedback scenario; values in the range {1...30} are allowed.	X	
Total network Number of slots for Level L1-L8	For all levels L1-L8, slot values are allowed in the range {1...30}.	X	
Base station level	The level set for the ITC.	X	
Base station slot	The time slot set for the ITC.	X	
	Adding a new feedback scenario		
	Removing an existing feedback scenario		

Table 45 Legend for input fields Scenarios

9.4.2 Alarm configuration

Local alarming can be done either via the GUI or via serial interface (MIP11 protocol). For both inputs, the alarm type (broadcast, widebroadcast) and the baud rate can be selected. If the baud rate is set to "Standard delivery", the alarm is sent directly without a transport layer. "Fast delivery", on the other hand, uses the transport layer; this can be useful if not only the corresponding station but a whole segment - consisting of several rings - is to be addressed.

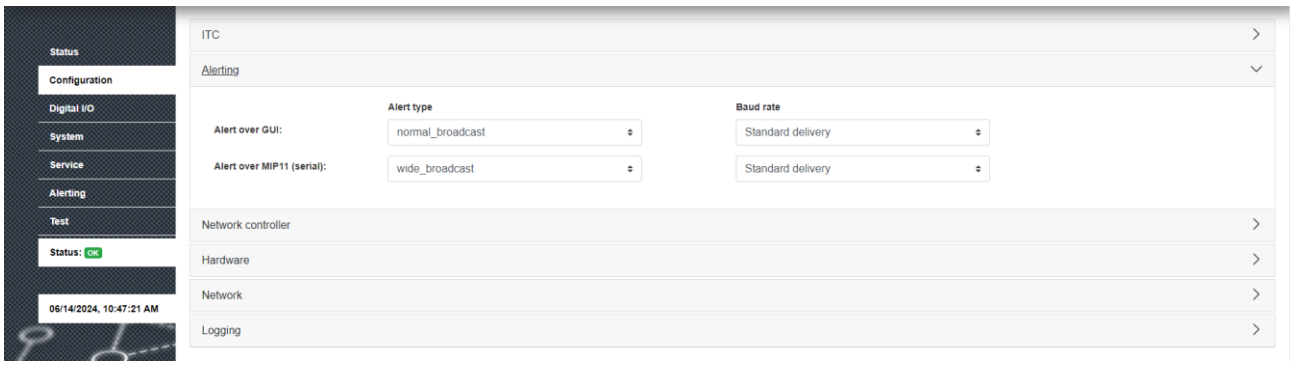


Figure 26 Alarm type configuration

9.4.3 PNC configuration

To make authorized PNCs available as clients, their IP addresses as well as the input and output port must be set.

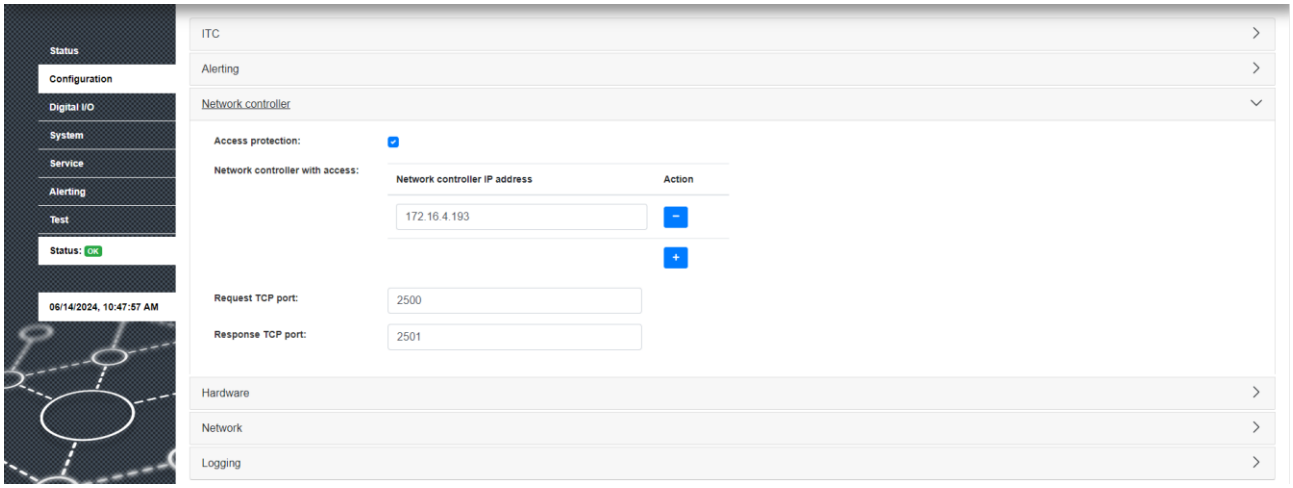


Figure 27 PNC configuration

The checkbox for access protection can be used to grant or deny access rights to the PNCs. The IP check only takes place after access protection has been activated; by default, all PNCs have access to the ITC.

Input field	Function and input value
PNC-with access right	All authorised PNCs with the corresponding IP addresses can be entered here.
Request TCP port	Default Port 2500.
Response TCP port	Default Port 2501.
	Adding an IP address with access right.
	Removing an existing IP address with access right.

Table 46 Legend for PNC configuration input fields

9.4.4 Hardware configuration

The hardware parameters depend on the transceiver module used and are read automatically from the TRx19.

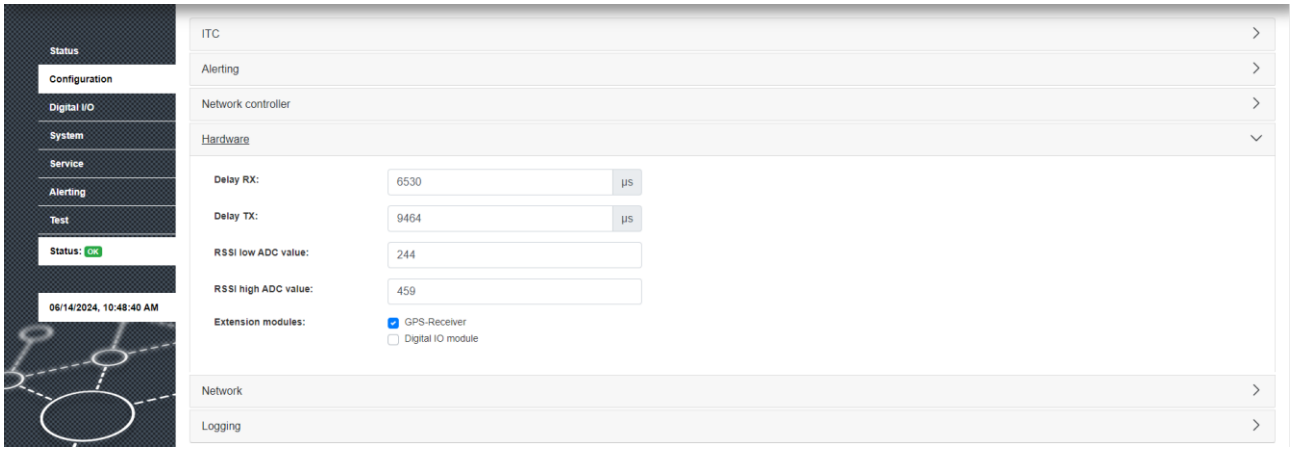


Figure 28 Configuration of hardware readings

Input field	Function and input value
Delay Rx	Delay value of the TRx module, in µs. Automatically set by the final test.
Delay Tx	Delay values of the TRx module, in µs. Automatically set by the final test.
RSSI Low ADC Value	Offset parameters of the ADC linear equation (value according to final test).
RSSI High ADC Value	Offset parameters of the ADC linear equation (value according to final test).
Extension modules	A GPS card built into the ITC must be activated here (GPS is required with a primary DAU if a multi-primary network is used). Furthermore, the optional I/O expansion card can be activated here.
Activate power supply for external devices (13.5V/1A max OUT) - (Power saving mode is disabled)	Activate this checkbox to activate the power supply for external devices.
Battery capacity	Capacity of the connected battery in Ah.

Table 47 Legend of input fields for hardware measured values

9.4.5 Network configuration

The TCP/IP-relevant parameters can be set here in order to connect the ITC to the network accordingly. Furthermore, it is possible to establish an LTE connection via the internal modem.

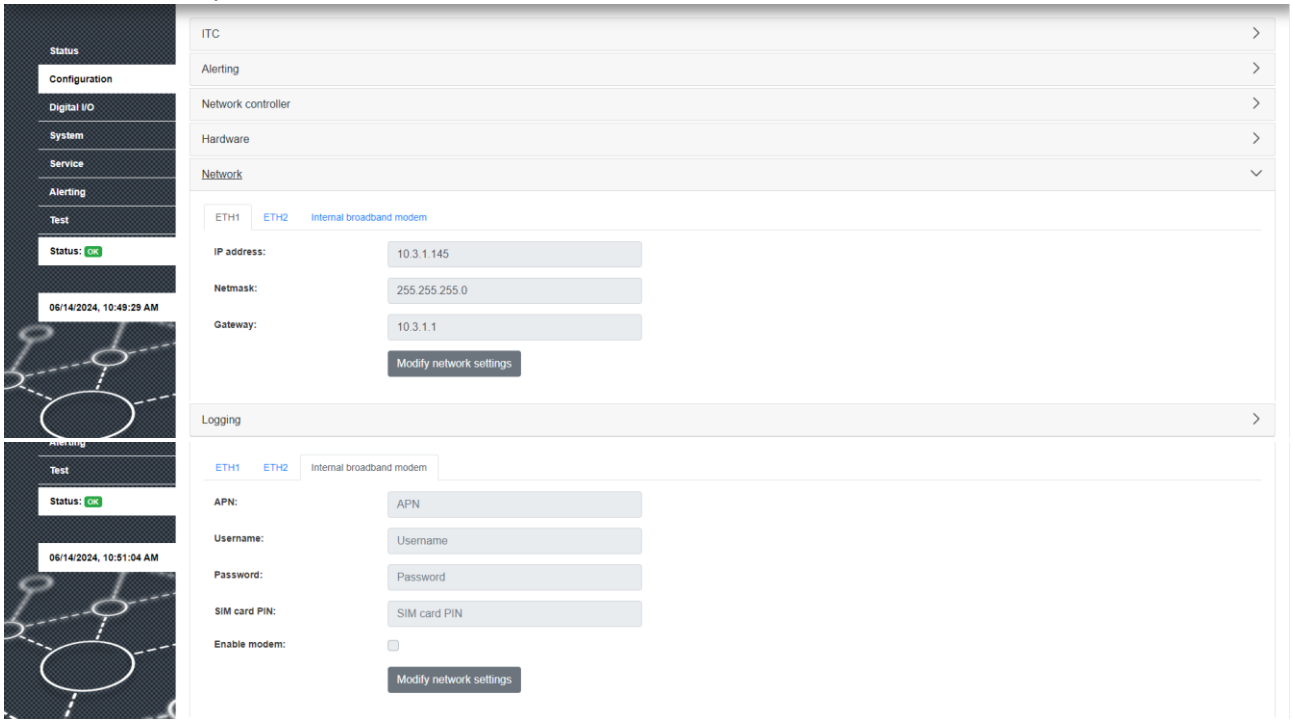


Figure 29 Network configuration

Input field		Function and input value
ETH1 & 2	IP address	IP address of the ITC.
	Net mask	Netmask of the ITC.
	Gateway	IP address of the gateway which is connected to the ITC.
Internal broadband modem	APN	Access point name (APN) of the SIM card provider.
	Username	Optional
	Password	Optional
	SIM card PIN	Optional
	Activate modem	If a modem is to be used and the SIM card is inserted, the function must be activated here.

Table 48 Network configuration legend

With the button "Change network parameters" the above settings can be changed.

Hint:
If the button "Change network settings" is pressed in the pop-up window, the settings are immediately applied.

The following safety measures are recommended when using a connection via the internal LTE modem:

1. Prohibit outgoing traffic via LTE.
2. VPN should not be shared with other hosts.
3. Only SSH and HTTP(s) should be allowed via VPN.
4. Use HTTPs instead of HTTP.
5. Use strong SSH password (or use private/public key login only).
6. Carry out regular security updates.
7. Allow only authenticated HTTP(s) access.

9.4.6 Logging

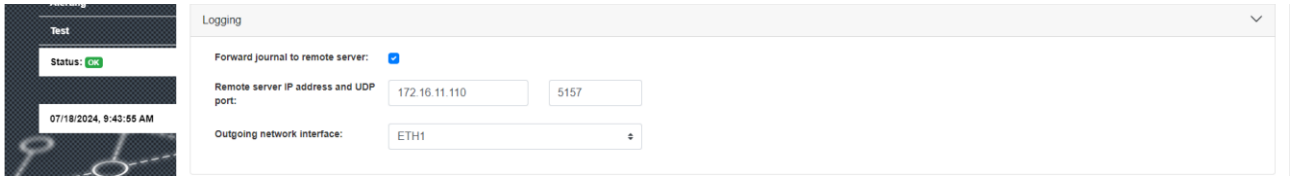


Figure 30 Logging

Input field	Function and input value
Forward journal to remote server	Activates the sending of log data to the remote server
Remote server IP address and UDP port	IP address and port number of the remote server
Outgoing network interface	Network interface (ETH1, ETH2 or internal broadband modem)

Table 49 Logging legend

9.5 Digital I/O

9.5.1 Local alerting

For the inputs **SC IN 0** and **SC IN 1,** predefined message texts (type 'numeric' and 'tone only' also possible) can be stored and assigned to a local segment and RIC. If necessary, more I/Os are available with an optional I/O card.

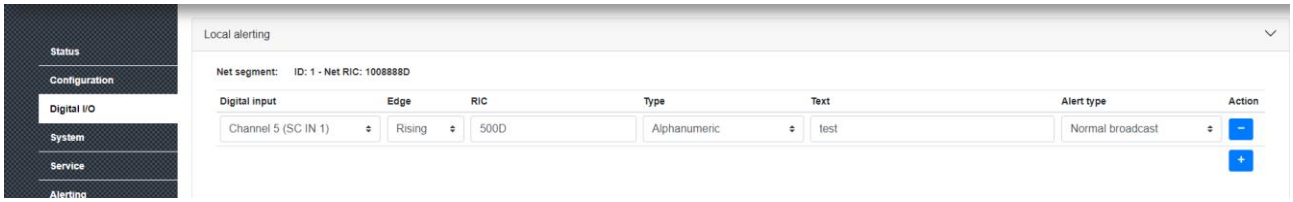


Figure 31 Configuration Digital I/O

Input field	Function and input value
Digital input	Number of the input contact.
Flank	Rising or falling edge.
RIC	Pager RIC.
Type	Message category.
Text	Message text visible to pager.
Alarm type	Transmission via broadcast or wide broadcast.
	Add digital input.
	Remove existing digital input.

Table 50 Digital I/O legend

9.5.2 Siren control

The following illustration shows the interface for configuring the connection of a siren control. Only the RIC and the defined digital output have to be defined.

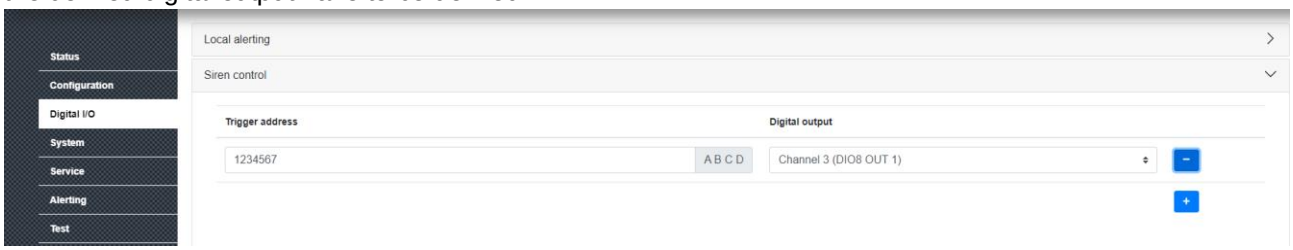


Figure 32 Siren control configuration

Input field	Function and input value
Activation address	Siren control-RIC
Digital output	Digital output to which the siren control is connected.

Table 51 Siren control legend

The siren signal to be executed is determined via the respective function address of the RIC (ABCD) based on the TR BOS guidelines:

A: Close contact for 2s
B: Open / close contact in 12s cycle during 60s
C: Open / close contact in 2s cycle during 60s
D: Close contact for 60s

9.5.3 Toggle Output

The Toggle Output configuration is used to program digital outputs with a specific time duration based on the RIC address of the broadcasted telegram.

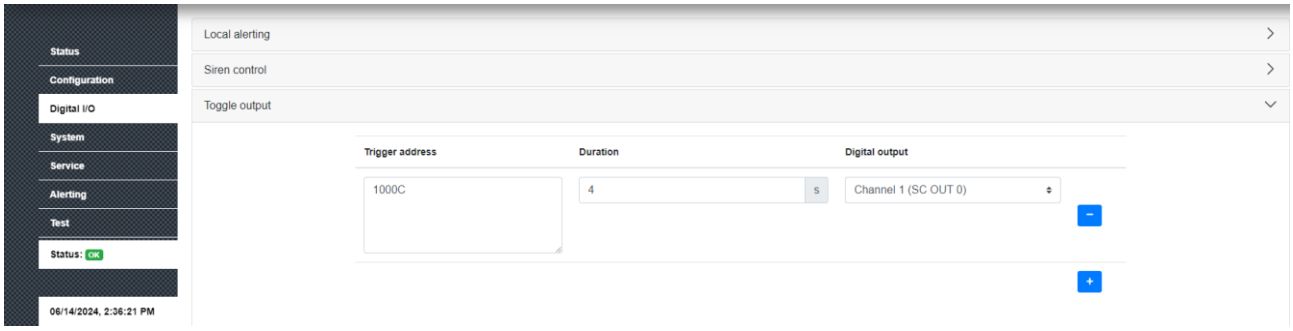


Figure 33 Configuration Toggle Output

Input field	Function and input value
Trigger address	RIC address to trigger digital output signal
Duration	Duration of signal in seconds.
Digital output	Output selection.

Table 52 Toggle Output Legend

9.5.4 Digital outputs

The interface for configuring the digital outputs is used to set the digital outputs to logic 0 or logic 1. By setting the status, the output is set to logic 1. The difference to the “Toggle output” tab, is that digital signals are not linked with a specific RIC, but instead simply set manually to high or low. This can be done with the checkbox directly in the ITC interface or from the PNC with a Set-Configuration telegram. The “SC OUT 0” channel is placed on the Synchro-Card.

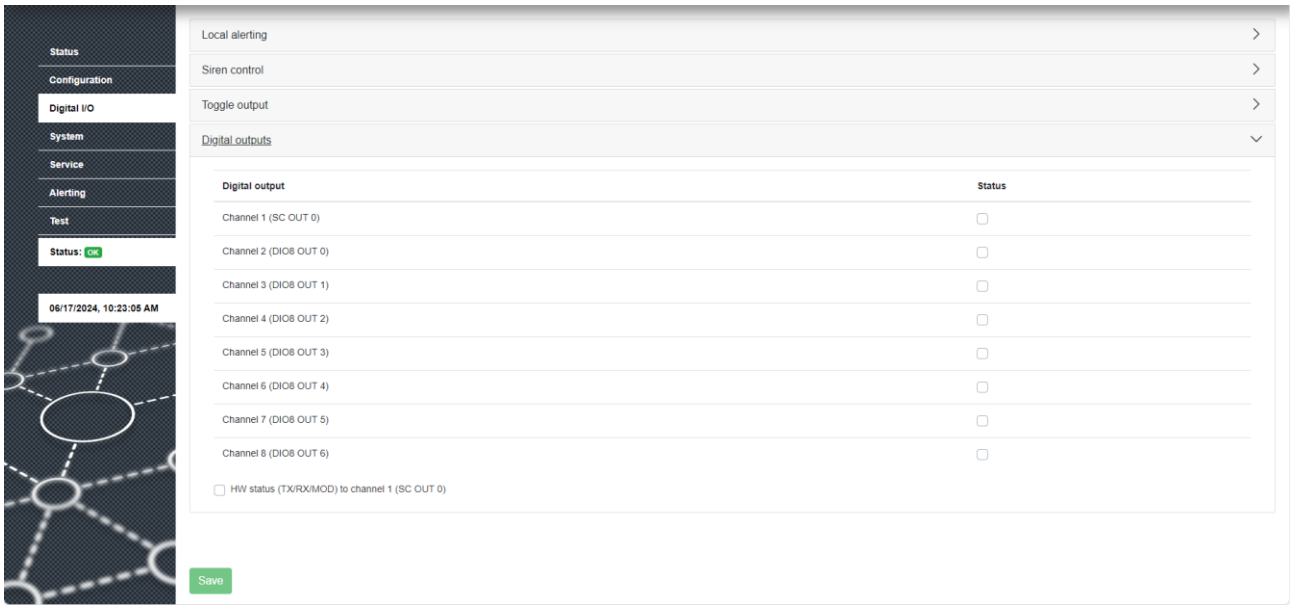


Figure 34 Configuration Digital outputs 1

The checkbox **HW Status (TX/RX/MOD) on channel 1 (SC OUT 0)** can be used to define that the corresponding output channel 1 is activated when a transmitter/receiver error is triggered or the error of an extension card.

If an output channel is used in the “Toggle output” tab, then it becomes unavailable for the “Digital output” tab:

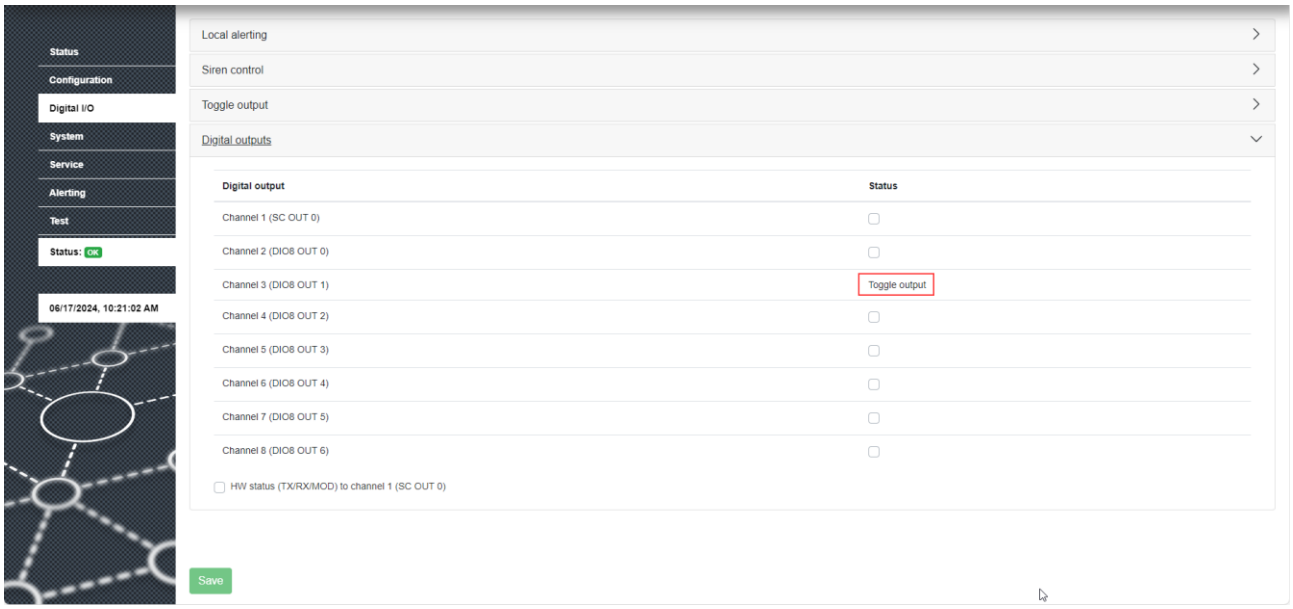
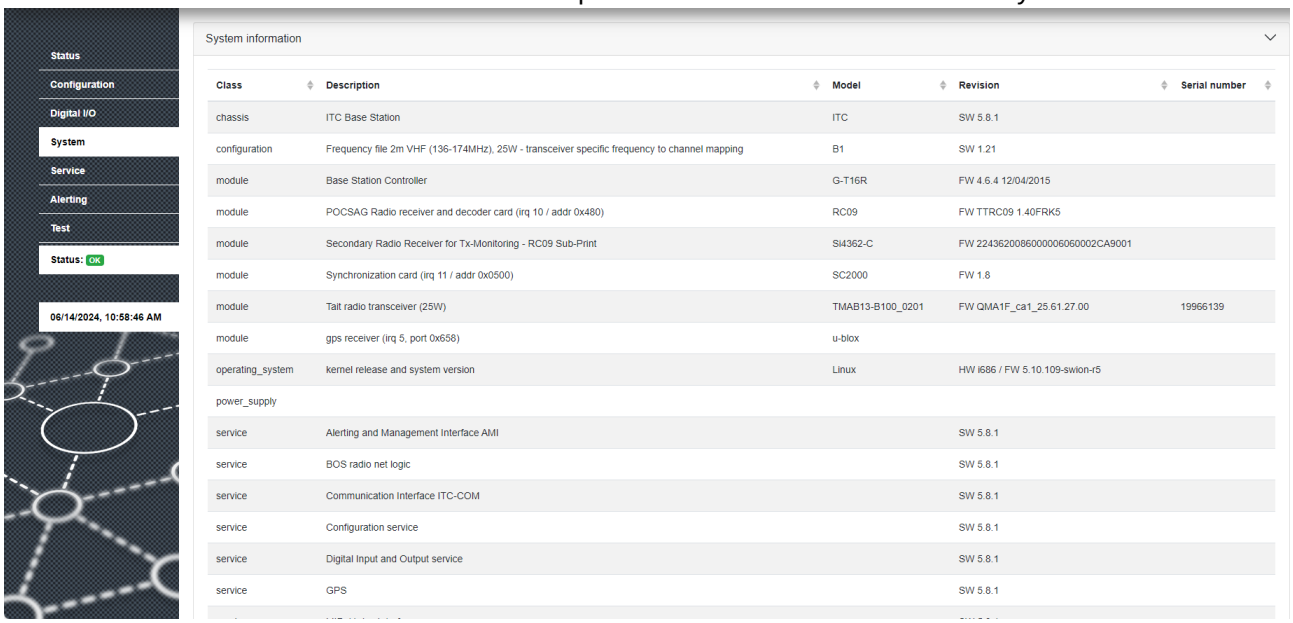


Figure 35 Configuration Digital outputs 2

9.6 System

Here you can find information about the individual HW components as well as software versions and serial numbers. This information must be sent to Swissphone in the event of an error or analysis.



Class	Description	Model	Revision	Serial number
chassis	ITC Base Station	ITC	SW 5.8.1	
configuration	Frequency file 2m VHF (136-174MHz), 25W - transceiver specific frequency to channel mapping	B1	SW 1.21	
module	Base Station Controller	G-T16R	FW 4.6.4 12/04/2015	
module	POCSAG Radio receiver and decoder card (irq 10 / addr 0x480)	RC09	FW TTRC09 1.40FRK5	
module	Secondary Radio Receiver for Tx-Monitoring - RC09 Sub-Print	Si4362-C	FW 22436200860000060060002CA9001	
module	Synchronization card (irq 11 / addr 0x0500)	SC2000	FW 1.8	
module	Tait radio transceiver (25W)	TMAB13-B100_0201	FW QMA1F_ca1_25.61.27.00	19966139
module	gps receiver (irq 5, port 0x658)	u-blox		
operating_system	kernel release and system version	Linux	HW i686 / FW 5.10.109-swion-r5	
power_supply				
service	Alerting and Management Interface AMI		SW 5.8.1	
service	BOS radio net logic		SW 5.8.1	
service	Communication Interface ITC-COM		SW 5.8.1	
service	Configuration service		SW 5.8.1	
service	Digital Input and Output service		SW 5.8.1	
service	GPS		SW 5.8.1	

Figure 36 System information

9.7 Service

The service interface is used to upload and save ITC configurations or to generate or export system data.

The service interface allows uploading or saving ITC configurations, generating and retrieving system data for debugging/troubleshooting purposes, updating software (e.g. updates), changing the default password, setting the system time and restarting the ITC.

Important note for SW upgrades from V4.x to V5.x:

1. Download/save ITC4 configuration.
2. Insert ITC5 flash card.
3. **ITC5: Enter customer-specific frequency or upload m8p file**

   -> This must be done before the following upload (point 4) of the ITC4 configuration so that the frequency is not missing from the frequency table.
4. Upload saved ITC4 configuration to ITC5.

Input field		Function and input value
Download data	System data generate	With slow connections, it makes sense to generate the file before downloading. When the journal has been generated, the amount of data contained in the .zip file is visible. The time period always covers a defined time range that looks into the past.
	Download system data	Download the already generated journal. If no journal has been pre-generated yet, the download can also be started directly.
Update software	Current version	Displays the currently implemented software version
	Passive version	The passive version shows another version in operation, which is stored in the system but is not active.
	New version	Field for selecting the new software version to be installed. With the button "Upload" this can be pre-installed but not yet activated; it then appears as a passive version. With the button "Upload and activate" it can be made the current version directly.
Upload/download configuration	Configuration	Here, an ITC config file can be exported / imported, e.g. when replacing an ITC at a location.
	Configuration comes from the same base station	The complete configuration including IP / name / network settings is adopted.
	Apply ETH-1 IP configuration	The network configuration (see chapter 9.4.5) is adopted if activated.
	Adopt WWAN configuration	Settings of an optional internal broadband modem are adopted (see chapter 9.4.5).
Set customer frequencies	Upload	Possibility to upload a frequency file (ex works). From ITC2800 onwards, a frequency file is no longer necessary.
	Enter manually	Input of a customer-specific frequency that is not contained in the frequency file. From ITC2800 onwards, this can be done directly in the configuration (see chapter 9.4.1).
Change password	Access web interface	User selection.
	New password	Assigning a new password.
	Repeat new password	Confirmation of the new password.
Operation	System date/time	Setting the date and time. Attention: In mains operation, set the date and time via the Time-SET command in the PNC.
	ITC Restart	Restart of the ITC.

Table 53 Service interface

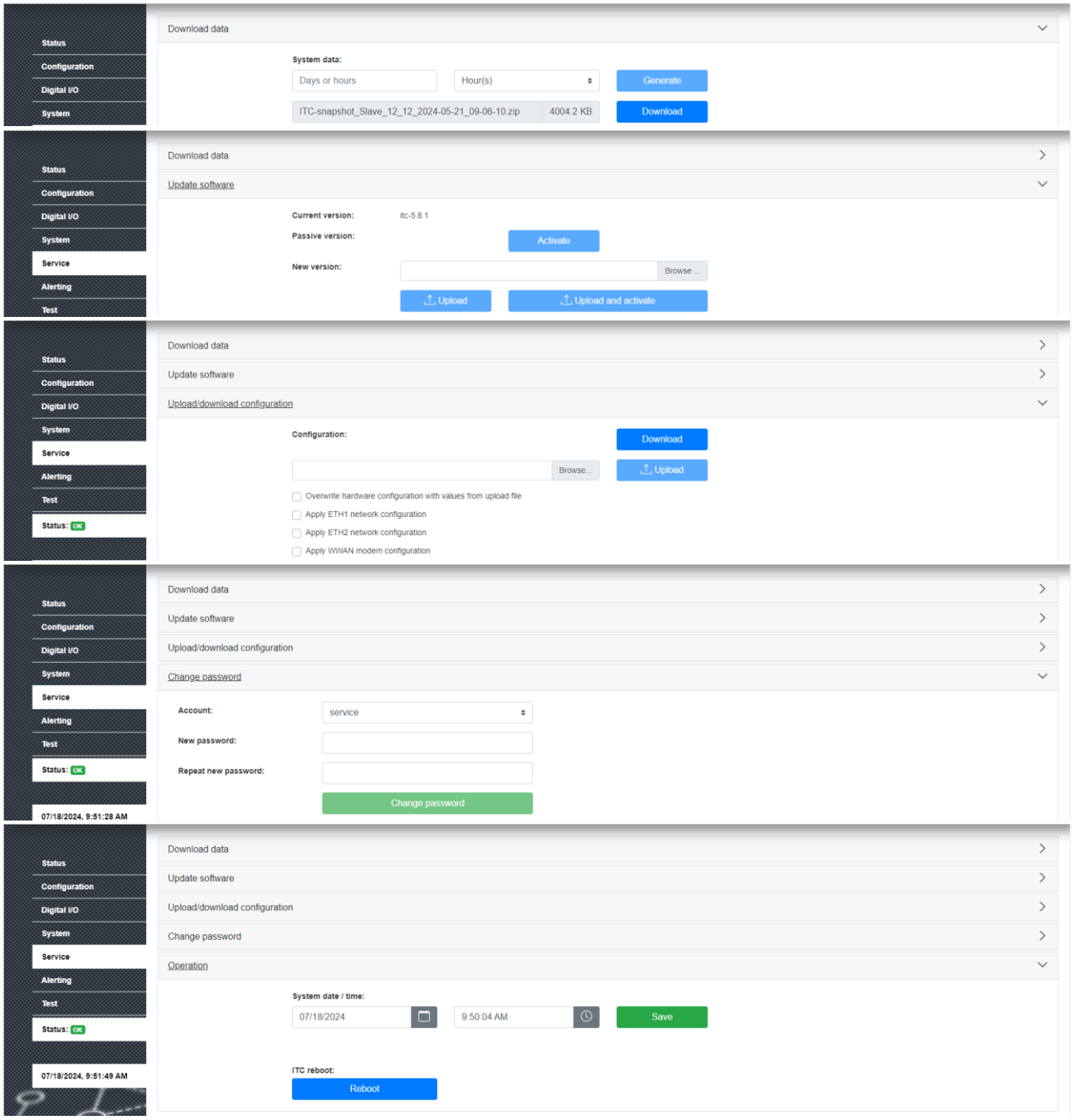


Figure 37 Service

9.8 Alerting

The 'Alarming' interface enables the transmission of a freely definable alarm message in the configured default segment.

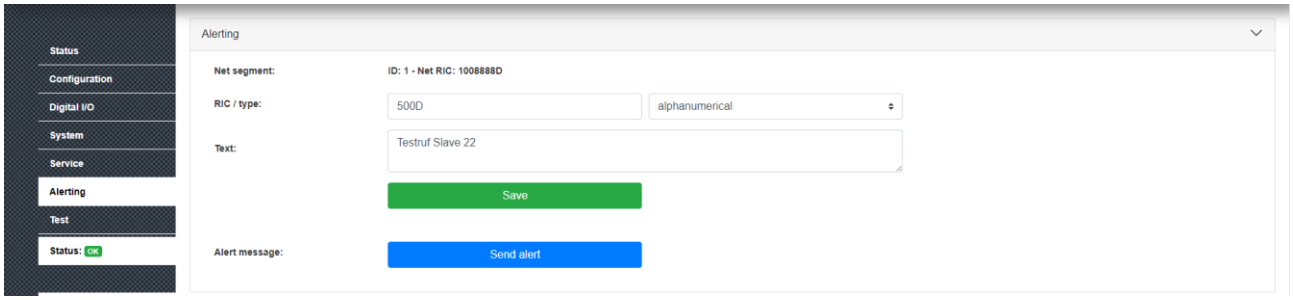


Figure 38 Alarm configuration

Input field	Function and input value
Network segment	Corresponds to the local segment by default (informative display).
RIC / Type	Specification of the addressee and the recipient type.
Text	Alarm text to be sent.
Alarm message	Button for sending the defined alarm text in the network segment.

Table 54 Alarm configuration legend

> **Hint:**
> The settings made can be saved with the Save button. The settings remain available even after restarting.

9.9 Test

The parameters "Standard frequency" and "Standard baud rate" set under configuration can be used to make the POCSAG transmissions audible. This is done with the integrated beeper on the RC card. The button "Send" sends out a corresponding preamble with the configured time (seconds).

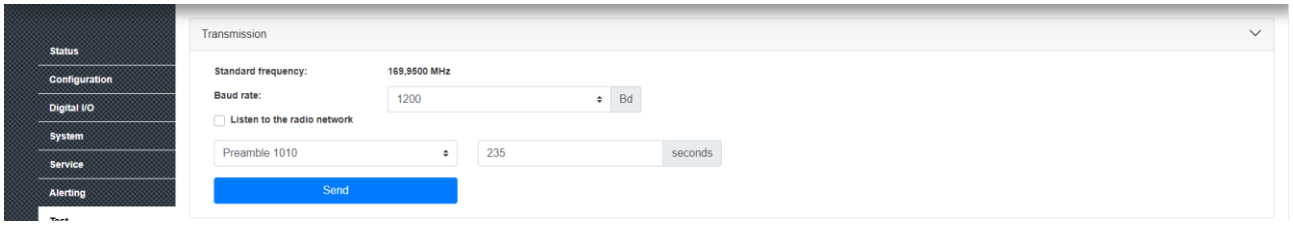


Figure 39 Test configuration

9.10 Error Codes

Severity	Error code	Error description	Category	Comment	Protocol	Meaning
Error codes 1xxx (Radio interface)						
N	1001	Transmission Received	RECEPTION		RADIO	
N	1002	Transmission Sent	TRANSMISSION		RADIO	
N	1004	Uninteresting Transmission Abortion	RECEPTION	Abort of receiving a transmission which we did not yet consider to be interesting for this base station.	RADIO	
E	1101	Transmission abortion	RECEPTION	Abort of receiving a transmission which we know is addressed to this base station (broadcast ring, p2p ID or broadcast confirmation level).	RADIO	
E	1102	Transmit Failure	TRANSMISSION	The execution of a radio transmission failed.	RADIO	Check the status and configuration. If no errors are apparent there, contact customer support.
W	1105	Transmit in occupied net	TRANSMISSION	The base station knows that the network is busy, but sends a transmission into the net which may result in collisions.	RADIO	If this occurs regularly, there is a configuration problem. The error should only occur with decentralized "primary" base stations.
N	1106	Forward broadcast disabled by config	TRANSMISSION	Forward disabled by config.		
W	1108	Radio Restarted	SYSTEM	Radio Restarted message received.	RADIO	If this happens regularly, there is a problem with the radio or the radio channel.
Error codes 2xxx (Primary radio interface independent)						

N	2001	Request received	RECEPTION		ITCCOM	
N	2002	Request acknowledge sent	TRANSMISSION		ITCCOM	
N	2003	Response sent	TRANSMISSION		ITCCOM	
N	2004	Response acknowledge recieved	RECEPTION		ITCCOM	
W	2101	Receive request failed	RECEPTION		ITCCOM	Check network connection and client version.
W	2102	Send acknowledge failed	TRANSMISSION		ITCCOM	Check network connection and client version.
W	2103	Send response failed	TRANSMISSION		ITCCOM	Check firewall settings and connection.
W	2104	Receive acknowledge failed	RECEPTION		ITCCOM	Check network connection and client version.
W	2105	Received invalid request	RECEPTION		ITCCOM	Check network connection and client version.
Error codes 3xxx (Secondary radio interface independent)						
N	3201	Request received	RECEPTION	MIP-11 Telegram is received.	MIP11	
N	3202	Acknowledge sent	TRANSMISSION	MIP-11 Acknowledge is sent.	MIP11	
W	3301	Error on Interface	RECEPTION	MIP-11 errors which occurred on receiving telegrams. Note that not all reported errors are logged here, as potentially every received character could cause an error. Errors in journal: TIMEOUT, BUFFER_FULL.	MIP11	
E	3302	Error on sending out	TRANSMISSION	Acknowledged messages are dropped because of processing error.	MIP11	
N	3401	GPS position and time fixed	STATUS		GPS	
W	3402	GPS position and time fix lost	STATUS		GPS	
N	3501	Syslog remote logging enabled	STATUS		SYSLOG	
N	3502	Syslog remote logging enabled	STATUS		SYSLOG	

W	3503	Syslog output queue congested	STATUS	Remote syslog server is available, but is not processing log data from ITC (fast enough). Entry is written at most once per hour (without restart).	SYSLOG	Check syslog server, network connection between itc and syslog server or configuration for journal logging over syslog.
Error codes 4xxx (Management and user interface)						
N	4001	AMI Request received	RECEPTION		AMI	
N	4002	AMI Response sent	TRANSMISSION		AMI	
E	4101	Invalid AMI request	RECEPTION		AMI	Check client.
E	4104	Customer frequency delete request failed	RECEPTION		AMI	
Error codes 5xxx (Operation)						
N	5001	Test mode started	OPERATION			
N	5002	Test mode stopped	OPERATION			
N	5003	Change to alternate frequency	OPERATION			
N	5004	Change back to standard frequency	OPERATION			
N	5006	Delay Operation	OPERATION	The execution of a request has been delayed.		
N	5007	m8p file upload	OPERATION		AMI	Upload m8p file.
N	5008	Customer Frequency delete request accepted	OPERATION		AMI	
N	5009	beep on tone-only call	OPERATION	Test function.		
E	5101	Radio Network Busy	OPERATION	Request received while busy.		Check client version and configuration, check network configuration, more than one client sends requests.
E	5102	Unknown segment	OPERATION	Segment is not known.		Check configuration.
E	5103	Inactive segment	OPERATION	Segment is known, but not active.		Check configuration.
E	5104	Station is no master in segment	OPERATION	Base station is not master for the requested transmission, rejected.		Check configuration.
E	5107	m8p file upload failed	RECEPTION		AMI	
E	5108	Delete customer frequencies failed	OPERATION			

N	5201	Send Broadcast	OPERATION	Master sends broadcast.		
N	5202	Forward Broadcast	OPERATION	Slave Forwards Broadcast.		
N	5203	Transmission Check Successful	OPERATION	Transmission check was completed successfully.		
E	5301	Check Ring Timeout	OPERATION	broadcast 'tmo' error.		
E	5302	Multimaster too late	OPERATION	broadcast 'tla'.		Check Client Time Server.
E	5303	Multimaster too early	OPERATION	broadcast 'tea'.		Check Client Time Server.
E	5304	Multimaster no sync reference	OPERATION	broadcast 'tns'.		Check GPS connection.
E	5305	Transmission Check Error	OPERATION	There was an error in the transmission check (wrong codewords or no codewords received at all).		If no transmission was received: Check configuration. If everything is OK, there may be a hardware problem. If the transmission had errors: Check the syslog for a possible error image Contact customer support for this.
N	5401	Send P2P Request	OPERATION	Master sends P2P Request.		
N	5402	Forward P2P Request	OPERATION	Slave forwards P2P Request (to final hop).		
N	5403	Send P2P Response	OPERATION	Slave (Final Hop) sends P2P Response.		
N	5404	Forward P2P Response	OPERATION	Slave forwards P2P Response (back to master).		
E	5501	P2P Timeout	OPERATION	P2P 'tmo' error.		Checking the radio signal quality, antenna, network planning.
N	5801	Push User Data	OPERATION	set new user data.		
N	5802	Update-User-Data	OPERATION	update user data.		
N	5803	Clear-User-Data	OPERATION	clear the available user data.		
N	5804	Fetch-User-Data	OPERATION	fetch user data.		
N	5805	User data timeout	OPERATION	Timeout on user data.		
Error codes 6xxx (Current status)						
N	6001	Mains power restored	STATUS		ps.mains	
W	6002	Mains power failure	STATUS		ps.mains	Check mains power supply.

					counters.emergency_power_supply	
E	6003	Low battery power	STATUS		ps.battery counters.low_power	Check battery capacity.
N	6004	PS: operating voltage	STATUS			
N	6005	Battery reverse polarity changed to ok	STATUS		ps.battery_reverse_polarity	
W	6006	Battery reverse polarity detected	STATUS		ps.battery_reverse_polarity	Change battery polarity
N	6007	Battery wire break changed to ok	STATUS		ps.battery_wire_break	
W	6008	Battery wire break detected	STATUS		ps.battery_wire_break	Fix battery connection
N	6009	Battery defect changed to ok	STATUS		ps.battery_defect	
W	6010	Battery defect detected	STATUS		ps.battery_defect	Replace battery
N	6101	Forward Power changed to Ok	STATUS		tx.forward_power	
W	6102	Forward Power changed to Warning	STATUS		tx.forward_power	Possible problem, check system.
N	6111	Reverse Power changed to Ok	STATUS		tx.reverse_power	
W	6112	Reverse Power changed to Warning	STATUS		tx.reverse_power	Possible problem, check system.
N	6113	Transmitter temperature	STATUS	°C	tx.temperature	
N	6121	SC Device changed to Ok	STATUS		tx.sc_device	
E	6123	SC Device changed to Error	STATUS		tx.sc_device	Problem, e.g. hardware failure etc..
N	6201	Radio communication changed to Ok	STATUS		rx.communication	
E	6203	Radio communication changed to Error	STATUS		rx.communication	
N	6209	Radio communication cleared	STATUS		rx.communication	

N	6211	Radio programming changed to Ok	STATUS		rx.programming	
E	6213	Radio programming changed to Error	STATUS		rx.programming	
N	6219	Radio programming cleared	STATUS		rx.programming	
N	6221	PLL locking changed to Ok	STATUS		rx.pll_locking	
E	6223	PLL locking changed to Error	STATUS		rx.pll_locking	
N	6229	PLL locking cleared	STATUS		rx.pll_locking	
N	6231	RSSI level changed to OK	STATUS		rx.rssi	
W	6232	RSSI level changed to Warning	STATUS		rx.rssi	
E	6233	RSSI level changed to Error	STATUS		rx.rssi	
N	6239	RSSI level cleared	STATUS		rx.rssi	
N	6241	RC09 firmware version OK	STATUS		rx.rc_device	
W	6242	Wrong RC09 firmware version	STATUS		rx.rc_device	
N	6251	RSSI adjustment ok	STATUS		rx.rssi_adjustment	
E	6253	RSSI not adjusted	STATUS		rx.rssi_adjustment	
N	6259	RSSI adjustment condition cleared	STATUS		rx.rssi_adjustment	
N	6301	Controller temperature	STATUS	°C	bsc.temperature	
N	6302	Controller temperature read error	STATUS		bsc.temperature	
N	6401	Digital IO status changed to Ok	STATUS		ext.digital_io	
E	6403	Digital IO status changed to Error	STATUS		ext.digital_io	
N	6409	Digital IO status cleared	STATUS		ext.digital_io	
N	6410	GPS sync pulse received	STATUS			

W	6411	No GPS sync pulse received	STATUS			
N	6412	GPS is accurate	STATUS		gps.accuracy	
W	6413	GPS is not accurate	STATUS		gps.accuracy	
N	6414	GPS accuracy status cleared	STATUS		gps.accuracy	
N	6415	Communication to GPS device is ok	STATUS		gps.communication	
W	6416	Communication to GPS device does not work	STATUS		gps.communication	
N	6417	GPS communication status cleared	STATUS		gps.communication	
Error codes 7xxx (System)						
N	7001	System started	SYSTEM			
N	7002	Shutdown with reboot	SYSTEM			
N	7003	Shutdown with halt	SYSTEM			
N	7004	System update	SYSTEM			
N	7005	NTP Daemon	SYSTEM	Start/Stop NTP daemon.		NTP is started when GPS is enabled and the GPS status becomes good. NTP is stopped when the System time is assumed to be no more accurate enough. For example when the GPS status is bad for some time or the GPS has been disabled.
N	7006	Managed power supply PS19 available	SYSTEM			
W	7101	System not properly shut down	SYSTEM	System was turned off without shutting it down.		Always use the SC button or the GUI to shut down the system before tunring it off.
W	7102	Service restart	SYSTEM			
E	7103	System update failure	SYSTEM			
E	7104	System shutdown failure	SYSTEM			
W	7105	NTP service failure	SYSTEM	There occured a problem with the NTP daemon (start/stop or status).		

E	7106	Managed power supply PS19 not available	SYSTEM	PS19 variant (PS19_140W_AC or PS19_200W_AC) is configured but communication is not working.		
N	7201	System configuration changed	MUTATION		System Config	
N	7202	Counters reset	MUTATION		status.counters	
N	7203	Timers reset	MUTATION		status.timers	
N	7210	Adjust system time	MUTATION	Adjust or set system time.	System Time	
N	7211	System configuration unchanged	MUTATION	set system configuration with identical configuration.	System Config	
N	7212	Transceiver user data written	MUTATION	Setting delays and rssi for TM9300.	TM9300 User Data (Delays and RSSI/ADC)	
E	7301	System configuration failed		set system configuration failed.	System Config	
W	7302	System config power reduced to maximum available	MUTATION	set greater value for transceiver power that transceiver supports.	System Config	The configuration is accepted, but the power is reduced to the maximum power that the transceiver supports.
E	7310	Adjust system time failed	MUTATION	Adjust or set system time failed.	System Time	
E	7312	Transceiver user data write failed	MUTATION	Setting delays and rssi for TM9300 failed (request issue or hardware problem).	TM9300 User Data (Delays and RSSI/ADC)	
W	7313	Migration of ITC4 config	MUTATION	There was a problem migrating an ITC4 config to ITC5 system config	System Config	Either check the ITC4 config and fix it, or set the affected values manually. This will happen when a TRx19 is installed because the channel can not be mapped to a frequency, in this case the frequency must be configured manually.
N	7401	Digital Input Edge	DIGITAL_IO			
N	7402	Digital Output Changed	DIGITAL_IO			
N	7403	Pulse pattern started	DIGITAL_IO			

N	7404	Pulse pattern stopped	DIGITAL_IO			
N	7405	Digital IO send alarm	DIGITAL_IO			
E	7501	Digital IO send alarm failed	DIGITAL_IO			
W	7502	Pulse pattern already started	DIGITAL_IO	A pulse pattern or a siren alert is triggered while another one is already running on the same digital output. The trigger is ignored.		Make sure siren alerts or pulse patterns are not requested before the duration of the last siren alert or pulse pattern has passed.
N	7601	Wireless broadband modem connected	SYSTEM			
N	7602	Wireless broadband modem disconnected	SYSTEM			
W	7701	Wireless broadband modem connection failed	SYSTEM			
W	7702	Wireless broadband modem connection lost	SYSTEM			
N	7801	Battery connected	SYSTEM	State is reported by PS19		
N	7802	Battery disconnected	SYSTEM	State is reported by PS19		
N	7803	Battery charging	SYSTEM	State is reported by PS19		
N	7804	Battery not charging	SYSTEM	State is reported by PS19		
N	7805	Battery not deep discharged	SYSTEM	State is reported by PS19		
E	7901	Battery deep discharged	SYSTEM	State is reported by PS19		
E	7902	PS hardware error	SYSTEM	State is reported by PS19		
E	7903	PS fuse alarm	SYSTEM	State is reported by PS19		
E	7904	PS start time error	SYSTEM	State is reported by PS19		
E	7905	Power supply communication timeout	SYSTEM			
E	7906	Power supply charger configuration	SYSTEM	PS19 battery charger could not be configured		Replace PS19 (or update PS19 firmware)
W	7907	Using safe battery charger configuration	SYSTEM	The battery charger reported an error; a reduced charger current was configured		There might be a mismatch between configured and actual

						battery capacity. Check the connected battery.
E	7908	PS firmware update failure	SYSTEM	Logged by PS19 update script		
Error codes 8xxx (System)						
E	8101	RC09 Communication Timeout	SYSTEM	RC09 device is unresponsive		
Error codes 9xxx (Unexpected)						
X	9001	Invalid configuration file	SYSTEM	Configuration file was corrupted and must be reset to default.		
X	9003	Invalid status file	SYSTEM	Statusfile was corrupted and must be reset to default.		
X	9005	Operating system command failed	SYSTEM	Operation system operation failed unexpectedly.		
X	9006	Watchdog reboot	SYSTEM	System was reset due to a watchdog event.		

Table 55 Error code overview

The indication of the severity level depends on the severity levels used in the logging menu (see Chapter 9.3.2). A distinction is made between the following severity levels:

Normal [N]
Warning [W]
Error [E]
Unexpected [X]

Note: The terms "Master" and "Slave" used in the error codes stand for "Primary" and "Secondary".