

F125 frigate	Technical Documentation Personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Technical Documentation

Personal tracking system

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Revision History

revision date		Change (page / section)	description
0	05/05/2011	All	Build template concept (JM)
0.1 DRAFT	07/25/2012	All	Acquisition of documentation object 2011 for the first submission to the ARGE
0.2 DRAFT	07/25/2013	All	Acquisition of objects from the system specification 07/2013 MvBelow
0.3a DRAFT	08/11/2013	Chapter 7	Import Software chapter of software documentation (MvB)
0.3c DRAFT	08/12/2013	Chapter 3.4	Revision, adjustment to current state, technical drawings reimported (A. Meyer)
0.3f DRAFT	08/23/2013	Chapter 6	Revision disorder and redundancy (MvB)
0.3g DRAFT	09/03/2013	Chapter 5.6	Revision, correction, formatting, directory revision (DJ)
03.i DRAFT	09/11/2013	Chapter 7	Image updating, revising, proofreading, formatting (A. Meyer)
0.4a DRAFT	24/09/2013	All	Format adjustments directory revision, picture update (A. Meyer)
1.0	08/10/2013	attachment	Interface Description MSB / ILOAD
1.1	07/18/2014	Chapter 4,5,6,7,9,10 Appendix A	Implementing change from defects list
1.2	09/11/2014	Chapter 5.5,11, Annex C	Implementing change from defects list 2
1.3	17/12/2014	Section 4.2.2,	Implementing change from defects list 3
1.4	06/03/2015	Appendix C	Cable numbers added
1.5	06/03/2016	Everything references Appendix B, C	Spell Check Renewed, supplemented (editorial) Changes terminal plan, Editorial revisions
1.6	08/11/2017	Chapter 10, 11.7	Fault diagnosis extended repair extended Editorial

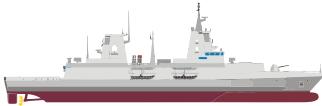
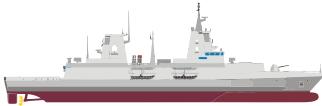
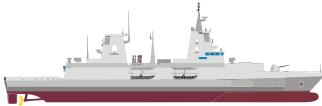
F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Table of Contents

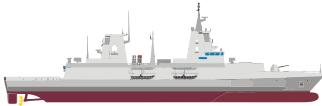
Revision History	2
Table of Contents	3
Figures	8th
Abbreviations and Definitions	11
Applicable Documents	14
Referenced documents	14
1 Introduction	15
2 Requirements of the Final Specification F125	15
3 Concept of autonomous personal tracking system (POS)	16
3.1 Sectors	17
3.2 Presentation of personal location data in the BDC HMI	18
3.2.1 Representation of the status of the tags in the BDC	18
3.2.2 Degradation upon failure of one room and brand representation in the BDC	19
3.3 Battle damage	20
3.4 Logging on and off at shore	20
3.5 Initialization	20
3.6 IT security	21
4 Components of the personal tracking	23
4.1 DAY	23
4.1.1 Technical data of the TAGs	24
4.1.2 Environmental data of the TAG	25
4.1.3 Configurable parameters TAG	26
4.1.4 Structure of TAG	27
4.2 Chargers for TAGs	30
4.2.1 Environmental data (service) -Ladeschale	31
4.2.2 Collecting charging cradle for TAGs	31
4.3 Space brands	35
4.3.1 Technical data of the room brand	36
4.3.2 Environmental conditions room brand	37
4.3.3 Configurable parameters of the space brand	38

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

4.3.4 Construction of the space brand	39
4.3.5 Installation steps the space brand	41
4.4 Central processing unit (POS Server)	47
4.4.1 Technical data of the central unit	48
4.4.2 Environmental conditions CPU	50
4.4.3 Hardware	50
4.4.4 Structure of the POS server	51
4.4.5 Software of the POS server	51
4.4.6 Redundancy of the POS server	52
4.5 Management and diagnostics station of POS (mobile)	53
4.5.1 Technical data of the management station	53
4.5.2 Environmental conditions Management Station	54
4.5.3 Hardware	55
4.5.4 Software	55
4.6 Network doses of POS	56
4.6.1 Technical data of the network socket	57
4.6.2 Environmental conditions of the network socket	58
4.6.3 Installation steps of the POS network socket	59
5 Interfaces of the personal tracking	62
5.1 Radio interface between the tags and the space brands	62
5.2 Interface to the MSB	62
5.3 Interface to ILOAD	62
5.4 Interface platform	62
5.5 Wiring diagram to the platform	63
6 Functional description of the person tracking system	64
6.1 BIT / BITE	65
6.2 Normal operation	67
6.2.1 Communication between space and brand TAG	67
6.2.2 Transport of the data to the POS server:	69
6.2.3 Transport of data between POS and ILOAD	70
6.3 Emergency / emergency shutdown	70
6.4 Fault Operation	71

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

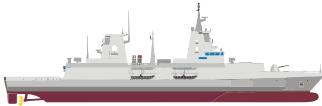
6.5 EMCON ("silence")	72
6.6 Redundancy concept	73
6.6.1 Case distinctions failover from the normal master-slave operation:	73
6.6.2 Case distinctions for starting up a server in the POS system:	74
7 Software	75
7.1 The software description of the room brand	76
7.1.1 The LAN-Tronix-Xport	76
7.1.2 The PosMonitorTCP	79
7.1.3 Adjusting the transmission approvals	81
7.1.4 Adjustment of status monitoring space marks	81
7.2 The firmware description of the tag	83
7.3 The software for logon and logoff client	83
7.4 The KVM access from the management and diagnosis station	85
7.5 The software on the POS servers	87
7.5.1 The BIOS adjustments	87
7.5.2 The MEBx parameter	89
7.5.3 The Raid configuration	90
7.5.4 The operating system.....	91
7.5.5 The AGV system Guard	92
7.5.6 The RST-service client	93
7.6 The MySQL server on the POS servers	93
7.6.1 The structure of the table structure on the POS database	95
7.6.1.1 The table "Doors"	95
7.6.1.2 The "Pos" Table	96
7.6.1.3 The "receiver" table	97
7.6.1.4 The "rsrooms" table	98
7.6.1.5 The "sector_boundaries" table	99
7.6.1.6 The table "sector_boundary-status"	99
7.6.1.7 The "sector_status" table	100
7.6.1.8 The "sectors" table	100
7.6.1.9 The "settings" table	101
7.7 The computing logic of the SIS POS service	102

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

7.8 The dependencies of services	103
8th Installation and setup of POS software	103
9 Service	104
9.1 Safety instructions	104
9.2 Commissioning of the plant	104
9.3 Decommissioning of the plant	105
9.4 The operation of the system	106
10 Fault diagnosis	107
11 Maintenance and repair of personal tracking system	111
11.1 Safety	111
11.2 Fuels / Utilities	111
11.3 Maintenance Table	112
11.4 Maintenance of the TAG	113
11.4.1 Exchange man-.....	114
11.5 Maintenance of the space marks	114
11.5.1 Maintenance (replacement) of the space marks	114
11.6 Maintenance of the POS server	118
11.6.1 Advance of service or repairs to be carried out measures	118
11.6.2 After maintenance or repair measures to be implemented	118
11.6.3 Regular maintenance tasks at the POS server (ANS_POS_F125)	119
11.6.3.1 Sight and noise testing fan	119
11.6.3.2 Server Perform maintenance	119
11.7 Maintenance and repair work at the POS server	121
11.7.1 Replacing the CPU fan:	122
11.7.2 Replacing the case fans	123
11.7.3 Replacing the power supply Bicker	123
11.7.4 Exchange of the data memory (SSD) of the central unit	125
11.7.5 Replacement memory module (s) of the central unit	127
11.7.6 Replacement of the entire CPU	129
11.8 Maintenance of the network socket	129
11.8.1 Replacing network socket	129
11.9 Maintenance of management and diagnostic station	130

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

11.9.1 Spare diagnostic station	130
Attachment	131
A Interface Description POS for MSB	131
A1 Interface tasks	133
A2 Network connectivity Physically	133
A3 Network connectivity Logically	134
A4 General network services	136
A5 Communication interface (network layer)	137
B Interface Description personal tracking system ILOAD	138
B1 Data communication between ILOAD and POS	139
B2 Structure of the UDP / NMEA packages	139
B3 Interface 'standard 0183'	140
B4 Central NTP time the POS systems	141
B5 Records	141
B6 communication POS • ILOAD	142
B7 communication ILOAD • POS	147
B8 List of all doors and hatches:	149
B9 List of all brands space	149
C Terminal diagram components	Error! Bookmark not defined.
C1 Terminal diagram 24V DC	Error! Bookmark not defined.
C2 Network cable plan	Error! Bookmark not defined.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

List of Figures

Figure 1: Example section of the outline configuration of [2]	17
Figure 2: Example Display POS data in the BDC	18
Figure 3: Faulty room at brand	19
Figure 4: Red Room	22
Figure 5: Illustration of a tag housing with service charging	23
Figure 6: Drawing DAY	24
Figure 7: split drawing of TAG	28
Figure 8: charger	30
Figure 9: Drawing Service charging cradle	30
Figure 10: 4x3 collecting charging cradle	32
Figure 11: Drawing collecting charging cradle	32
Figure 12: Split representation of the collective charging cradle	34
Figure 13: Drawing Room brand	36
Figure 14: Space brand in 3D	39
Figure 15: The connections of the room brand	39
Figure 16: Split representation of space brand	40
Figure 17: Built-shells and slid on cone rings	41
Figure 18: Assembled room branded network cable from VG-fitting	42
Figure 19: Stripping of the network mesh network cable	43
Figure 20: stripping the protective film of the four Kupferlitzenpaare	43
Figure 21: placement of the copper wires of the network cable in the wire manager	43
Figure 22: Final assembly of copper in Telegärtner network connector	44
Figure 23: Final assembly of Telegärtner network plug	44
Figure 24: Figure POS server	47
Figure 25: Drawing POS server blade 1.2	48
Figure 26: Drawing POS server blade 2.2	49
Figure 27: Interfaces of the POS server	51
Figure 28: Management and diagnostic station	53
Figure 29: network socket (Weidmueller)	56
Figure 30: Drawing network socket	57
Figure 31: drilling template network socket	58
Figure 32: the socket element (Weidmueller, IE-BI-RJ-45 FJ-A ')	59

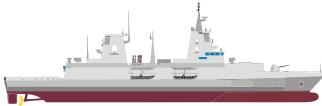
F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Figure 33: assembly of the bushing insert the POS network sockets	60
Figure 34: inserting the network port to the network socket	60
Figure 35: schematic diagram of the components	63
Figure 36: Overview POS	64
Figure 37: schematic signal running in the POS	68
Figure 38: Timing of signal travel in the POS	69
Figure 39: The XPort Pro space brand	76
Figure 40: Configfile as XML	77
Figure 41: The IP configuration of the Lantronix XPort Pro	77
Figure 42: The reboot of the space marks in the system site of the web front-end	78
Figure 43: Tunnel ConnectMode	79
Figure 44: PosMonitorTCP	80
Figure 45: Settings in PosMonitorTCP	82
Figure 46: PosTag configurator	83
Figure 47: POS Activator	84
Figure 48: Log on VNC viewer	85
Figure 49: The VNC Viewer in action (left in the BIOS / OS law of the POS server)	86
Figure 50: Status screen of the BIOS	87
Figure 51: Power Failure Recovery	88
Figure 52: USB switch off	88
Figure 53: Set administrator password	88
Figure 54: AMT configuration in the BIOS	89
Figure 55: Intel AMT external access and operating system	89
Figure 56: The Intel Rapid Storage Controller	90
Figure 57: The degraded RAID in BS (OS)	91
Figure 58: The AGV system Guard	92
Figure 59: Program window of RST on MS Windows Server 2008R2	93
Figure 60: Manual import PosDB.sql	94
Figure 61: The data flow diagram of the F125	94
Figure 62: The Doors Table	95
Figure 63: Table POS	96
Figure 64: Table receiver	98
Figure 65: Table Radio Silence Rooms	98

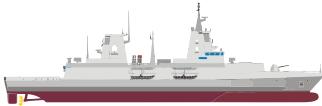
F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

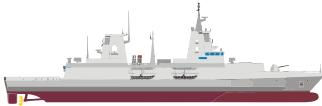
Figure 66: Table sector_boundaries	99
Figure 67: The table "sector_boundary-status"	99
Figure 68: Table sector_status	100
Figure 69: Table Sectors	101
Figure 70: Table Settings	101
Figure 71: SIS POS dependencies	103
Figure 72: 3D exploded view of the Space brand	116
Figure 73: (dis) assembly of the CPU fan	122
Figure 74: releasing the housing from the fan housing	123
Figure 75: Server Interior 1	124
Figure 76: Server Interior 2	125
Figure 77: SSD Plextor M6 Pro 256GB, SATA (PX-256M6P)	127
Figure 78: Kingston ValueRAM DIMM 4GB, DDR3-1333, CL9-9-9	128
Figure 79: Network Architecture INeS F125	131
Figure 80: Architecture Access area	132
Figure 81: Block diagram, connecting the POS server with the ILOAD servers	138

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Abbreviations and Definitions

Abbreviations

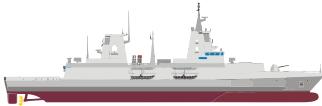
abbreviation	description
AT	contractor
ARGE F125	Association frigate 125
ARP	Address Resolution Protocol
AEA	Amendment
BDC	Battle Damage Control System
CO2	carbon dioxide
COTS	Commercial, off the shelf
CTG	Command task group
EMCON	Emission control ("silence")
GB	Gigabyte = 2³⁰ byte
HE	Height unit (in a 19 "cabinet)
HMI	Human Machine Interface
ILOAD	Integrated control and automation system Ship Technology
INeS	Integrated network for ships - successor standard of the MSB
Intel IANS driver	Intel Advanced Networking Services driver for dual Network Interface Cards
ID	Identifier - like (a) unique number for the identification of a record object, etc.
IP	Ingress Protection - Ingress and protection class according to DIN EN 60529
IPMS	Integrated management platform system from Siemens for the control and monitoring of the electronic systems on board a naval vessel
IT	information technology
ISM	Industrial, Scientific, Medical - Frequency bands for some European and international use of RFID systems.
IT SiBe	IT - Security Officer

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

abbreviation	description
IT Sibo	IT - Security board
IT SiKo	IT - security concept
LC	Lucent Connector - connectors for optical data lines (fiber)
LiPo battery	Lithium-polymer accumulator
LMGSGO cable	Lightweight Marine power cables with approval of the Bundeswehr Procurement Office.
LOM	to ensure the possibility of a system administrator access to a server system, regardless of whether the system is turned on or an operating system was installed - "Lights Out management"
Low Bat.	Low Battery - Low battery voltage
LWL	Optical fiber (also known as fiber optic cable, cable for data transmission via light waves)
MBEx	Management Engine BIOS extension, a body set up by Intel BIOS management interface, it allows to manage computers on the network card.
MSB	Multi Service Board Network
NMEA	National Marine Electronics Association
NMS	Network Management Server
OAG	contracting
OPZ	operations center
PC	personal computer
PCIe	Peripheral Component Interconnect Express - standard for expansion cards in the PC
POS	Personnel Tracking System, personal location system
RFID	Radio Frequency Identification Device
RJ45	Registered Jack # 45 - Standard connector for CAT cable for Ethernet networking
SAGD	Schadensabwehr- and combat service
SAM	SAM Electronics
SATA	Serial ATA (Advanced Technology Attachment) - Standardized connector for hard disk and PC
SMA	Sub Miniature Antenna

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

abbreviation	description
SRD	Short Range Device
SSD	Solid State Disk - data memory with non-volatile memory chips instead of magnetic media
STP	Spanning Tree Protocol. Network protocol for the use of switch infrastructure
DAY	On the Spot mitzuführender transponder of the POS
TAzV	Technical Annex to the Contract
TCP / IP	Transmission Control Protocol / Internet Protocol
TIA	Telecommunication Industry Association
UDP	User Datagram Protocol
VLAN	Virtual Local Area Networks
ZigBee	Industry standard for wireless networks over short distances ((on standard Standard) IEEE 802.15.4)

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Applicable Documents

Ref.	Document No. and title.	author	Version / Date
Volume 16	Building specification D no.: 118496 00160 S 0000	TKMS	n / A
Volume 5	building specification POS	TKMS / ANS	0
N / A	IT SiKo F125	BWB	3.0

referenced documents

Ref.	Document No. and title.	author	Version / Date
[1]	Concept personal tracking system from 111,979 to 37,840-K-0101	ARGE F125	D / 12.07.2012
[2]	Personal tracking overview arrangement 111979-37840-K-0100	ARGE F125	L / 03.15.2016
[3]	F125 Type summary sketch	ARGE F125	H / 28.02.2011
[5]	Specification sector boundary numbers	ANS	A / 09.10.2013
[7]	Requirements PO server for installation Cabinet	Atlas E.	27.11.2012
[8th]	Siemens Rack_Server_V_Z1	Siemens	06/14/2012

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

1 Introduction

The person tracking device (hereinafter POS) is the support of the damage prevention combat service (SAGD) on board the frigate class 125, and enables the on-board wireless personal tracking by detecting at the transitions between division / division and cover / cover the frigate.

The aim of POS is to enable faster among others the SAGD measures such as the introduction of CO2 in fires, by the fact that the person tracking system (POS) can immediately determine whether to stay in a particular department nor any person without acknowledgment of a crew member to wait on site.

This technical documentation for personal tracking system describes the implementation of the requirements of the concept of POS (Rev.D) and hereby presents the technical framework for the whole system is.

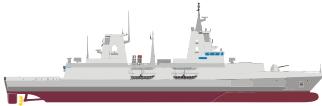
2 requirements of the final specification of F125

The Personnel Tracking System is a self-tailed to the ILOAD system.

Via the interfaces of the POS to the MSB data from the POS to be transmitted to the ILOAD and displayed there.

The personal tracking system here has the following features:

- Connection of the personal tracking system to the ILOAD for display in the BDC and integration into the user interface of the ILOAD; it is not a separate system or provided by the POS operator interface needed. Via the user interface of ILOAD takes place next to the display even eg active / Inaktivschaltung the POS via a control element.
- The detection of people on board takes place by means of stationary transmitter / receiver units (hereinafter room trademarks); these detect the signals from person-transponders (hereinafter TAGs) of the individual crew members. The constant carrying the tag is fundamental to the functioning of the system and to ensure through organizational measures of the operator.
- Requirements tags: mechanical strength, protection class IP at least 54, sea water resistance, heat resistance (short-term heat load of 2 seconds to 800 ° C), secure function even with an applied protective equipment.
- Requirement of space makes shock and vibration safety belt according to 0, at least protection class IP 56, sea water resistance, heat resistance (short-term heat load from 2 seconds to 1000 ° C).
- Notice: All functions of the POS described below work in purely quantitative terms, it represented only numbers of crew members. Basically, the information how many crew members there are in a particular department, deck, upper deck or on land sufficient. The evaluation purposes any necessary assigning tag IDs to people then remains the responsibility of the operator sovereignty.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

- Access restriction: only one role assigned persons can perform a query on the whereabouts of crew members. An overview also allows Sollist Comparison of crew on board. This allows these persons a Vollzähligkeitsprüfung. This role assignment is made exclusively by ILOAD.
- Each time possible perspective view of the whereabouts of the crew of the ship via the user interface of the ILOAD (BDC). The representation is made (corresponding abstracted) Ship plan. By the Personnel Tracking System all departments / decks are covered within the ship. The POS case only provides the data to the ILOAD and is presented by ILOAD itself. In addition, both the access to or stay on the outer deck, and the number of shipping associated itself located on shore by an automatic drain and registration system registered.

3 concept of autonomous personal tracking system (POS)

The POS detects the position of all crew members on board the F125 through RFID technology (ISMKurzstreckenfunk). For this purpose the ship is divided into sectors. The sectors of the vessel to be secured in the POS with a plurality of fixed transmitter / receiver units (room trademarks) and recorded. Crew members carry personal transponders (TAGs) to be in communication with these space marks and so a inclusion in the tags on individual sectors of the ship allow. Inclusion in the of the TAGs to a sector occurs in the program logic of the POS by evaluating the strength of the received tag signal in the space brands.

The room trademarks are networked via the MSB with the POS server. The POS server determined using data from the room marks the number of people per department and deck (sector, see [2]). The information gathered will be stored in tabular form for people each sector in a database on the POSServer. To display the information about the MSB are transferred to ILOAD. The presentation takes place exclusively in the BDC ILOAD. The transmission of the current data is carried out automatically without an explicit request from the ILOAD every five seconds.

The data of the location of people are stored for 24 hours, with a temporal resolution of a data set every 5 seconds. A record here corresponds to one value each for the number of persons for each sector of the ship. For a special evaluation, this data is transmitted to the ILOAD. is transmitted exactly one record from any point within the last 24 hours. This time must be included in the transfer request of ILOAD. This serves, for example, in case of failure or degradation (see Sec. 3.2.2) / retrieve the POS, the situation just before this failure of this disorder. The transfer of data for a special evaluation is carried out exclusively at the request of ILOAD.

F125 frigate	Technical Documentation personal tracking system	
Date: 11/08/2017		Revision: 1.6

3.1 sectors

The individual sectors in which the number is determined to persons (TAGs), arising from the various departments / decks of the F125. The boundaries of the sectors are shown in the drawing person tracking overview arrangement [2] based on the type of outline sketch [3]. the positions of the area marks are also shown in the drawing.

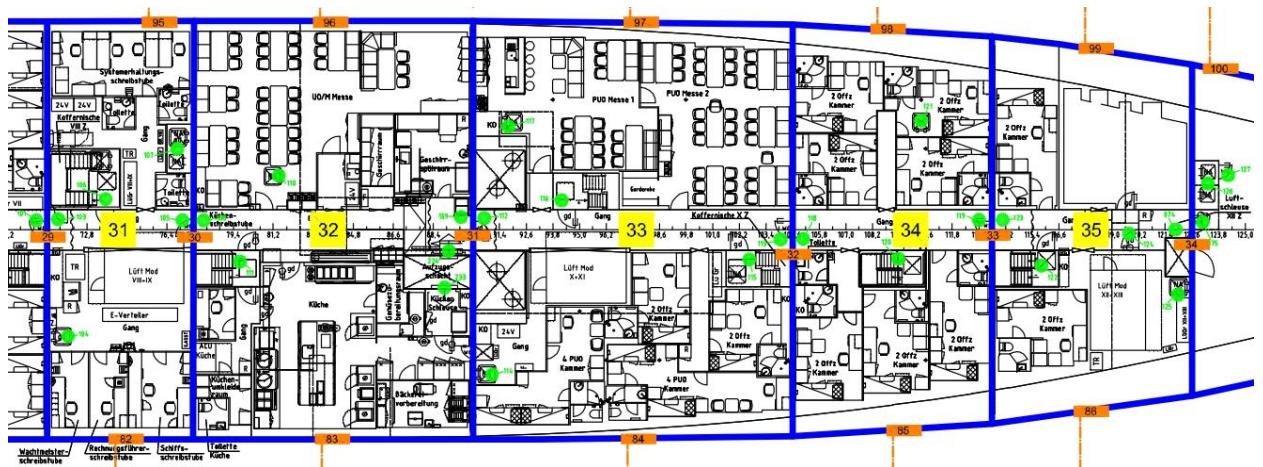


Figure 1: Example section of the outline configuration of [2]



Date: 11/08/2017

Revision: 1.6

3.2 presentation of personal location data in the BDC HMI

The data for the display is sent from the POS to the ILOAD (number of people per sector, status of the room brands, status of borders, the status tags). The display in ILOAD done in IPMS module BDC to the ILOAD servers.

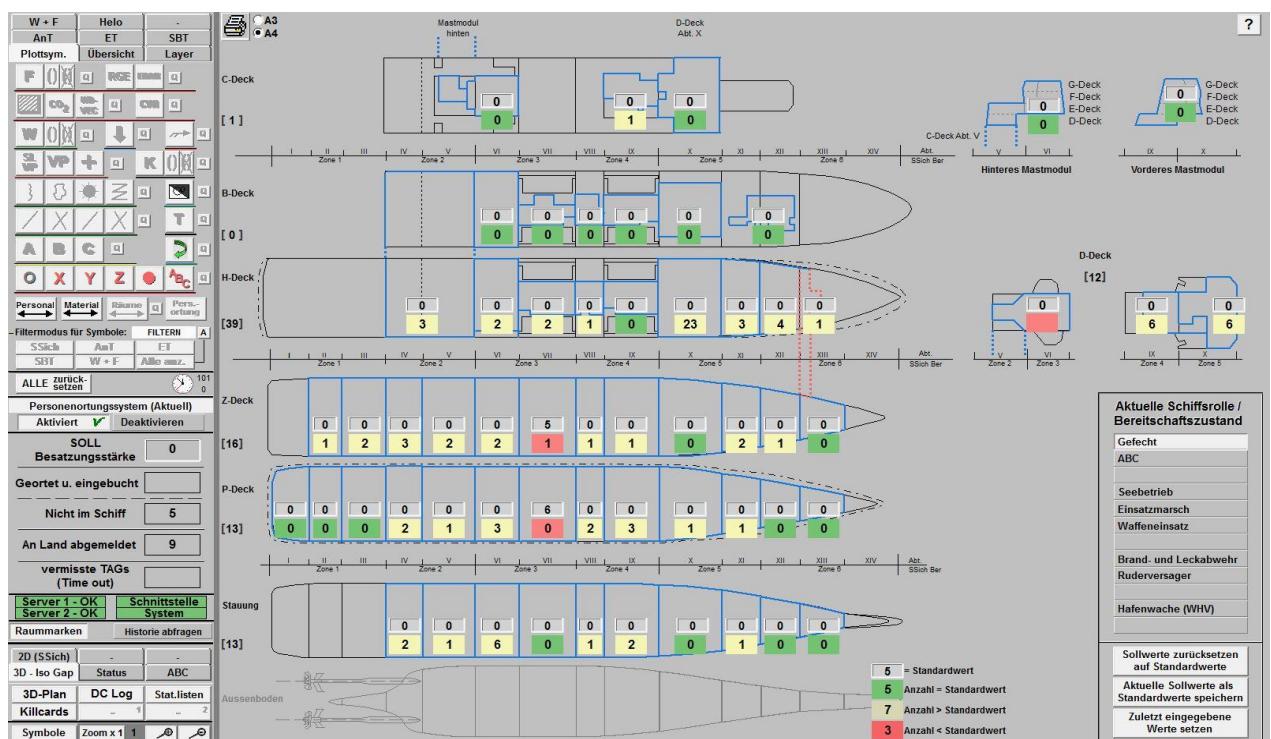


Figure 2: Example Display POS data in the BDC

Implementation of representation falls exclusively on ILOAD. A presentation in the POS itself is not provided.

3.2.1 description of the status of the tags in the BDC

The POS also delivers the ILOAD a status of the tags. Here, all the tags whose battery voltage is lower than a predetermined threshold (3500mV), reported the ILOAD. Similarly, a transfer of all the tags as registered in operation, which are obtained after six hours without detection by a space brand and "missing" after 12 hours as reported the status "not tracked" in the system takes place (see Annex B6).

From radio traffic safety reasons, no space trademarks are installed on the outside deck. Therefore, the POS classified by program logic all those tags the sector 66 (Außendeck- FD) in the BDC to which it assumed by receiving the tag ID from a mounted on a door to the outer deck space make the TAG wearer to have to enter the outer deck, if the tag ID is then received in any other sector. Tags which carry the status "Shore Leave" are recorded in sector 67 and displayed in the BDC in quantities.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

3.2.2 degradation upon failure of one room and brand representation in the BDC

For the degradation of a sector is the failure of a space mark by the integrated monitoring of the POS sufficient (receiver testing, see section 6.4). The degradation of a sector is reported to the ILOAD and displayed in the BDC by a color change of the affected sector border from green to red.

Due to the used radio technology, the POS can now perform any differentiation between these mutually adjacent sectors more to the affected sector boundary. The tag IDs of the tags located in the degraded sector are grouped logically and added to the stored in the program logic of the POS sector (see [5] sector specification limit numbers). This Zuschlagungs logic based on the fact that the sector boundaries are numbered. In the degradation of a sector sector boundary is defined in the POS of the "target" sector for Inclusion in the TAGs Based on the sector boundary number of "fallen".

In the 2D illustration of the decks the summary of the sectors is shown to be inactive by a color change of the border. In the 2D view, the upper limit of the lower deck and the lower limit of the upper deck of the combined sector are shown as inactive here. In order to indicate the summary of the decks, in addition, a dotted line is displayed at the division boundaries between the decks.

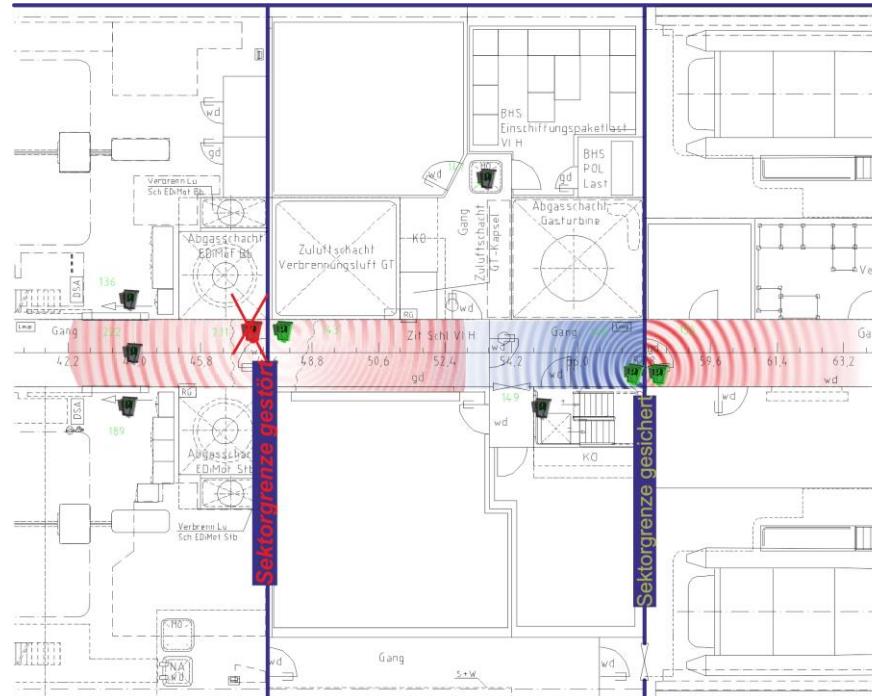


Figure 3: Faulty room at brand

The degradation of a sector has no effect on the remaining sectors. The summation (degradation) is extended in case of failure of bordering further space brand respectively. Join

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

several spatial brands malfunction or failure in the Degradationskette one, it may happen that no reliable data can be delivered. As a result, the overall status of the POS is set to "inactive".

3.3 battle damage

Fall in a battle damage space brands of, the system behaves as described in Section. 3.2.2 described. To gain access to the information "number of persons per sector" just before occurrence of the battle damage, the person tracking system stores the historical data over a period of 24 hours with a time resolution of one record every 5 seconds in a database on the POS server. A record here corresponds to one value each for the number of persons for each sector of the ship. By reading out the historical data of each of these data record can be represented points in time within the last 24 hours of BDC.

3.4 Logging on and off at shore

For automatically logging on and off at the POS at shore two special space marks are provided, one each for logging on and off. These area marks are mobile and are at the guard booth through which the shore is carried out, placed. Registration and deregistration at the POS in this case is realized via the management and diagnosis station, which signals the presence or cancellation on the system via the client software PosActivator for the officer on duty, both visually and acoustically.

Crew members who want to leave the ship to shore, log out by passing the tag on the logout brand. Deregistered tags are added to the sector 67 "Shore Leave" in the POS database and displayed on both the management and diagnosis station and the ILOAD. Thereafter, these tags are up to the (re-) application recorded on the PosActivator no longer over the area marks on the ship. The feedback of gone ashore crew members by means of passing the tag on the mark. You will be noted as "on the ship" in the POS database, and back of the room brands in the ship.

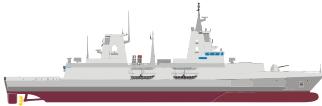
TAG has systemic to ensure error-free logon and logoff operations min. 3 seconds in a radius of max. 20cm (can be varied) remain the respective brand.

3.5 initialization

The initialization of the system takes place in several steps. This starts with the switching on of the system and is complete when the server all connections to the room brands produced, transmitted you the relevant function parameters, and has successfully established its own current POS server status (master or slave).

The current status to the silence and the doors on the part ILOAD is requested. This is successfully processed, the NMEA interface with current data from the POS server is supplied and transfers it cyclically (see Appendix B1) to the ILOAD server.

When commissioning and handover of the POS system as a whole all the tags of the core team are activated, remain all tags unneeded disabled in your suitcase. can be "inactive" tags are activated by applying the charging voltage and set to the operation mode via the board contained in the supplied charging cradle (supplied 2). The TAG must (by entering the inventory number inventory

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

number is to be entered in the PosActivator software in the database on the Marine Koppel "cliff" side of the tag). Upon activation of the tags it is first added to the outer cover and can be outputted to the crew member.

3.6 IT security

For the sake of IT security (IT SiKo), according to the presented at the 6.IT-Sibo POS concept, no room trademarks may be installed in the following listed "red areas".

This is true for the following areas on the ship to:

- The rear mast module (by combining them into one sector from the e-cover)
- The forward mast module (by combining them into one sector from the F-deck)
- the OPZ
- The CTG - guide space
- The radio room

This requirement complicates the differentiation within "radio silent areas" between "red areas with access to the outside decks" and the "upper deck". This is installed by additional, before the "funk silent areas" short-range space brands that have reduced transmission and reception performance achieved. The POS is programmed at these sites for special case distinctions:

DAY 1 before "radio quiet area"

If a tag is in the field of short-range space chips over a certain period of localized (for example TAG-carrier is present in front of the door to the "radio silent area"), a special reception value of <96dB in the short-range space flag is generated, the one in the system trigger "event". Thus starting a 15sekündiger countdown is started again after expiration when the TAG is further detected by the short-range space mark,

DAY 2 back in the sector

1. if true, the tag is recognized, however, again from a space mark even after repeated the countdown,

DAY 3 in the "red room"

is the TAG carrier placed under the intention to have the entered "red space" and the TAG added to this, if after the expiration of the countdown (even after repeated sequence), it furthermore no further detection (reception of a data packet) of the TAGs by a room brand comes on board.

The status of the hatches and emergency exits from these radio-quiet rooms / areas are monitored by means of door switch in ILOAD and relayed to the POS. Are all monitored outer hatches from the respective "radio quiet area" closed, the tags are assigned to the respective sector.

For the special case that an outside hatch is opened from a "red zone", corresponding to a degradation of the "radio-quiet space" (see section 3.3), because differentiating between this "functional



Date: 11/08/2017

Revision: 1.6

quiet area "and the outer shroud is no longer possible. The "red room" imputed tags are logical and slammed into the sum of the outer deck.

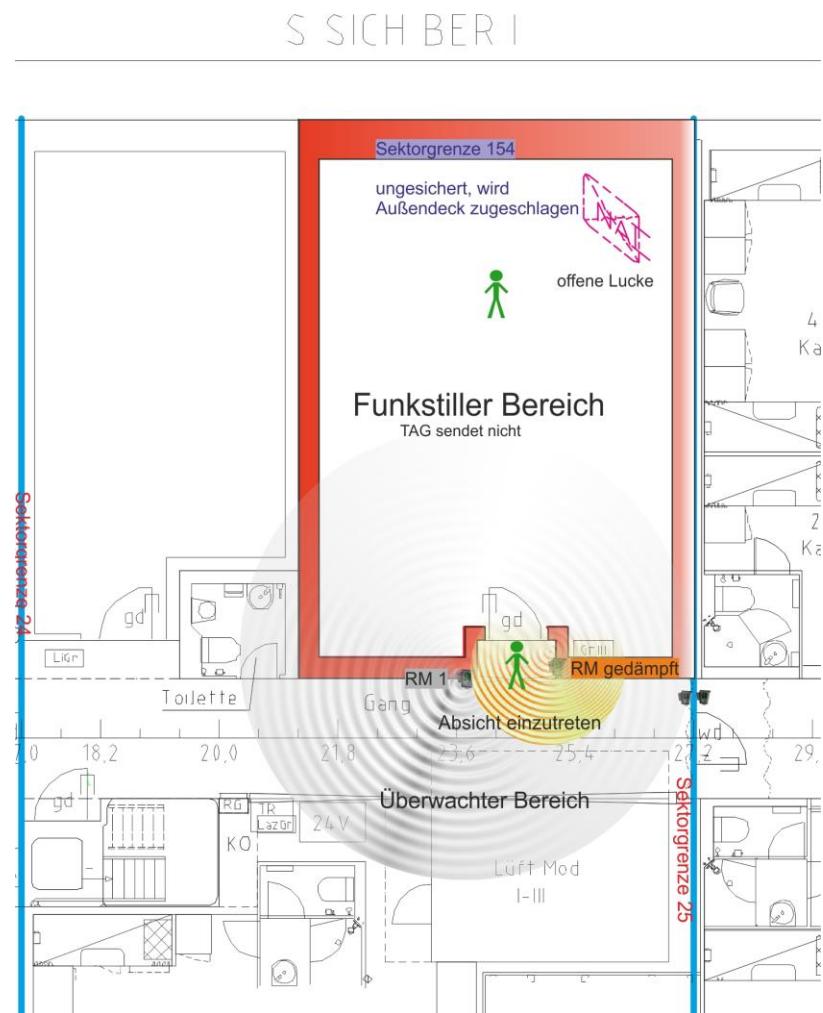
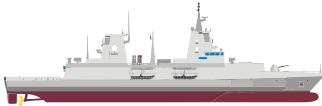


Figure 4: Red Room

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4 components of the personal tracking

All POS components (POS3784) compliant (are manufacturer certificates for each component before) to the RoHS / REACH EU directives.

The POS uses components that communicate SRD (Annex 11 B3) on the ISM band (RFID) together. RFID describes a system for the identification and localization of objects and / or persons by means of radio transmission. In this case, there is a RFID system basically consists of a transponder (TAG) and a receive - and reader (room trademark).

Active RFID systems have an autonomous power supply (battery, battery) TAG other and hereby realize the requirements for coverage and fault tolerance in accordance with the concept. The maximum functionality of the active RFID tag is achieved (chip-on system) RFIDHalbleitern through the use of SoC, which can be adjusted by means of free programmability fully flexible to special requirements.

The used frequency of the person tracking device is 866 to 868 MHz and is the part isag with the frequencies 866,9MHz (channel 0) and 867.6 MHz (channel 3) released. This is a legal, free ISM frequency band for use COTS RFID applications with 10mW transmission power.

4.1 DAY



Figure 5: Illustration of a tag housing with service charging

Each crew member receives an active transmitter, a so-called TAG. The transmitting unit of a tag is activated only when the transmission enable a space mark is present, after which the tags send once per second a signal (data packet) to the space brands. The transmitter unit is deactivated when no transmission enable a space brand has been received for three seconds. This transmission shares the space marks are transmitted cyclically several times per second.



Date: 11/08/2017

Revision: 1.6

The TAG will automatically switch to receive as soon as he no longer transmit approvals have been obtained (see Sec. 4.1.3), this happens both when entering radio quiet rooms / areas, the outside decks, leaving the ship and the deactivation of the POS system (EMCON).

The performance of the battery, the function of the tags for at least six months safe and a reserve of at least 5% is hold. TAG sends a message (LowBat) on Spatial brands to the server once a certain adjustable threshold voltage (recommended 3500mV) was not reached. The transmitting range of the tags is max. about 6-7 meters. The transmission of the tag ID is encrypted. Basically, the ID of the tag can be parameterized, but should not be used twice (with the on-board hardware and software that is not possible) within a ship.

The belt clip the tags is so dimensioned to fit over a naval coupling.

4.1.1 Technical data of the TAGs

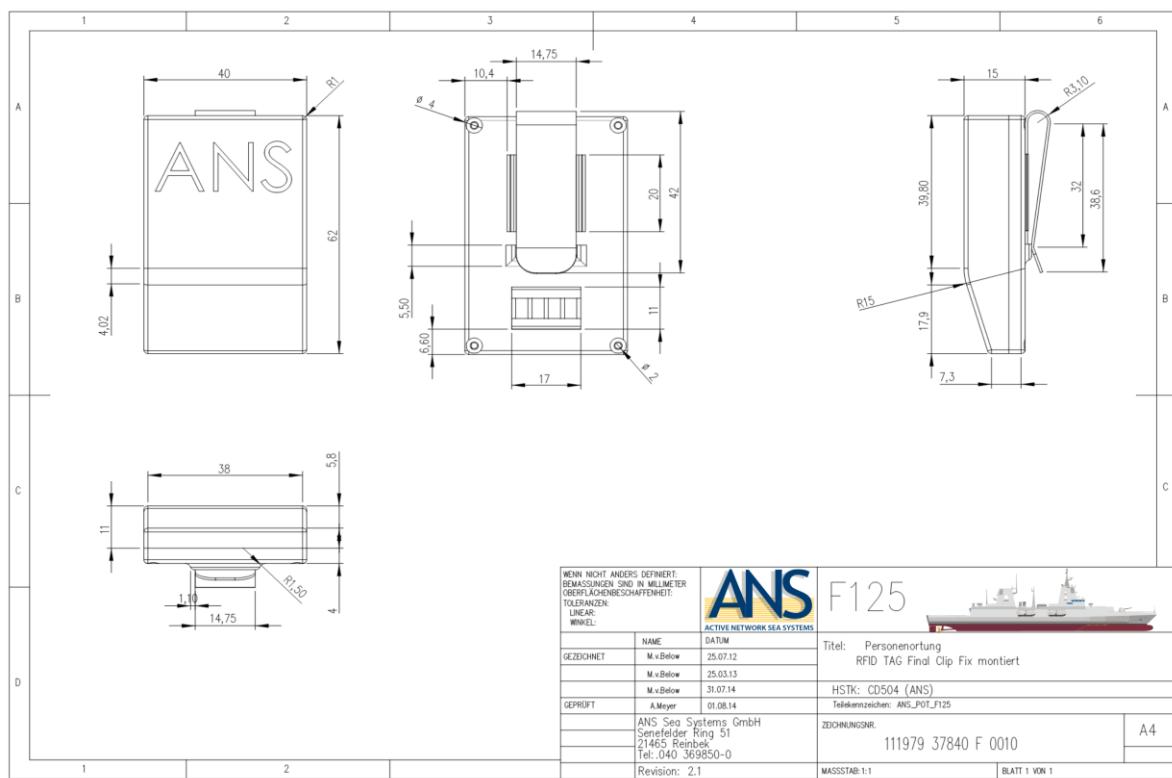
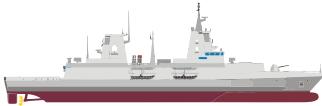


Figure 6: Drawing DAY

The diagram is used here only for illustration, it is as a stand-alone document no. 111979 37840 0010 F before in Revision 2.1.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.1.2 Environmental data of the TAG

storage	
temperature	-20 ° C to 60 ° C (-4 ° F to 140 ° F)
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
shock	200g, 2ms, half-sine
vibration	1,5grms
height	-15 to 12.192m (-50 to 40.000Ft)
business	
temperature	0 ° C to 55 ° C
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
shock	200g, 2ms, half-sine
Li-Po battery lifetime (at 20 ° C)	300 cycles (with > 80% total capacity)
Battery Type	Varta LPP 523450 DL
housing material	
Material	PA3200 GF
tensile modulus	2500 MPa
tensile strength	45 MPa
flexural strength	65 MPa
Melting temperature (ISO 11357-1 / -3)	185 ° C
flammability	UL 94 V-0
density	1060 kg / m3
toxicity	AITM 3.0005

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.1.3 Configurable parameters of the TAG

Note: Which belongs to the board included charger is only suitable for charging and activate the tags!

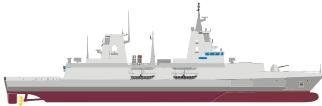
The configuration of the tags is performed by means of PosConfigurator software via the service charging cradle. The software recognizes the tag by its unique inventory number and can be customized in all its operating parameters to the requirements of the system.

Currently, a maintenance at the UAN ANS is scheduled for service and parts replacement. For this purpose, the tag ID and the required mode of operation, being given to a tag assigned to a replacement or a new TAG TAG ID.

TAG sends a data packet to the space marks by default all 1000ms. In contrast, the time in which the tag waits for a transmit enable from a room mark is (transmit enable reception window) 35-50ms. TAG receives via the alarm time no transmit enable by a space brand, he switches to receive mode (awake time 35-50ms) and does not send data packets (more). TAG remains silent for about four seconds (-> sleep time) and then on again to reception (wake time 35-50ms).

All other parameters are always preconfigured in the TAGs of the POS of the respective ship, but can be for fault diagnosis of the appropriate service personnel (ANS SIS) change. All with well marked parameters are not relevant for this project and are not configurable in the final release.

Config parameters (Settings)	
TAG ID:	1-65535 (16bit) (variable F125 1-200)
Transmission power:	-30dBm - + 10dBm (default F125: -10dBm)
Transmission channel:	0-5 (default F125: 0)
Reception slowdown:	0-18 dB (F125 default: 0)
Receive Channel:	0 - 5. (default F125: 3)
Switching threshold "low battery"	in mV (default F125: 3500)
Tamper:	n / A
Mode: (Off, watchdog)	Off-controlled, repeaters (default F125: watchdog)
Config parameters (data rate)	
Data rate (baud)	2400, 38400, 153600 (default F125: 38400) Baud
Config parameters (clock)	

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

clock	Value in ms (16bit) (default F125: 1000)
Clock in motion	Value in ms (16bit) (F125 default: 0)
Config parameters (watchdog)	
Sleep time:	Value in ms (16bit) (default F125: 4000)
Sleep time in motion:	Value in ms (16bit) (F125 default: 0)
Waking hours:	In ms (16bit) (default F125:> 50ms)
Rec Motion message:	n / A
Reference TAG ID (transmission enable)	ID (group) (default F125: 1-261)
alarm time	Value in ms (16bit) (default F125: 5000)
Alarm TAG reception (transmission enable)	YES
Motion indicator:	Inactive
Transmission power:	-30dBm - + 10dBm (default F125: -10dBm)
Config parameters (second power)	-30dBm - + 10dBm (default F125: -10dBm)
Config parameters (repeater)	n / A

4.1.4 Structure of the TAG

TAG HT_F100 used for this project is based on the hardware series HT104 and with this protocol Compatible. The TAG signal is FM-modulated with Manchester encoding based on the wireless industry standard ZigBee in the above ISM frequency bands transmitted (see chapter 5).

The tag is generally defined as a replacement part, maintenance-free and composed of the following parts:

Individual components of the TAG	
Upper shell casing	1x (PA3200 GF)
Lower shell casing	1x (PA3200 GF)
accumulator	1x Li-Po (Varta LPP 523450 DL)

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Direct screwing	4x lens head TX5 (6mmx1,4mm)
circuit board	1x epoxy-glass fiber (94-V0)
Seal (zw. Upper and lower shell)	1x 1mm flat seal
clip	1x belt clip (screwed)

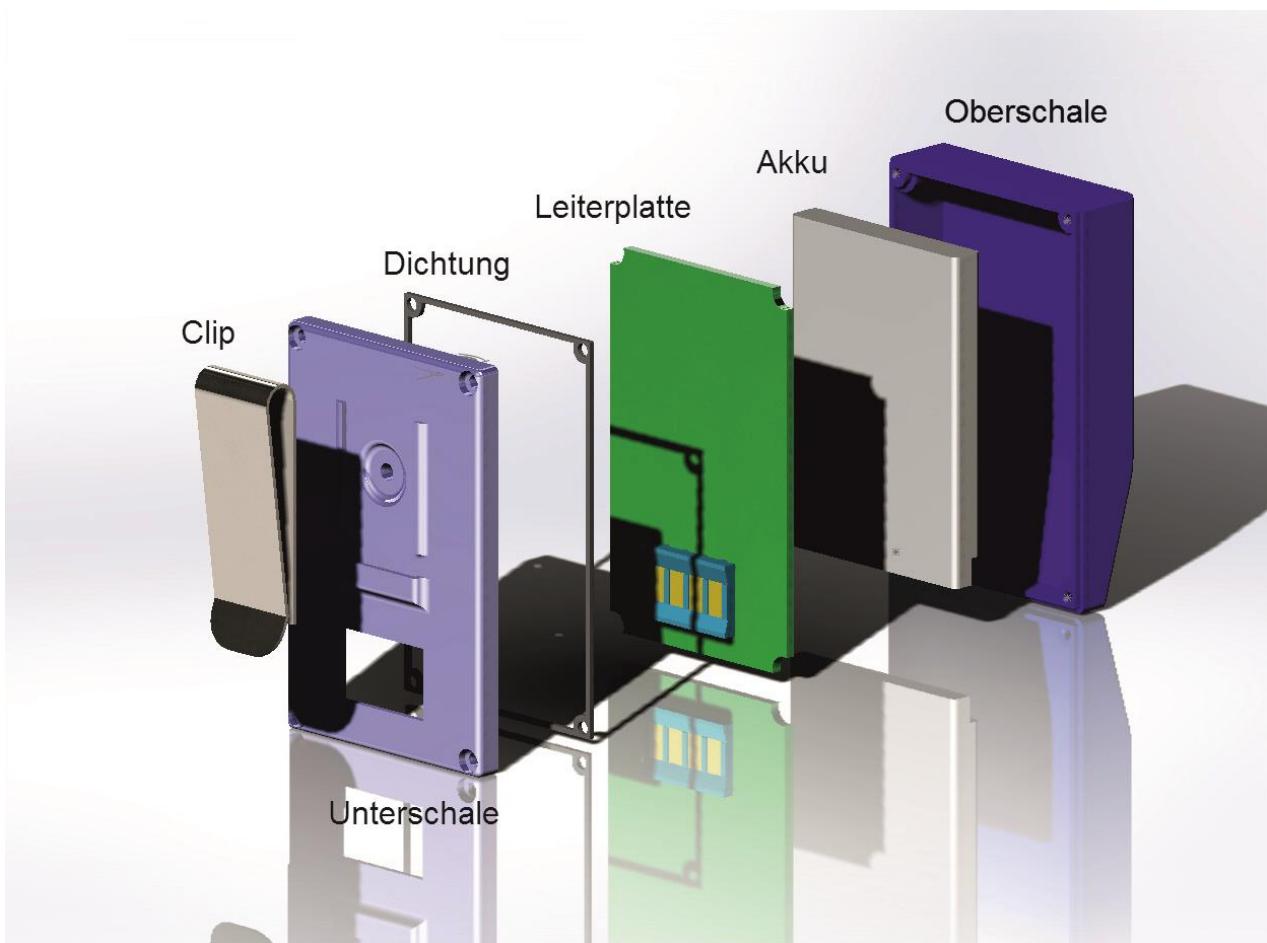
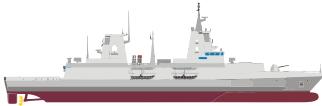


Figure 7: split drawing of the TAG

1. The tag body is made of the flame resistance of the equipped with halogen-free flame retardant plastic PA3200 GF due to the requirements. In the case of a short-term high-temperature load, a carbonising layer which insulates the lying behind material forms on the material surface.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

2. The built-in TAG LiPo battery can via the supplied charging cradle to recharge (for signal Low Bat. From ILOAD) in up to 300 cycles. The nominal operating voltage is 3.7V, with recharging are maximum values to 4.2V possible. The nominal total capacity of the batteries is 1000mA (h), the maximum discharge capacity at 1900mA (h). The battery is connected by means of a two pin Molex connector to the circuit board of the tag and can be replaced by the manufacturer in case of a defect.
3. used for screwing the TAGs plastic direct fasteners (EJOT Delta PT) are made of stainless steel, colored black chemically in the execution A2 and meet the construction requirements laid down in the contract specification for the POS.
4. The printed circuit board of the TAGs is flush fitted into the lower shell of the housing and has a recess for the service interface. The printed circuit board is manufactured in the 4-layer multilayer construction and protective coating for greater durability. On the circuit board, both the RFIDSOC chip, as well as the voltage and charging regulation are accommodated for operation. The service interface (Bourns 70AD) is certified to MIL STD-202 and designed for up to 5000 mating cycles.
5. About the seals at the interface and the two housing shells with protection class IP ensures 54th



Date: 11/08/2017

Revision: 1.6

4.2 chargers for TAGs

In the board included a charging cradle for the tag is included, over which charged the tags and enabled. For this purpose, an external power supply (PSU) is necessary. The physical cut-off voltage of the TAG is about 3V. The charge controller on when the maximum voltage of 4.2V charging after about 4 hours.

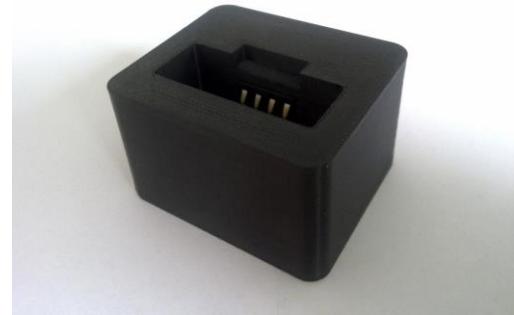


Figure 8: charger

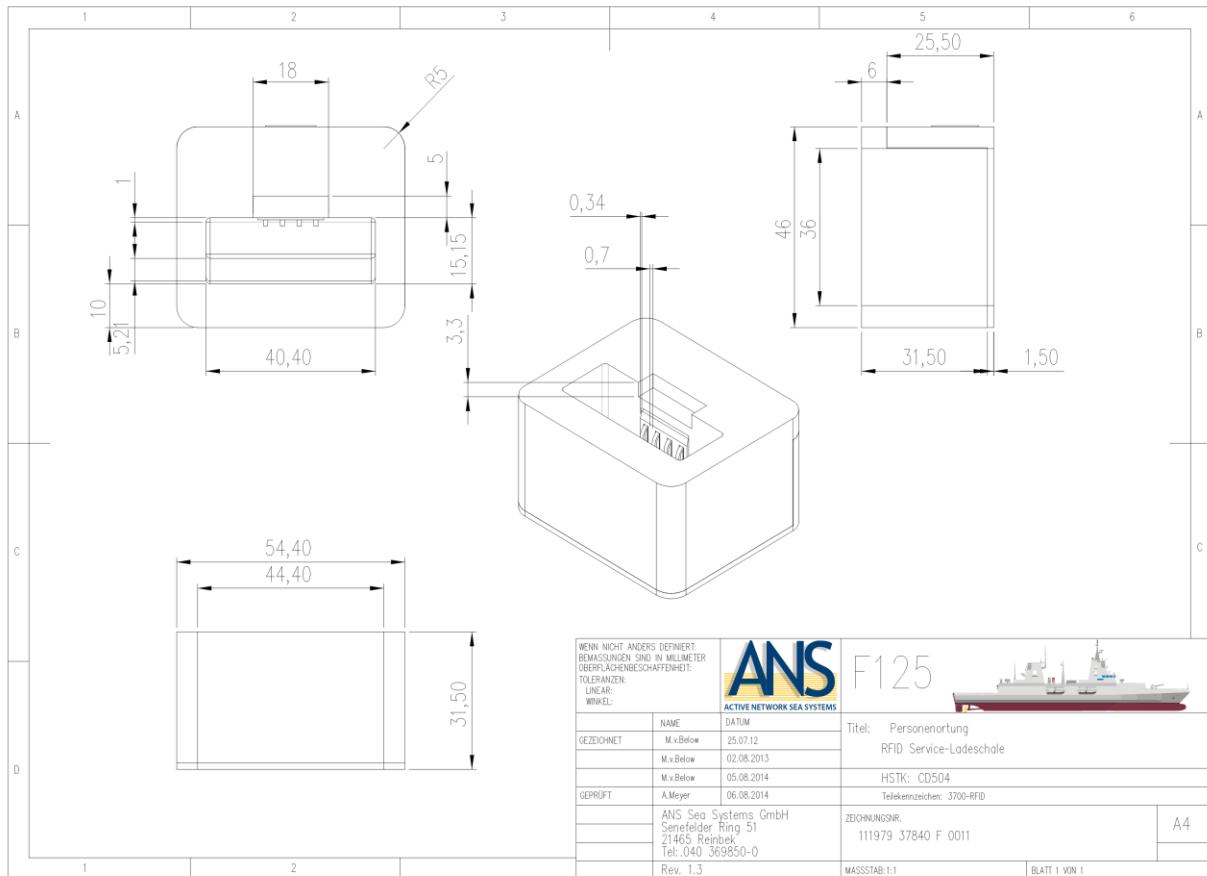
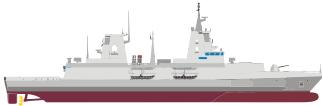


Figure 9: Drawing Service charging cradle

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.2.1 environmental data (service) -Ladeschale

storage	
temperature	-5 ° C to 60 ° C (-4 ° F to 140 ° F)
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
Dimensions:	See diagram
height	-15 to 12.192m (-50 to 40.000Ft)
business	
temperature	5 ° C to 55 ° C
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
shock	200g, 2ms, half-sine
Interface:	USB 2.0 (only service charging cradle)
Operating voltage:	5 V
housing material	
Material	PA3200 GF
tensile modulus	2500 MPa
tensile strength	45 MPa
flexural strength	65 MPa
Melting temperature (ISO 11357-1 / -3)	185 ° C
flammability	UL 94 V-0
density	1060 kg / m3
toxicity	AITM 3.0005

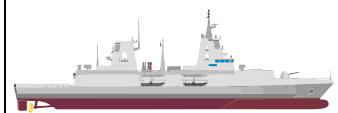
4.2.2 Collective charger for TAGs

As an additional tool for the charge of the TAGs on board a collecting charger is provided. In this device, it is possible to load in one pass up to 12 tags.

The collecting charging cradle is generally defined maintenance-free and as a replacement part. The repair is performed exclusively by their manufacturers as part of its warranty. **A service of this component by the naval arsenal is not provided.**

F125 frigate

Technical Documentation personal tracking system



Date: 11/08/2017

Revision: 1.6



Figure 10: 4x3 collecting charging cradle

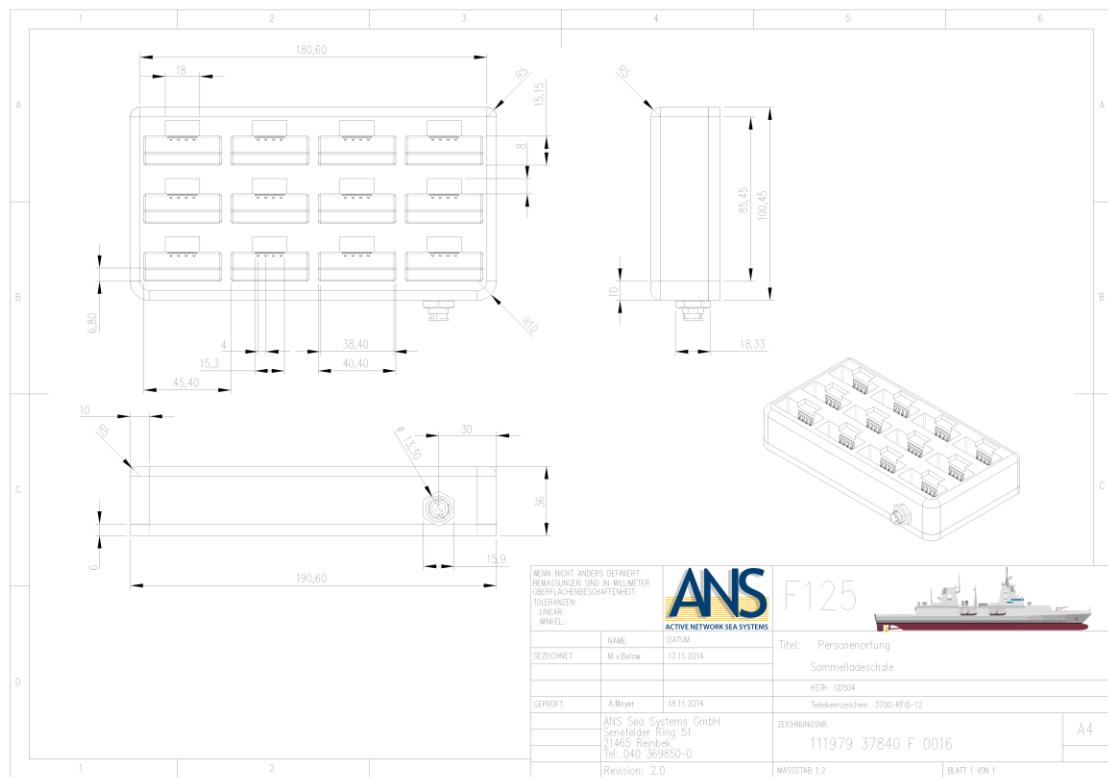


Figure 11: Drawing collecting charging cradle

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

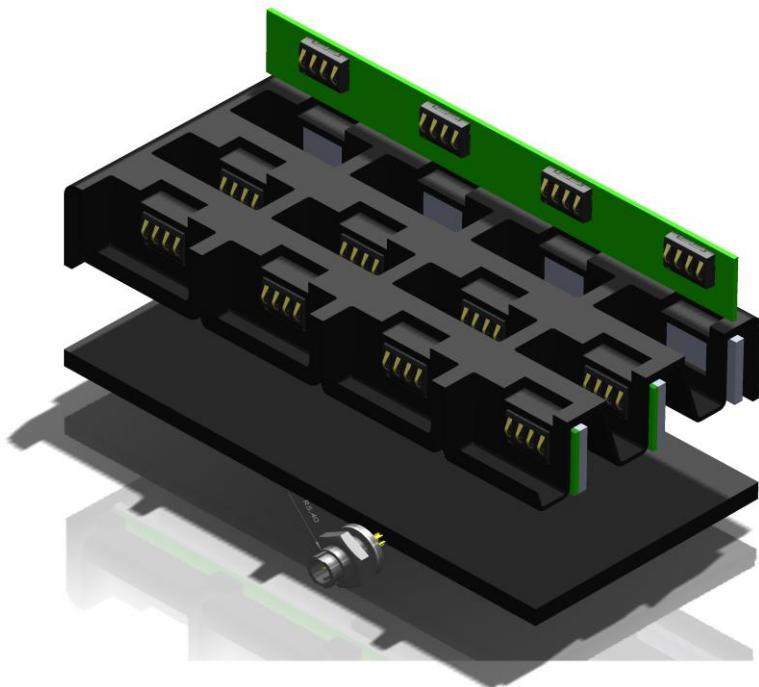
The diagram is used here only for illustration, it is as a stand-alone document no. 111979 37840 F 0016 before Revision 2.0.

Proposal amounts AT: provided no ET / AT						
LFC TKZ	HSTK	mass	Packaging Unit	COTS	SLC	Delivery of the manufacturer
3700-RFID-12	CD504	Approximately 600g	1 piece.	2	0	Approximately 8 weeks

Individual components of the collection cradle	
housing material	PA3200 GF (SIS)
baseplate	PA3200 GF (SIS)
RFID PCB	3x epoxy-glass fiber (94-V0)
antenna housing	PA3200 GF (SIS)
housing seal	Silicone rubber
power adapter	Meanwell LPV-100 (IP67)

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Figure 12: Split representation of the collective charging cradle



F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

4.3 Space brands

The room brands on board the frigate are all the same type and fulfill the same function principle. Most space trademarks are consequently at positions and functions that serve the simple summation of TAGs and their inclusion in the sectors. Here are the most obvious signs affixed to the doors / passages space marks (of those two, one located at each passage side). Inclusion in the clear of TAGs in the sectors often requires the use of several space brands that are linked in the POS database to a sector and their data packets are used for totalization.

be installed (see Kap.3.6) on the outer deck or in "radio-quiet rooms" no room brands. This raises the proviso to realize at the transitions to the outer shroud and in front of "red spaces" solutions that ensure a "uninterruptible" location of the tag by means of space brands.

Space brands that are installed in these particular positions are stored accordingly in the POSDatenbank and software-controlled in its transmission and reception power adjusted (such as short-range space marks before "radio silent areas" see Kap.3.6), or special logic in the interpretation the data packets sent subjected (eg access to the outside decks).

The positions of all space marks are shown in the outline configuration of [2]. The space marks are directly connected to the MSB, the power supply is separate 24 volts from the distributed spare power supply, the operation is thus ensured also in case of failure of the main power grid. An integrated into the room makes fault analysis ensuring a steady self-test.

F125 frigate

Technical Documentation personal tracking system



Date: 11/08/2017

Revision: 1.6

4.3.1 Technical data of the room brand

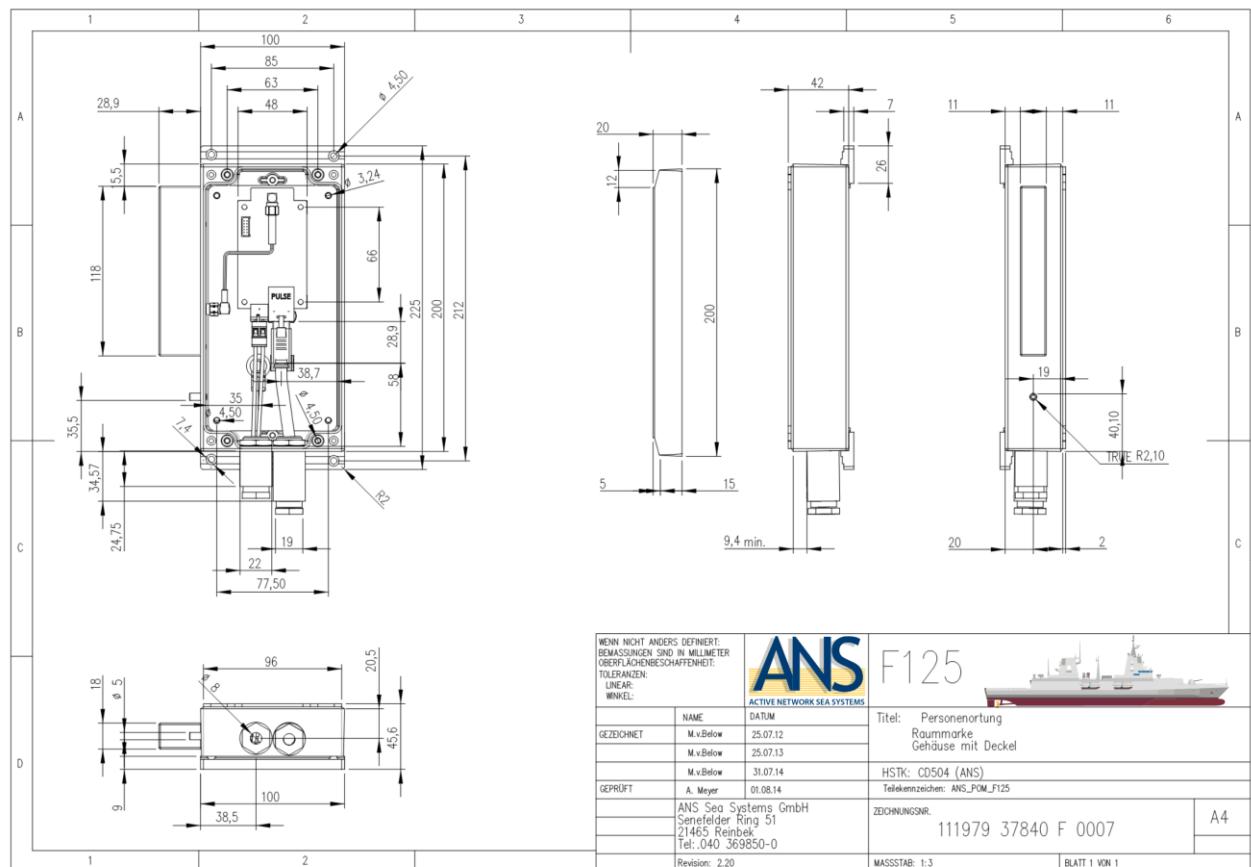
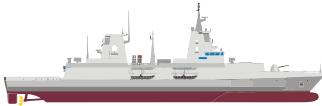


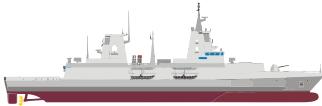
Figure 13: Drawing Room brand

The diagram is used here only for illustration, it is as a separate document.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.3.2 Environmental conditions room brand

storage	
temperature	-20 ° C to 60 ° C (-4 ° F to 140 ° F)
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
shock	200g, 2ms, half-sine
vibration	1,5grms
height	-15 to 12.192m (-50 to 40.000Ft)
business	
temperature	- 0 ° C to 60 ° C
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
shock	s. Document WTD 71 0006/2010 WB
vibration	s. Document WTD 71 0006/2010 WB
Power supply:	24V
housing material	
Material	DIN EN 1706 EN AC-AISI 12
protection:	IP 56 (n. EN 60579)
painting:	Powder RAL 7001
Impact resistance:	7 joules (EN 60079-0)
Material antenna housing	PA3200 GF
flammability	UL 94 V-0
density	1060 kg / m3
toxicity	AITM 3.0005

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.3.3 Configurable parameters of the space brand

Config parameters (Settings)	
Receiver ID:	1-65535 (16bit) (variable F125 1-259)
Transmission power:	-30dBm - + 10dBm (default F125: + 5dBm)
Transmission channel:	0 - 5. (default F125: 3)
Reception slowdown:	0-18 dB (default F125: calibration)
Receive Channel:	0-5 (default F125: 0)
Reception test (test period):	1-255 s (default F125: 240)
Reception test (test period):	in s (8-bit) (default F125: 1)
LED Toggle (Released)	Yes (default F125: 1)
LED Alarm (lag time)	Yes (default F125: 1)
Config parameters (data rate)	
Data rate (baud)	2400, 38400, 153600 (default F125: 38400) Baud
Config parameters (transmission enable)	
Timer ticks / second	Value (8bit) (default F125: 200)
interval	Value (8bit) (default F125: variable 10-40)
Status message (room trademark)	
Unknown:	No connection between the server and space brand
fault:	Brand space has not received a signal within 240s
Ready:	Signal reception within the last 240s

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.3.4 Structure of the Space brand

The electronics of the Space brand is housed in a die-cast aluminum housing for maintaining the protection requirement. The external power supply and the network cables are compatible with the Treaty through VG-glands and placed in the screen on the housing of the room brand. The lid is secured against falling with retaining tabs on the chassis.

Housing tabs are provided for the assembly of the space marks on board, which cylinder with screws A2 25mm or 12mm M4 (TX20) are screwed. At some positions, the area marks are attached to a respective holder at the mounting location.

The exact space brand positions are shown in the type list (37840-K-0100-D-Personenortung_H_15_04_-2012.pdf). The RFID circuit board is mounted on the board in the housing construction. All the fittings inside the housing are secured by means of vibration-proof lock washers or locking paint.

The patch antenna connected via SMA connector with the RFID circuit board is housed in a housing at the side-mounted, own antenna housing which is sealed against the housing separately.

The power supply of space brands via the 24-volt DC based network of the vessel. Which has the consequence that an emergency shutdown only the space marks can not be done centrally (installation s. Chap. 4.3.5).

The network connection of the space mark via a special cable (Draka ToughCat 7S / FTP) directly into the space mark (s. Page 41).

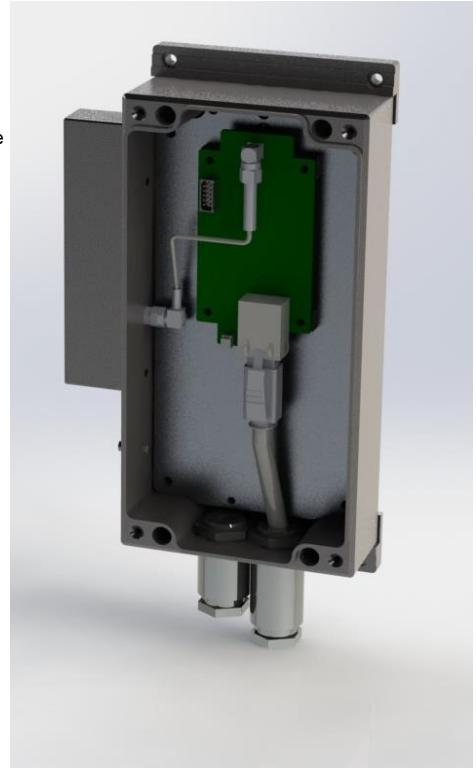


Figure 14: Space brand in 3D

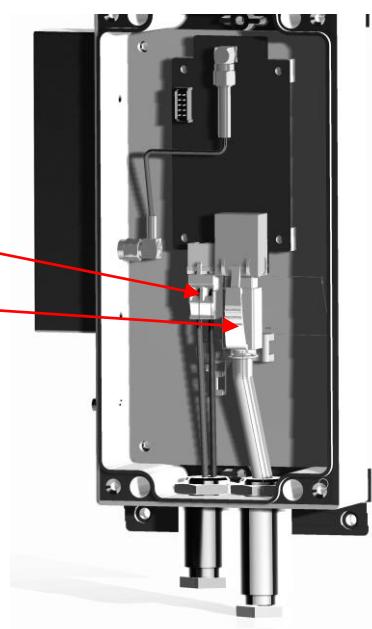


Figure 15: The connections of the room brand

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Individual components of the space brand	
Room brand housing	1x Rose (die-cast aluminum)
housing cover	1x Rose (die-cast aluminum)
housing tabs	2x Rose (die-cast aluminum)
Lid retaining straps	2x Rose (plastic)
structural panel	PA3200 GF (SIS)
RFID PCB	1x epoxy-glass fiber (94-V0)
antenna housing	PA3200 GF (SIS)
Antenna housing seal	Silicone rubber

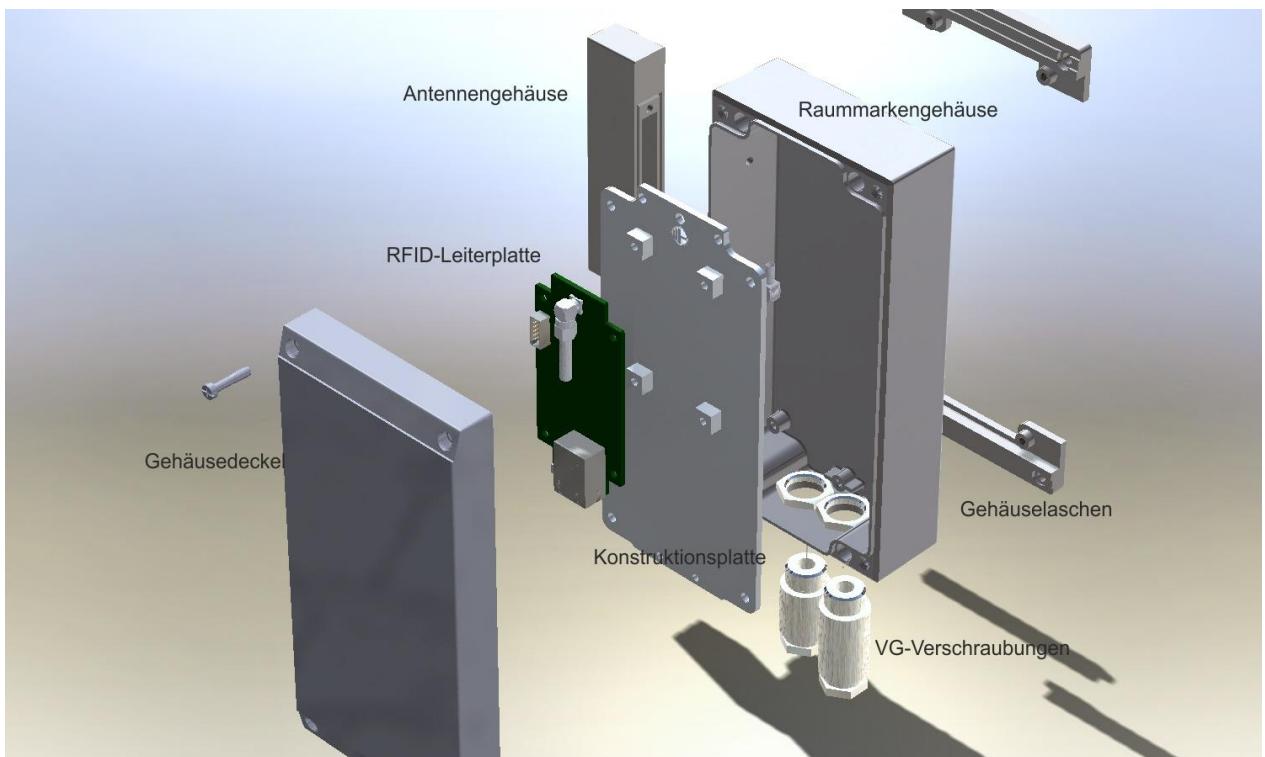


Figure 16: Split representation of space brand

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

4.3.5 Installation steps the space brand

1. Check the pin spacing on the spot: The distances of the bolts for mounting the room brands

be mounted in the ship, 85mm must be in the horizontal and in the vertical position of 212mm (with a tolerance of 0.5 mm), in order to ensure stress-free mounting housing space brand using the housing plates.

Second Mounting space Brand: using the M4 screws (cap screws) is to be screwed to the bolt or the holder space brand. When installing the room brands is essential to ensure that the lock washers supplied are used. They are designed to prevent loosening of the room trademarks of the bolt through the vibrations of the ship. The nuts with the allowable maximum torque for the screws of 1,5-

2.5Nm (hard hand) tightened.

Note! *The following steps should be executed in the order described as caused by the installation, make varying cable lengths behind the network cable pipes manual adjustments to the cable lengths needed.*

Third Installation of the network cable: For this is the longer VG-fitting (top view: front right,

Dose-Honshu) to open at the bottom. Here, the inner parts (2xKonusring, 2x half shell) be found. Then the cover of the housing is opened and folded down. Well, the cutting out of the cable sheath followed by a suitable distance between the end of the network cable tubes and the housing with respect to the bending radii of the network cable at the point at which the VG-fitting is access to a length of about 35mm.

Now, the components must be threaded onto the cable in the order below, which expire at the end of the assembly against the gland:

- Shrink tubing WCSM 24/6 of 40 mm 4: 1 length (prefabricated)
- VG-screw below (size 19)
- Lower taper ring (threaded shows the direction of the cable end)

In the front of the threading formed, coat free piece of cable, the two half-shells of the VG-fitting now be used under the shield braid, but above the foil shield.



Figure 17: Built-shells and up to pushed cone rings

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Tip: The braided screen can be cut through the middle on some wires, allowing a slight disentanglement of Schirmungsgeflechtes and creates space for threading the half shells.

Caution!: The shield braid must be completely severed never, it should conservation at least 70%



Figure 18: Assembled room branded network cable from VG-screw

Me th, as otherwise the rear cable jacket region no longer has enough train safety (for open cable end).

the two conical rings now be postponed and thus fixes the shield braid of the cable firmly with the VG-shells. Velvet network cable is now inserted into the VG this screw into the housing and then secured to the VG-fitting (8-10Nm) screwed.

Notes: The foil shield cable wire pairs should be maintained as much as possible to prevent a near-end crosstalk (NEXT) largely or exclude.

4. Installation of Telegärtner network connector: The now remaining in the housing upper end of the network cable is shortened to about 85 mm, the cable sheath separated in the past about 30mm, so that about 55mm cable sheath remain inside the housing.

(1) After the Mantelschirmungsgeflecht as shown by the below Folienschirmung off
was attracted

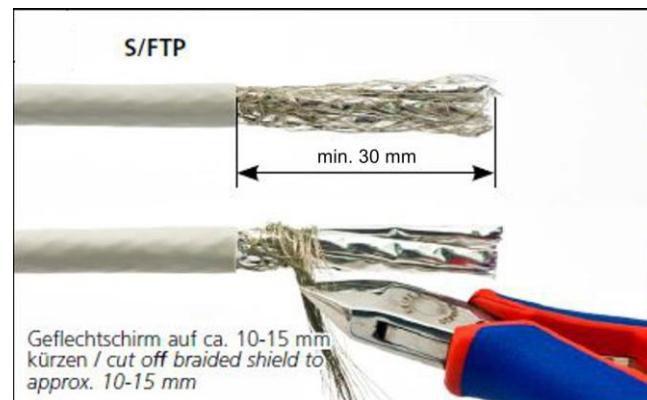




Figure 19: Stripping of the network mesh network cable

(2) the Mantelschirmungsgeflecht is cut via the cable jacket to the back in the second step

inserted and the foil shield of four copper wire pairs as shown in the following figure shortened to max.5mm presorted and the copper wire pairs for the laying on the network connector,

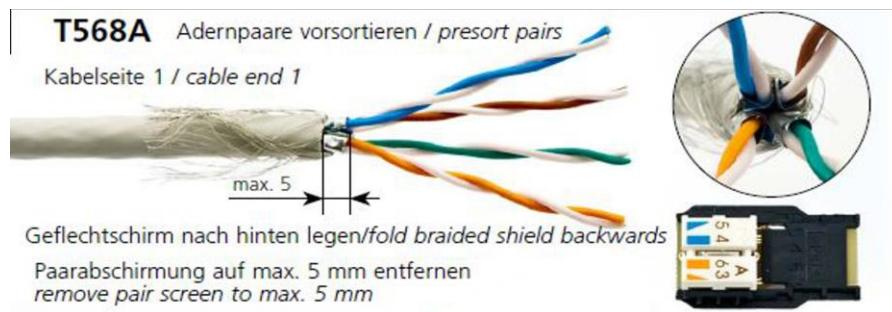


Figure 20: stripping the protective film of the four Kupferlitzenpaare

(3) the copper wire pairs are untwisted and as seen in the following diagram, opened.



Figure 21: placement of the copper wires of the network cable in the wire manager



(4) Now, the copper wire pairs are crimped with the wire manager with a parallel nose pliers, the copper wires clipped, the assembly aid is removed and the wire manager inserted into the connector.

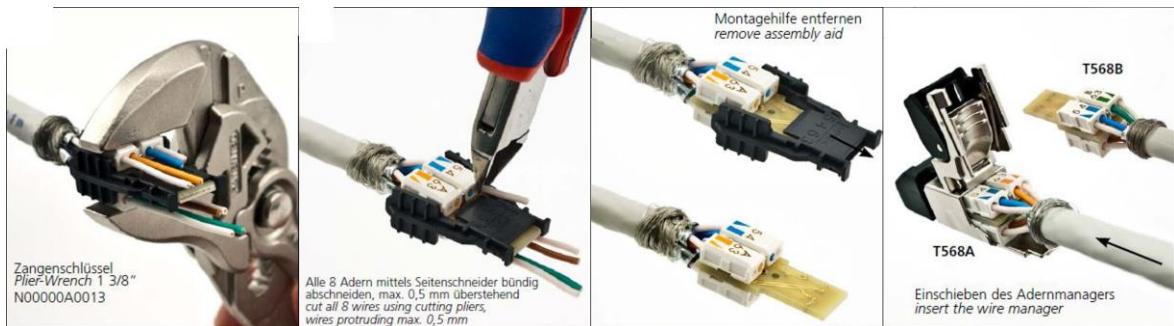


Figure 22: Final assembly of copper in Telegärtner network connector

(5) Then, fix the wire manager to the shield cover in the network connector, the examples

latching the network connector housing parts having a parallel pliers, fix the cable clamp (pre) and the network cable to the network connector (the upcoming used Draka cable has production related diameter 8,1-8,4mm) engaged with one click.



Figure 23: Final assembly of Telegärtner network connector

5. Check the network cable: The testing of network cable should be done in the moment when network connectors are mounted on both sides. The following parameters are recorded electronically with a meter and a total record of the number assigned cable (s.A2):

Reading information of the network cable, the space mark (Class E, 250 MHz)	
wiremap	g.Vertrag n. TIA568A
delay	<50ns

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Damping (250MHz)	G. IEC 11801
length measured	Value in meters
NEXT (near end crosstalk)	Margin:> 0.5 dB
ACR (crosstalk)	Margin:> 3dB
DC Loop Resistance	DC loop resistance

If during the measurement values which indicate an error in the network connector assembly, these by rectification (possibly with Neuauflegen) are to be removed and to perform the measurement again.

Cable fault be detected and separated are passed in a rest point list to the home side and SAM, so that interference suppression can be done. All measured values at and during the installation have been included are merged by the SNE project team and handed over to the AG during installation testing.

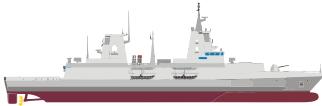
Finally, the network cable is connected to the soldered onto the RFID circuit board Lantronix XPort Pro (network socket).

6. Power supply for space marks hang up: Hanging up LMGSGO power cable (2x1,5mm₂) for the 24 V DC power supply, the space mark is performed in the almost same procedure as in the network cable. The VG-fitting (Top View: front left, Wiska) has an inner cone, with the Mantelschirmung of the cable is connected to the space brand housing and ends there. First, the fitting is opened, the inner cone and the cone shells removed, and then threaded in this fixed order the components on the electrical cable:

- Shrink tubing WCSM 24/6 40mm 4: 1 (pre-assembled)
- locknut
- cone ring

Now lead the power cable through the screw connection and so Shorten that 90mm power cable retained in the interior of the housing. On the entire length of the remaining in the housing power cable the cable sheath is removed and the underlying Kabelschirmungsgeflecht shortened to 20 mm. The Kabelschirmungsgeflecht is fanned out and pressed between ring cone and the cone and inserted into the VG-fitting. Thereafter, the needle on the power cord end nut is screwed with a torque of ca. 8-10Nm VG with the screw fixed.

The two conductors are stripped for pressing with end sleeves on the cable end to 6-8mm, imposed matching ferrules and pressed following power cable and ferrules to each other. The power cables (note the polarity!) With the ferrules in the two-pole PCB connectors plugged, screwed to the 2-pin power connector, and finally put on the printed circuit board into the appropriate connector.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

- (1) screwing the lid: After careful visual inspection of cable seat and possibly distances voltage cable or cuttings applies the space brand as operational. The lid is to be screwed by hand with the integrated locking screws and ensures sealing on its now the protection of the device.
- (2) Verschrumpfen the VG glands: Finally, the two-shrink to verschrumpfen waterproof on the VG gland. The 40mm WCSM 24/6 shrinkable tube 4: 1 is to be heated by means of hot-air dryer and shrink article so far, until the cable end is at least 20mm homogeneous degree.

Tip: *Shrinking temperature: 90-120° C, pre-set the hair dryer to a suitable temperature to prevent burns.*

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.4 the central unit (POS Server)

The central unit of the POS consists of a server, which is installed in a 19 "rack casing (4 U) for integration into a server rack. The server has a redundant design fiber optic network port for connection to the MSB, by which the interface is implemented to the space brands and ILOAD. The POS server determines using data from the room marks the number of people per department and deck (Sectors -> see chapter 3 concept of POS), as well as status information of the TAGs and space brands and stores them in a POS database listed by the number persons per sector from, it passes every five seconds to the ILOAD for display on a process picture in the BDC. About the ILOAD the POS can be disabled (eg EMCON).



Figure 24: Figure POS server

The server also has an integrated LAN interface (100Mbit BaseTX), which includes a full KVM interface (Intel AMT 8.0) and so the secured direct access from the POS VLAN in the MSB to the current Admin Console of the server allows. This includes direct access to the BIOS and MBEx management so that an advanced fault diagnosis in the case of hardware problems is possible through this interface. All connections to the server are mounted on the front and the housing has a depth of max. 450mm. Crucial to this request, the structure of the liquid-cooled server racks was in space 05Z01 (see Kap.4.4.6 redundancy of POSServers). The only moving parts in the POS server are monitored by the fan management of the motherboard housing and CPU fan.

The power supply to the POS server via the 24V DC power supply of the vessel and is protected by a 10A fuse. The cable (2x4mm²) (via a high-current connector D-Sub 2W2C



Date: 11/08/2017

Revision: 1.6

CONEC) connected to the server and ensures the operation of the 24V DC power supply industry (Bicker BES540C).

For direct service activities in the server of the POS server front PS has / 2 ports for mouse and keyboard each have a DVI-I port and a display port connector for video display. Possible scenarios reduce here but for defects of the power supply or on the motherboard, which lead to a total failure of a POS server, and are then dissolved by the failover of redundant POS server.

There are up to the regular maintenance of the POS server (housing and CPU fan, CMOS battery) not planned ET / AT measures at the POS server. An exception is the replacement of the power supply, which can be done as a special measure a double server failure (master and slave POS server) by MES3 if necessary, to restore the POS function. All other maintenance cases are to instruct on the naval arsenal at ANS (s. HVR-database).

4.4.1 Technical data of the central unit

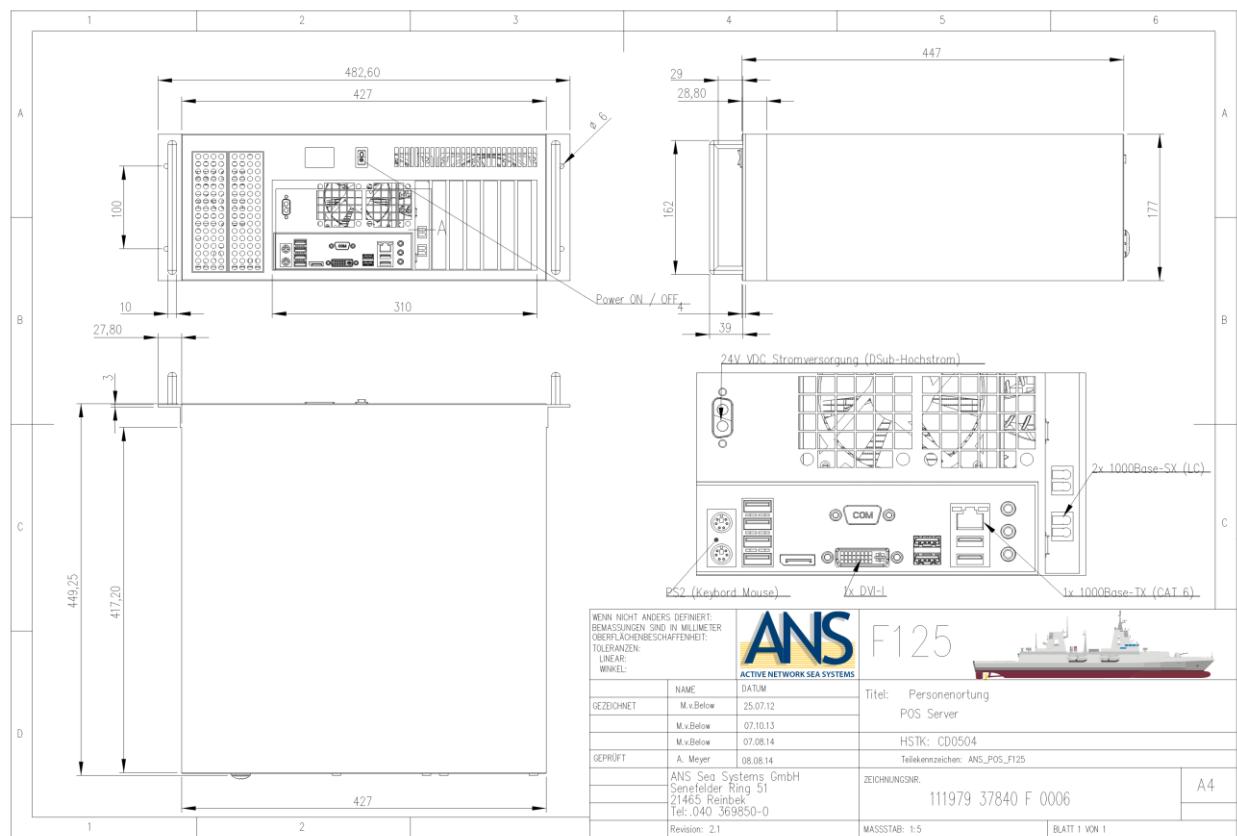
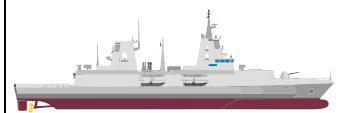


Figure 25: Drawing POS server, Page 1/2

F125 frigate

Technical Documentation personal tracking system



Date: 11/08/2017

Revision: 1.6

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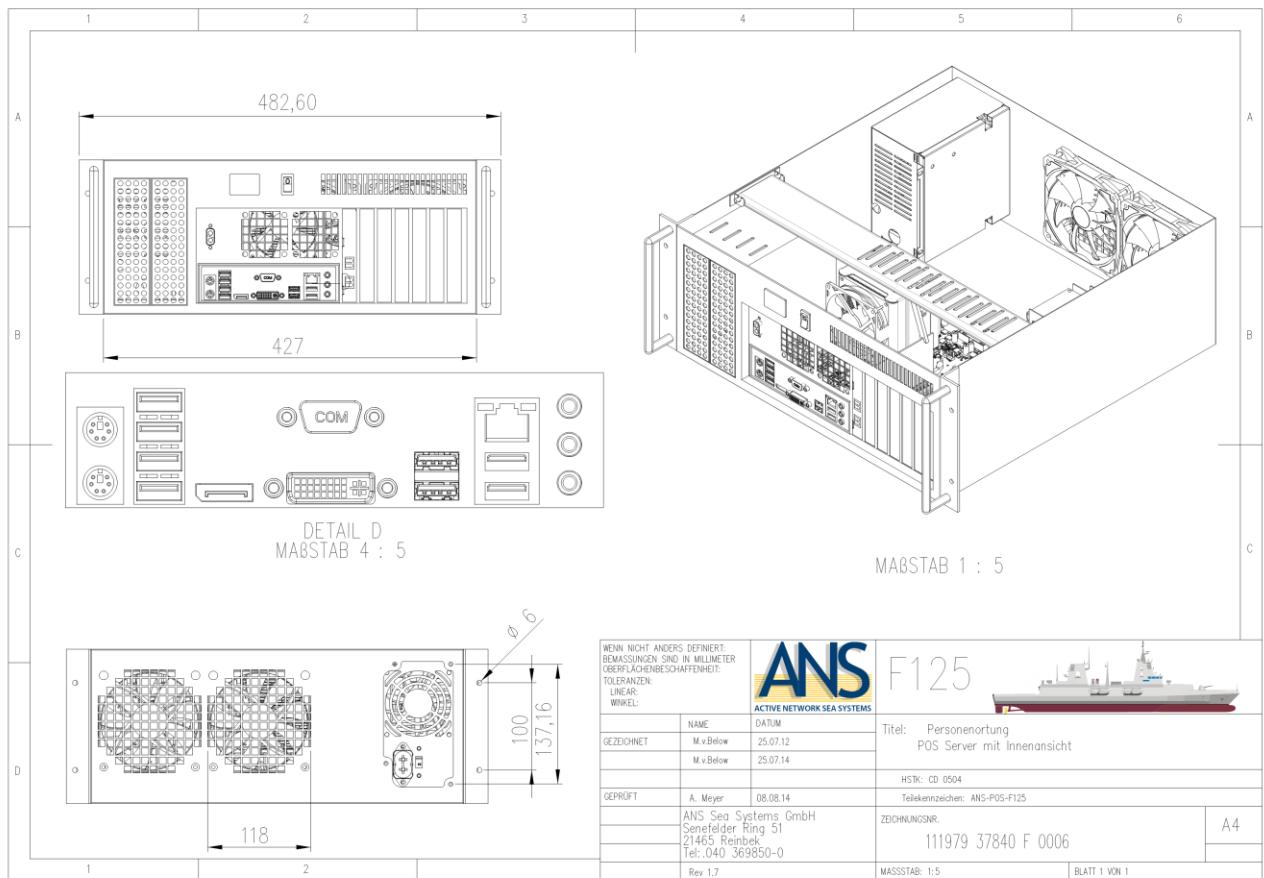
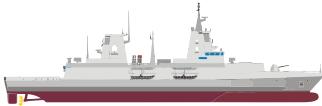


Figure 26: Drawing POS server blade 2/2

The diagram is used here only for illustration, it is as a separate document.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.4.2 Environmental conditions CPU

storage	
temperature	-20 ° C to 60 ° C (-4 ° F to 140 ° F)
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
shock	200g, 2ms, half-sine
vibration	1,5grms
height	-15 to 12.192m (-50 to 40.000ft)
business	
IP	IP 20
temperature	0 ° C to 55 ° C (32 ° F to 131 ° F)
Relative humidity	5% to 95% at 38.7 ° C (101.6 ° F)
rest shock	15g, 2ms, half-sine
vibration	1,5grms

4.4.3 hardware

component	execution
design	19 "-Rackgehäuse, 4 HE, connections out to the front set (front Access)
motherboard	Fujitsu D3162-B, Socket 1155, Q77 chipset, max. 32GB RAM
processor	Mind. QuadCore 4x 3.5 GHz (8MB cache, Intel Core i7-3770)
random access memory	Mind. 8 GB DDR3 RAM (2x 4GB PC3-10667U CL9 Kingston)
memory	2x 256GB SATA 6G SSD, RAID1 system
network	Integrated 10/100/1000 Mbit / s network card, RJ45 (copper), integrated KVM function PCIe x4 expansion card (Intel Pro / 1000 PT Srv SX) with 2x optical 1000MBit / s LC connectors
power adapter	Bicker BES540C 24V DC
power connection	High current D-Sub (2W2C CONEC)

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.4.4 Structure of the POS server

The selected COTS industrial components from which the POS server is established, guarantee on the part of the component manufacturers a high load capacity and durability. Here, the calculated failure-free period (MTBF) for the POS server located at 2.96 years.

All outer housing fittings are (Adjusted LT245.) According to the request, the contract system with lacquer secured. A later dismantling is not provided. For all internal components (reversible) exclusively Epoxidsicherungslack (BLR10SL Adjusted.) Is used to ensure vibration and vibration resistance. To reduce the probability of default POSServers both the case fan and the SSD storage are redundant.

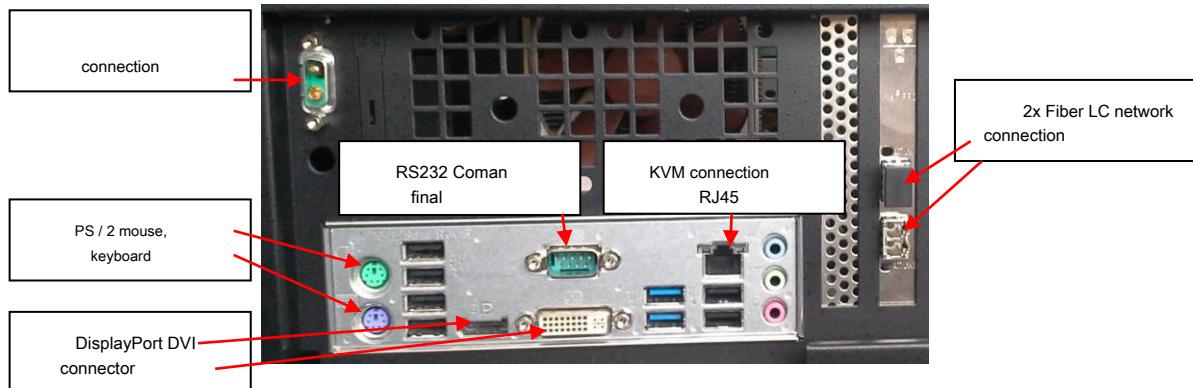


Figure 27: Interfaces of the POS server

4.4.5 of the POS server software

The requirements of the IT SiKo regarding the configuration requirements of the operating system found on the POS servers in accordance with the BW IT security configuration W2K8R2-W7 v2.6 Stand 03/2013. Here, both the hardware-related requirements (eg disabling USB ports, BIOS password policy) and the operating system near requirements in respect of a dedicated application server (general and local security policy) have been complied with. Domain-specific security requirements fall in this reaction is not (s. CERTBw IT security configuration W2k8R2W7 V.26.pdf).

As a server operating system 2008R2 Standard comes in the POS server Microsoft Windows Server is used (see Sec. 3.6 IT security). The POS server database is running on a MySQL Community Server version 5.6.13, which is owned 03/05 CE on the MySQL Workbench (DBMS).

For the function of the POS, the following software components on the POS server will be installed:

- ANS PosMonitorSerial software (data monitoring of login and logout brands)
- ANS PosMonitorTcp software (data monitoring Raummarken) high current 24V DC

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

- ANS PosConfigurator software (with this program the adjustable parameters of the TAG can be adjusted (see Kap.4.1.3))

4.4.6 Redundancy of the POS server

In accordance with the requirements of the POS, is supplied in hardware and software identical POS server from UAN (ANS) a second. The POS servers for resiliency in the loss event case in separate rooms installed (12H01; rack 37890-010A-0003, 05Z01; rack 66600-001A-0010) and two different network distributor (switch) with the MSB connected (see section 5.2). ,

The redundancy of the POS server at the network level is described in 6.6 and Annex A3.

The redundancy of the server at the application level is described in Section 6.6.1.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.5 management and diagnostics station of POS (mobile)

For parameter setting and maintenance of the components of the POS, as well as for the management of waste and Application processes in "Shore Leave" (see Section 3.4) is a mobile management and diagnostic station provided (as a "ruggedized" laptop running). With the help of a serial port (RS232 (D-SUB 9)) with this management and diagnostic station associated discounts and registration marks, tags are off in the database of the POS and logged.

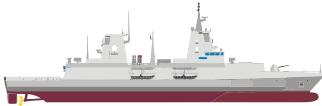


Figure 28: Management and diagnostic station

The parallel connection of the drain and registration marks is realized via the integrated COM port of the management and diagnosis station by means of an installed Express Card, the (D-SUB9) provides a serial RS232 interface. So login and logout brand are simultaneously controlled via the Managementund diagnostic station and down and registration procedures can be triggered simultaneously. the separate POS software is installed on the PosActivator Managementund diagnostic station for waste and sign-processes which is described in detail in Section 7.3 "Software".

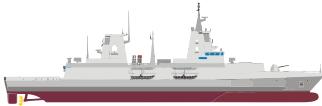
4.5.1 Technical data of the management station

In the management station is a fully from a third party (DELL) purchased assembly.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.5.2 Environmental conditions Management Station

business	
temperature	--29-63 ° C (-20 ° to 145 ° F) n. MIL-STD-810G
vibration	Vibration - Method 514.6 Procedures I (Categories 4.24)
shock	Fall from 2 m height - Method 516.6 Procedure IV
humidity	Moisture - Method 507.5 Procedure II
protection	IP-65 Certified Ingress Protection - Dust-tight and protected against pressurized water inlet
noise emission	Max 31.8 dB (OD)
Electromagnetic - Compatibility	MIL-Std 461F, CLASS B
AC adapter	
Type	90 W, 100 to 240 V AC
input frequency	50 Hz to 60 Hz
output current	4.62 A (constant current)
Rated output voltage	19.5 V DC (\pm 1.0 V)
Temperature range Operating / Storage:	0 ° C to 40 ° C; -40 ° C to 70 ° C
battery pack	
mass	344.73 g of lithium-ion battery cells 6
Temperature range Operating / Storage:	0 ° C to 60 ° C; -51 ° C to 71 ° C
charging time	about 1 hour until reaching a charge of 80% and 2 hours for 100% of capacity.
measures and weight	
Height / width / depth	56.8 / 356.1 / 296mm
mass	3.99 kg

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.5.3 hardware

component	execution
design	Notebook in ultra robust design (impact, camber and intrusion etc.) Tested according to MIL-STD-810G, IP-65, MIL-STD-461F and UL1604
model	DELL Latitude E6420 XFR
processor	Intel Core i3-2330M
chipset	Intel Mobile Express Series 6 chipset
screen	14 "TFT (1366 x 768), 730 cd / sq m, pitch 0.2265 mm
Video	Intel® HD graphics card 3000
random access memory	4 GB DDR3 SDRAM (1333 MHz)
memory	1x 128GB SATA SSD
Audio	IDT 92HD90, 24-bit (HDA), system speakers 2
network	Integrated 10/100/1000 Mbit / s network card, RJ45 (copper) Built-in wireless network card that supports IEEE 802.11a / b / g / n
Add. interfaces	9-pin D-sub connector (RS232), 1x ExpressCard slot

4.5.4 software

As a client operating system is Microsoft Windows 7 Professional installed on the management and diagnosis station 64bit (see Sec. 3.6 IT security). As remote maintenance tool VNC Viewer Plus V2.3 is installed (KVM n. Intel AMT). The POS database on the POS server can be managed by the management and diagnosis station via MySQL Workbench 6.1 CE (DBMS).

For the function of the POS following software components on the poserver be installed:

- ANS PosMonitorSerial software (data monitoring of login and logout brands).
- ANS PosMonitorTcp software (data monitoring Raummarken)
- ANS PosConfigurator software (with this program the adjustable parameters of the TAG can turn be compensated (see Kap.4.1.3))

For the management and diagnosis station and the thereon Microsoft Windows 7 Professional 64bit security configuration from the same policy for notebooks and client applies.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.6 Network doses of the POS

About five connected to the MSB network outlets the management and diagnosis station can be connected in the ship (see Sec. 4.5) with the POS. Each network can has two, from dust and water proof (IP67) ports for network cable in the form of two sockets according to IEC 61076-3-

106, however, only one of which is denominated.

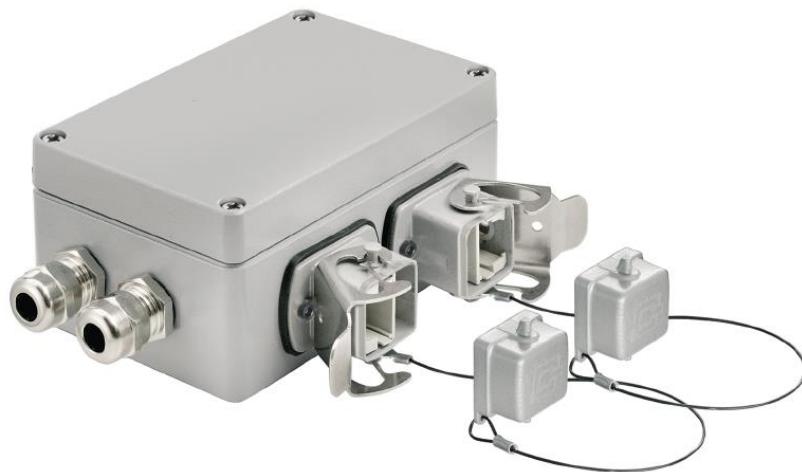


Figure 29: network socket (Weidmueller)

The cans are located at the following positions:

Asset Tag	designation	room
37840-006A-0001	Schiffstechnischer_Leitstand_05Z01	05Z01
37840-006A-0002	Wax prior VIII H Bb	08H01
37840-006A-0003	Wax prior VIII H Stb	08H02
37840-006A-0004	awake state Gang_05H00	05h00
37840-006A-0005	Room with server rack POS server 1	12Z06



Date: 11/08/2017

Revision: 1.6

4.6.1 Technical data of the network socket

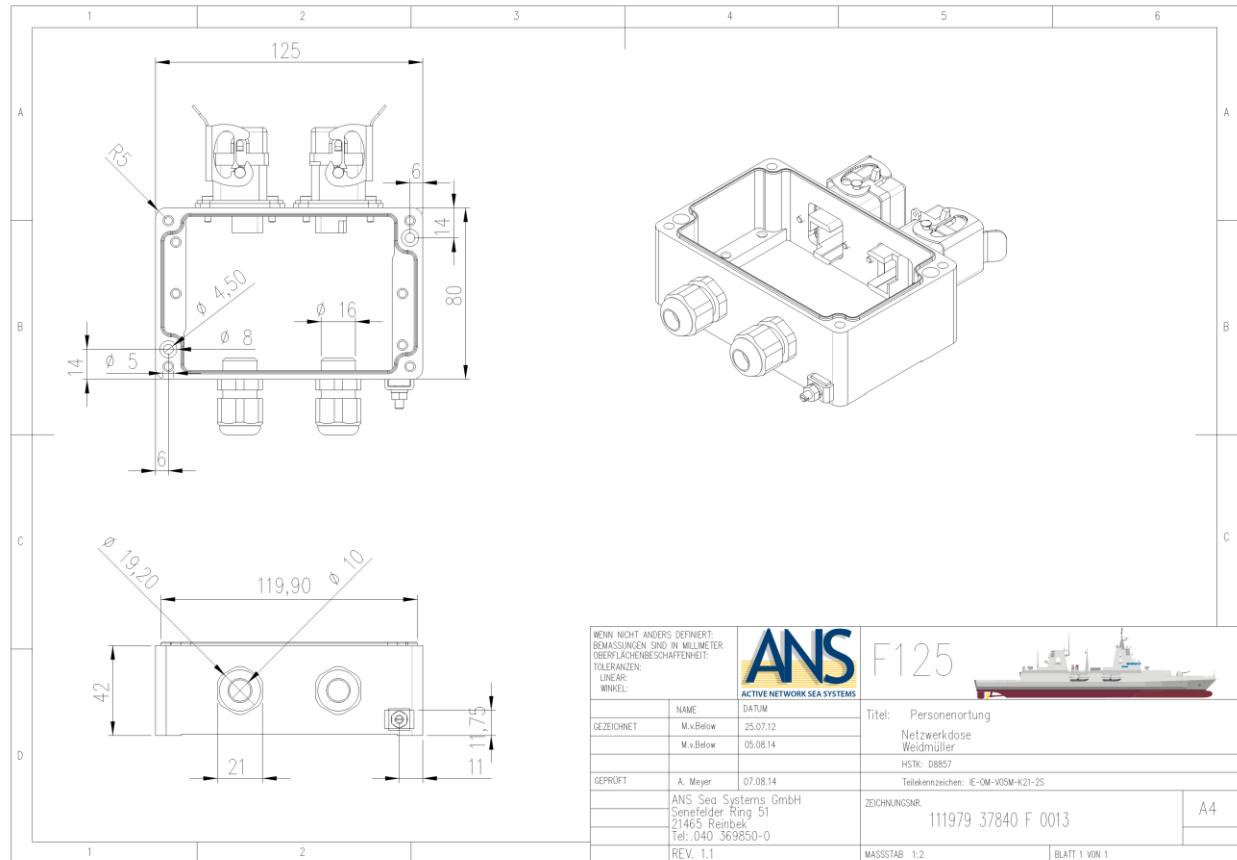


Figure 30: Drawing network socket

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F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.6.2 Environmental conditions of the network socket

Network socket Weidmüller IE-OM-V05M-K21-2S	
Connectors	Standardized to IEC 61076-3-106 variant. 1
temperature	-40 ° C to + 70 ° C (-40 ° F to 158 ° F)
Dimensions in mm (W)	136x125x57
Housing main material	AL-Si12
approval GOST	POCC DE.ME25.B01411.pdf
protection	IP67
RoHS	compliant
classifications	ETIM 3.0 EC001084; UNSPSC 30-21-18-18; eClass 5.1 19-0704-01; eClass 6.2 19-07-04-01; eClass 7.1 27-25-05-04

Bohrbild

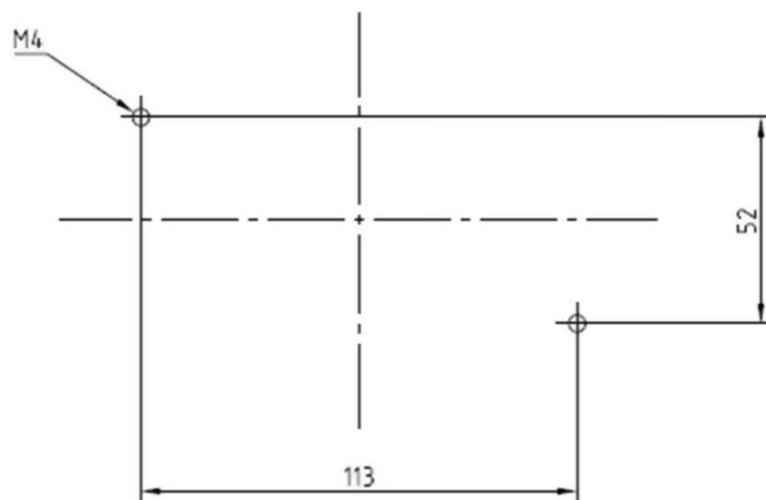


Figure 31: drilling template network socket

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

4.6.3 Installation steps of the POS network socket

1. ***Examination of the holes on the spot:*** The holes for the network socket must be performed, a thread for screwing the network socket to the wall in the bores may be present in addition to the dimensions of the above-defined (see Figure 31) a drilling template.

Second ***Installation of the network can:*** The design of the holes determines the mounting orientation of the network socket (horizontal or vertical cable guide). For the laying of the network cable, the installation of the network socket is carried out such that the shortest Netzwerkkabelweg can be maintained between the end of the cable guide tubes and the network socket (in compliance with the cable bend radii), and can be made of connection of a network cable problems. Taking these premises it is finally supplied with the M4 screw 25mm on the wall or the holder with a torque of hand tight (1,5-

to attach 2.5nm).

Third ***Installation of the network cable into the network socket:*** Before mounting the network cable compression fittings are ready to turn up the housing of the network socket that the network cable may be passed without difficulty. Then the network cable is plugged through and shortened to ca.80mm. During the installation of the network cable, it remains in the network socket because the later aufzulegende network jack not fit through the Klemmverschraubungsöffnungen.



Figure 32: the socket element (Weidmüller, IE-BI-RJ-45 FJ-A')

The assembly of the network jack is performed as specified below in the pictures. Finally, it must be made in the assembly of the potential compensation in the space provided on the housing screw.

Note: It must be followed, the following differences from the fine jack socket assembly instructions assembly instructions:



Figure 7: The foil shield is not as shown, removed up to the edge of the cable sheath, but to near end crosstalk effects (NEXT) can be avoided / minimize the foil shield of the twisted copper wires about 3mm received.

Figure 8: done the shortening of the copper after the placement of the copper wires in the socket element with a special tool, and not in front of it ready as described below.

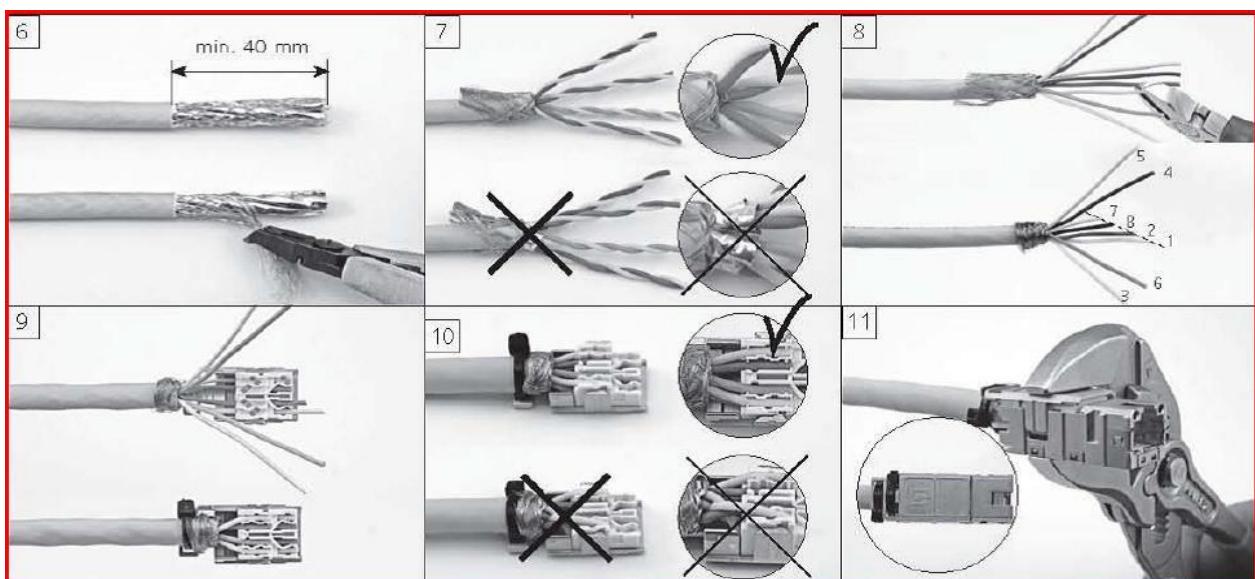


Figure 33: assembly of the bushing insert the POS network outlets

- (6) Top: removing the cable sheath Bottom: withdrawing the wire mesh screen (7)
 Above: removal of the aluminum foil sheath (8)
 Above: n untwisting the Litzenpaare TIA586A (see Figure 9) (9).
 Top: laying the strands Bottom: pinched strands (10)
 Above: Pad correctly Bottom: Bad (11)
 Compression of the socket.

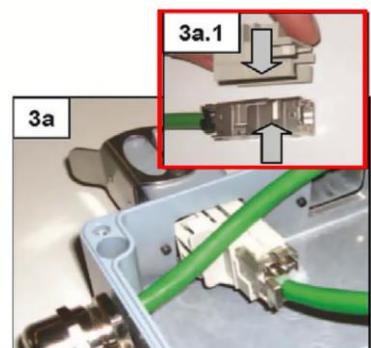
4th Installation of the network jack insert in the network can: After finishing the

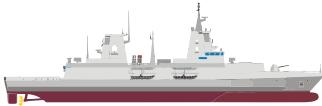
The network cable to the network jack is removed from the network socket output in network doses housing, which is opposite to the Klemmverschraubungseingang through which the network cable is inserted into the housing, the plastic shoe taken clipped onto the network socket (see **Error! Reference source not found.**) and following the network jack in the network socket output introduced up to an audible click.

IE-V05-K21-2L (-2R)

Figure 34: inserting the network port to the network socket

- 5th **Tighten the screw:** The compression fitting locks the cable by friction, which arises when the compression fitting the rubber inlay of the Netzwerkkablein-



F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

output jack presses against the network cable sheath. The compression fitting is therefore as far as turning one that neither network cable nor the plastic damage inside the glands that network cable is against jammed so tight that can not be torn from the network jack the network cable.

6th *Check the network cable:* The examination of the network cable, or the proper function of the

Network socket should be done in the moment when the network testing equipment are connectable on both sides. The following parameters are recorded electronically with a meter and associated protocol in the total number of the cable:

<i>Reading information of the network cable network socket insert in the POSNetzwerkdoose (Class E, 250 MHz)</i>	
wiremap	G. Contract n. TIA568A
delay	<50ns
Damping (250MHz)	G. IEC 11801
length measured	Value in meters
NEXT (near end crosstalk)	Margin:> 0.5 dB
ACR (crosstalk)	Margin:> 3dB
DC Loop Resistance	DC loop resistance

If during the measurement values which indicate an error in the network jack assembly, these by rectification (possibly with Neuauflegen) are to be removed and to perform the measurement again.

The connections to the 100Base-TX ports of the MSB by means of twisted pair cables (CAT 7), whose length will not exceed 100 meters. The physical paring has to follow at both ends of the cable to the standard TIA-568A. On the network side, the physical connection is made to the switches always modular jacks ("RJ45") to the MSB.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

5 interfaces of personal tracking

5.1 radio interface between the tag and the room brands

The used frequency of the person tracking device is 866 to 868 MHz and is the part isag with the frequencies 866,9MHz (channel 0) and 867.6 MHz (channel 3) released. This is a legal, free ISM frequency band for use COTS RFID applications with 10mW transmission power.

The tag signal is FM-modulated transmitted based with Manchester encoding on the radio industry standard ZigBee in the above ISM frequency bands (see Section 4.1.4). A more detailed description, can be read in chapter 6.2.1.

5.2 interface to the MSB

The MSB (onboard network) of the F125 provides the infrastructure for the POS. This is based on standard Ethernet networking technology and TCP / IP network covers all requirements of network communication of POS components, POS Intern (POS server and space marks) and from the POS to ILOAD.

The multiservice network board (MSB) is based on an IPv4 Ethernet network for data transfer for various services on board ships. thereby get modern COTS products are used, which provide common industrial and networking standards and implement.

The routing concept (in case of failure) of the MSB is described in Section 6.4 and Appendix 0th

5.3 interface to ILOAD

In normal operation, the POS has no user interface. All / detected data collected by the POS are displayed on the BDCS of ILOAD. For this purpose communicate POS and ILOAD via the "NMEA 0183" together.

The interface POS ILOAD is in the interface description personal tracking system - (see Annex B3) described ILOAD closer.

5.4 Interface to the platform

The POS is disconnected from the ship operation Relevant and drivability of the ship guaranteeing components of the ship and not affected in case of dysfunction, Service and working ability of the ship. there are agreements for the installation of the server with two UANs since the two POS servers are installed in each one of these racks UANs.

All stationary components of the personal tracking system are powered by 24V DC-based network of the ship and have the appropriate protection (circuit breaker) localization dependent. The indication of the space Ortzahlen brands found in Annex B9.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

5.5 Electrical switching scheme for the platform

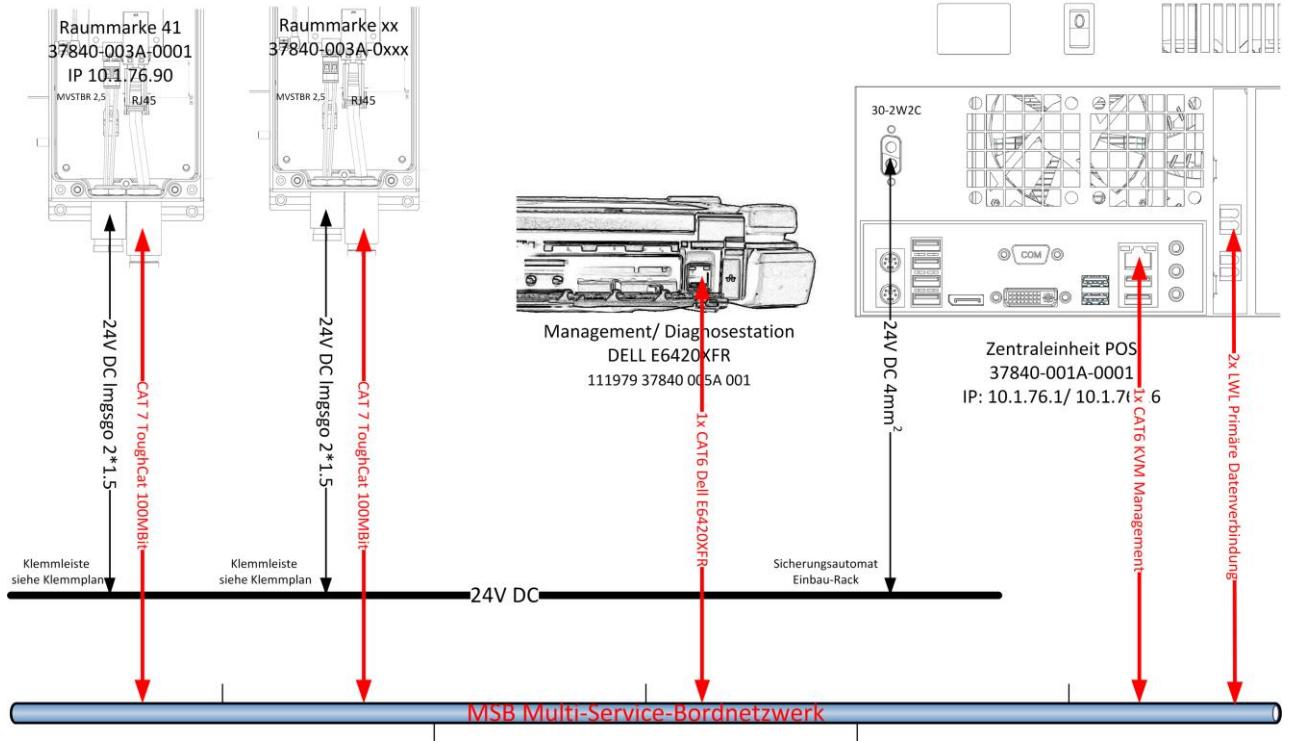


Figure 35: schematic diagram of the components

The Location of room trademarks is detailed in the type overview sketch from 111,979 to 37,840-K-0100 Rev D listed [2]. In the action plan the space information are also pos.receivers stored in the database table in the description field of each device. (Sect. 4.6 s.) Are to access the VLAN 176 of the personal tracking system 5 network sockets provided on which the Management und diagnostic station can be connected. The central units are located in racks in separate security areas of the vessel (see FIG. Sec. 4.4.6).

For the power supply of the entire system via the 24V DC power supply, a terminal plan exists (s. Appendix Error! Reference source not found., further specified what the position and connection of the individual devices.

For all network connections from the MSB to the terminals, the cable routing is the network cable plan (s. Appendix Error! Reference source not found.) the person tracking system can be seen.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

6, description of personal tracking system

The POS determines the positions of all persons on the basis of the carried TAGs on board. To this end, the tags communicate with the space brands via wireless technology (RFID), and the room brands with the POS servers. The POS server process the received through the space trademarks of the tag data and prepare them for display in ILOAD. At the same time enter the POS server requirements for radio communication to the space marks on. The following figure illustrates this communication.

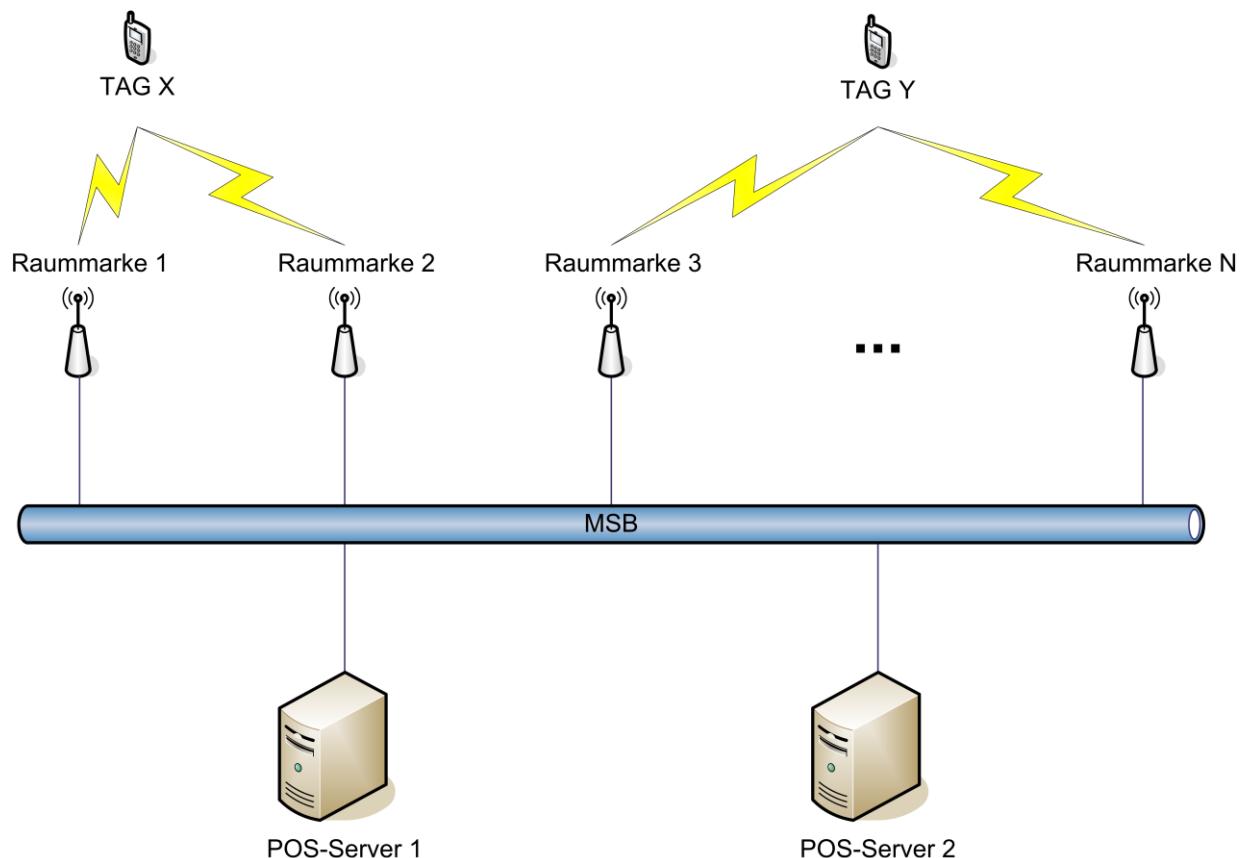


Figure 36: Overview POS

The POS knows the three operating modes "normal operation", "fault operation" and "radio silence". These modes of operation are described in detail below.

A basic POS operating characteristic both in the room and the brand tag is technically physical reasons: it can **Not** be transmitted and received simultaneously.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

6.1 BIT / BITE

The personal tracking system leads when you turn the first central processing unit an integrated Build In Test of all of your connected components (room marks the second central processing unit) by. This is done automatically at each start-up of a central unit by themselves.

As Build in Test equipment the management and diagnosis station are exclusively provided, which at any time transparent access to the POS server allows, when both components are connected to the onboard network. This is only necessary for commissioning to check the log files and server status, manual intervention for system start-up are not necessary in fault-free case.

The following table illustrates in descending order, the running tests of the central unit.

test name	test purpose	level	Result output / target
1. POST	- Test Hardware	BIOS (Fujitsu)	MBEX logfile
2. Boot Integrity Test	- Kernel start - driver status - hardware status	operating system MS Server 2008 R2	MS system log file
3. Network Link-Up State	- Status of the network connection 'Switch fault tolerance'	driver Intel	MS system log file
4. Database Integrity Test	- configuration check - File Check - integrity InnoDB - connection status	application MySQL (mysqld)	MS system log file Application log Mysql.err logfile
5. Connect SIS	- Connection status Receiver Service database - Check loop compensation - Querying the TCP tunnel space brands - Start delay (2min)	SIS POS Receiver	SIS-app log
6. SIS Config	- Check the space mark configuration	SIS POS	SIS-app log
7. SIS failover	- Master-slave configuration	SIS POS	SIS-app log
8. RM reception	- receiving inspection	room brand	Database POS TCP Monitor

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

9. RM Link-Up	- Connection Test Network	room brand	Lantronix (n. Visible)
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The following are only the application-specific TO eleven T described in detail. The tests 1-4 are universal product and can be viewed on the manufacturer.

To third described under Section 6.4 in paragraph 4.

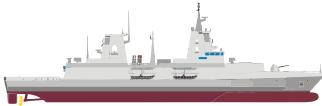
To 5. There is a connection check via pipe connection to the MySQL database is done. Parallel to this, the initiation of the 259 TCP tunnel space brands. This service starts delayed so that all database modules are pre-loaded completely. It follows the logic test the database, checks which misconfigurations within the tables sectors and sector_boundaries on loop references. This is absolutely necessary to eliminate inadvertent loop references in the Degradationslogik.

To 6. Depending on SIS Connect all configuration data from the database table pos.receivers written on the achievable at this time space marks (s. Kap.7.6.1.3) and verified. Errors that occur are with the status space Brands (s. Kap.B6) reported to ILOAD.

To 7. Under Chapter 06.06 redundancy concept described functional. The interval of the failover testing is configurable. Automatic switching from undefined to defined slave master / slave takes an average of 3 seconds.

At the eighth subchapter 6.4 described in paragraph 2.

To 9. The network interface of the Lantronix XportPro has a test circuit for the link-up status of the NIC. If the network connection is interrupted, the interface of the network interface is this to the RFID processor on, which then changes adhoc on radio silence, so this room brand does not send more transmit shares. This corresponds to the requirement that these devices have to accept without a server communication radio silence. (Under Section 6.4, paragraph 2 above).

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

6.2 normal operation

The POS is in normal operation, if it has received from ILOAD transmit enable, this was sent to the room brands and all components of the POS are operational (BIT). The transmission of the operating status without errors "normal operation" To the ILOAD (Appendix s. B, status TAG) occurs only when each active TAG once initially through the system located, both CPUs without problems run (s. Appendix B, status system status) and all area marks the status of "ready" (Report s. Appendix B, state space marks).

6.2.1 Communication between space and brand TAG

A tag sends its response data packets basically just after release by a space mark (this is so embedded in the firmware of the TAGs). Each room tag transmits all 35-50ms on channel 3 (ISM band: 867.6 MHz, see section 5.1) non-directionally with 0 - + 5dBm (variable transmit power depending on the positioning of the space mark) a transmit enable in the form of a minimum packet (ID of the space mark, ID the transmit enable (1 or 2). This package is a transmission time of <100us and can be received on board depending on the transmission power, in up to about 10-20m away.

After a transmit enable the space marks go straight back into the receive mode to Channel0 (ISM band: 866,9MHz, see section 5.1) to collect this response data packets of tags for the next approximately 0.1 second. This reception and transmission mode change the space brand is in the room makes configuration table (receiver)

in the POS MySQL database as countdown

Time (TxApprovalInterval) predetermined and set differently for each space mark in compliance with the surrounding space trademarks or their countdown times. In this way, the transmission clearances adjacent room trademarks are scattered in their transmission and reception range on the time axis. Moreover, significantly, that adjacent space brands always work with a slightly different number of transmission approvals per second in order to avoid overlap of the transmitter shares data packets to avoid cancellation of radio signals and to provide a maximum number of transmit releases available to the TAGs.

In addition, the transmission power of each antenna is adapted to the respective space mark position on the ship and also stored in the POS MySQL database receiver table. So different spatial conditions are balanced, which would otherwise lead to different reception levels to the room brands and wrong sectors-Zuschlagungen of TAGs (see Chap.

3).

A tag is average in the transmission range of 3-4 room brands that send its transmission approvals for a in which the POS MySQL database table receiver individually set for each room brand cycle on average every 100ms. is computationally therefore to be expected that a tag receives all 25-33ms and in the time frame of a TAG-wake time phase of 35-50ms least one transmitting release of a space mark. After the successful receipt of a transmission enable the sending shares reception window (awake time) in the TAG is terminated prematurely on within <100us click Send, then sent within a random time of max. 50 ms a data packet to channel 0 (866,9MHz) undirected with -10dBm. With the random time of data packet transmission of the tags to data packet collisions, as at multipoint (TAGs) to Point (space mark) compounds can not be excluded entirely are be minimized. The transmission power of the tag is designed for a radius 67Metern, this being dependent on the nature of the TAG surrounding space.



In addition, one of the first random period of time (coincidence time) is waiting different random time of about 50ms before re TAG transmission process to exclude two consecutive TAGDatenpakettkollisionen a tag if possible. So can receive up to 20-30 TAG data packets of different tags a room brand.

TAG goes after the broadcast of the data packet for the time of 1000 ms in the standby mode and sends hereafter without re-send by a space mark up to three additional data packets only after a re-send by a space mark is required. The requirement within a display cycle (ILOAD update NMEA) to enable the system to "silence" is hereby ensured. The following figures represent the function scheme described above represents (Figure 37) as well as a concrete example of the timings with two TAGs and four space marks (Figure 38).

Receives the day during the 35-50ms-transmit enable reception window (guard time) is not enabled, to conserve the TAG batteries a new send shares reception is attempted once the configured sleep time. The only exception to this rule is the self-test of spatial brand, in the failure analysis in Chap. 6.4 is described

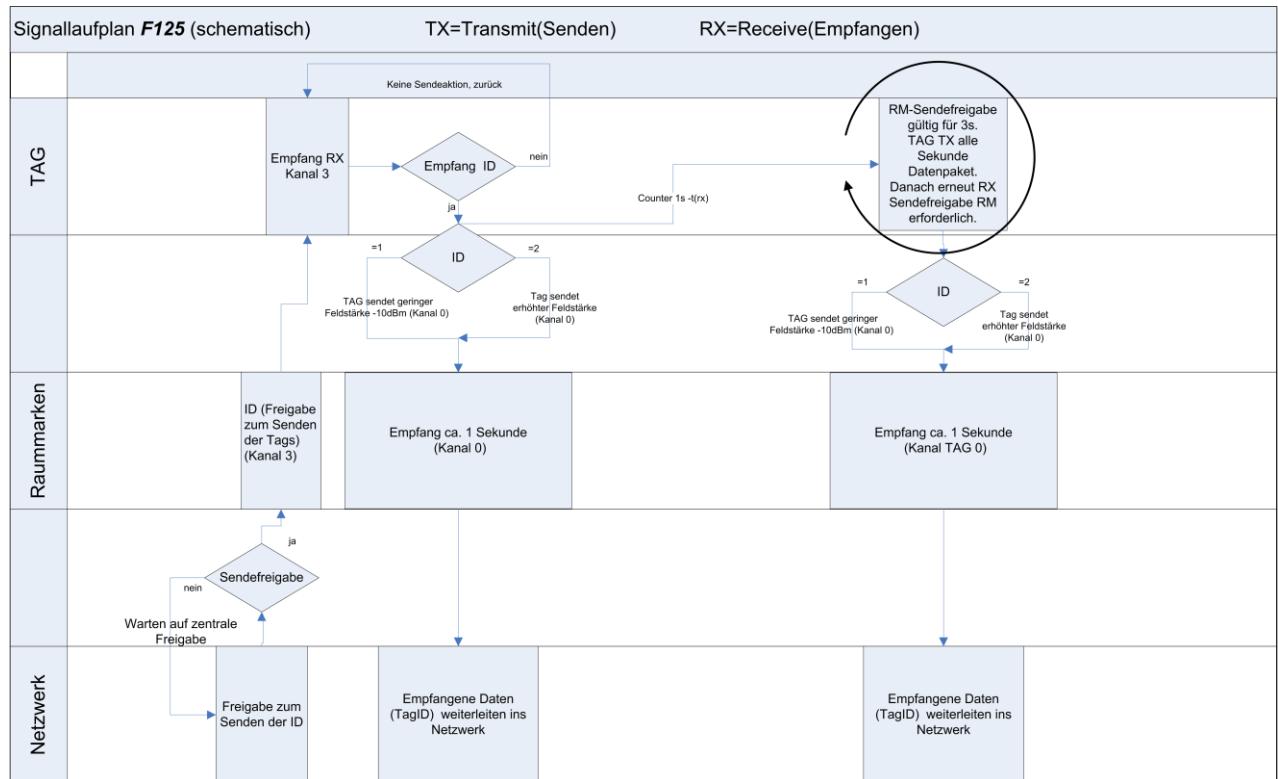


Figure 37: schematic signal running in the POS



Date: 11/08/2017

Revision: 1.6

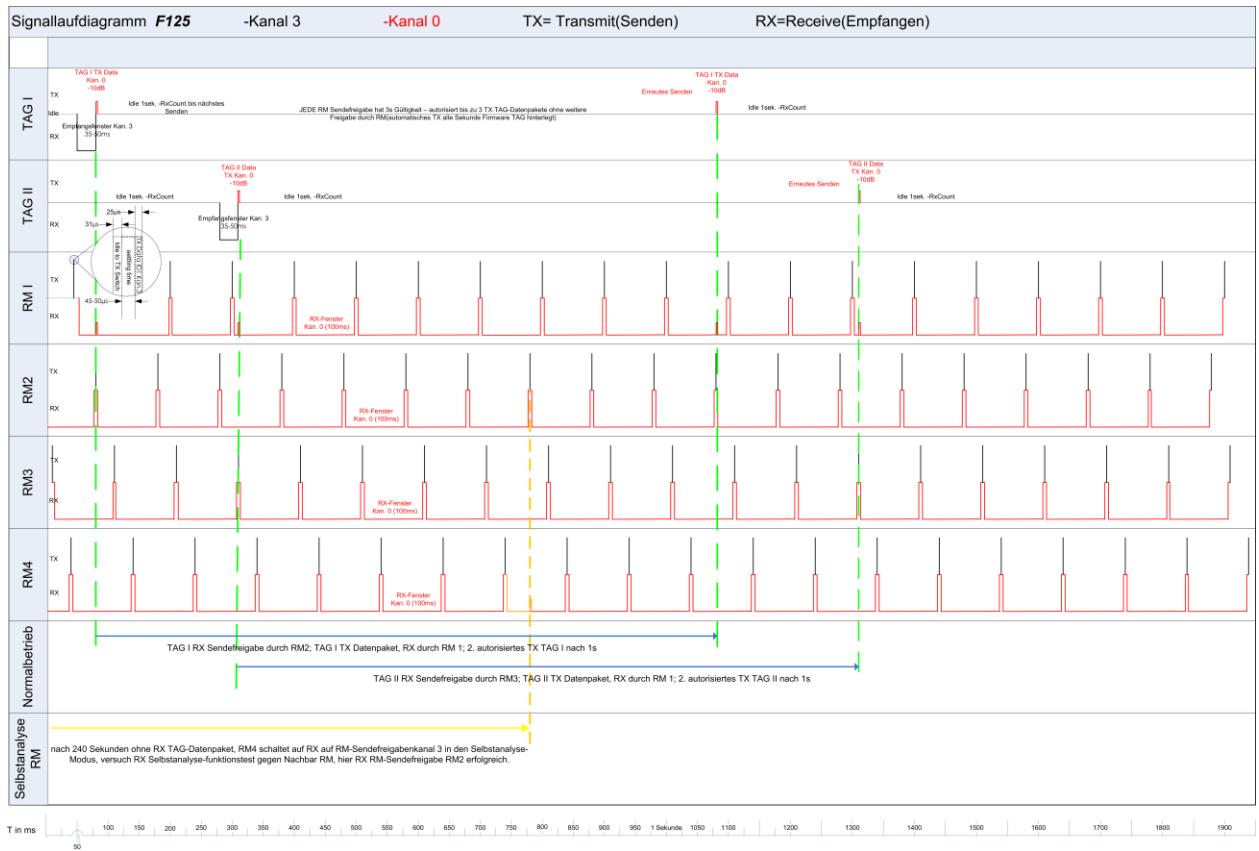


Figure 38: Timing of the signal propagation in the POS

6.2.2 transport of data to the POS server:

Both POS server get the space marks data packets in parallel delivered via the MSB via TCP / IP. The POS-receiver service to the POS server (master POS server), the TCP connection tunnel (port 10001) to the individual room brands forth and monitors all communications between space brands and POS servers.

Basically all static and dynamic configuration data, which are necessary for the operation of space brands, transmitted from the receiver table POS MySQL database at system startup / initialization to room brands. The IP address (Unique) the space brand is the unique key assignment. This is done once during the calibration of the ship POS. The following parameters are by default transferred to the space Brand:

- ID (Unique, 1-259)
- RfOutputPower (-30 - 10 dBm)
- TimeToRxCheck (1-255s)
- RxCheck Timeout (1-255s)
- Options (3.7)

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

- TicksPerSecond (1-255)
- TxApprovalInterval (1-255)

The ID of the transmit enable the space brand results from the static ID is assigned to the space marks individually via the IP address assignment of the antenna. The located on the POS server POS service buffers all incoming room brand records for calculation of the membership in a raw data table (RAMCache) for up to 30 seconds. Based on these raw data table, the long-term data (MySQL) based database for at least be generated, which is written to the POS and from the POS MySQL database server in the POS. 24 are stored. Corresponding hourly, cyclical cleanup processes ensure timeliness of the raw data in memory.

Furthermore, (Port 10002) set up communication between Management und diagnostic station to the POS server on a separate channel, which is used for registration and deregistration (TAGs, shore). The operation of this is detail in Chapter (software, Kap.7.3: logon and logoff shore) described.

6.2.3 transport of data between POS and ILOAD

Technical details of this communication are described in detail in Appendix B1.

The POS server (Master) sends automatically (without an explicit request) in a cycle of 5 seconds, the current run time data to the ILOAD, from which this is a so-called special evaluation (from amongst those maintained in the POS MySQL database TAG motion data a historical TAG Transaction data view) can request the 5Sekundenschritten over the last 24 hours in flat.

A status of the tags is automatically transferred to the ILOAD every 5 minutes or after a tag status change.

The entire data transport takes place parallel to the two ILOAD server using NMEA (0183) over UDP. All traffic between the MSB and the ILOAD carried to / from the POS server via defined port in both directions through a firewall. For balancing the ILOAD server initial status, the POS server an initialization request to the ILOAD, which answers this request with the return of the status of all doors and hatch contacts, as well as a transmission approvals status (silence). After that, the POS can resume normal operation. The ILOAD reports all POS relevant state changes to the POS master server, which can be incorporated into its POS calculations and reports the results to the ILOAD so that they can be shown in simplified form in the BDC.

6.3 Emergency operation / emergency shutdown

The person tracking system is a closed system which is operated independently on based 24V DC power of the vessel. The central units and the space marks are configured to start automatically, allowing for an unattended-up of the overall system.

The redundancy of the central unit **eliminates the emergency operating mode**. The POS system is not coupled to its control to the ILOAD. A possibly necessary **emergency shutdown** the central units can only be done by separating the supply voltage via the circuit breaker of the rack. An emergency shutdown of the space is not designed brands.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Analogous to repair the possibly necessary safety / Preliminary measures for the shutdown of the POS server must be observed.

6.4 Fault Operation

The failure of a POS server (master or slave) are added to the POS in the fault mode status, even if the proper functioning of the POS by the failover operation is ensured (see Kap.6.6.1). The redundancy receives all operational functions of the system. Therefore, for the personal tracking system **no emergency mode** designed and provided.

The analysis of the technical readiness to receive in the RFID transponder is within range of the firmware of the space marks (antennas) dissolved. Each room brand towards monitored for a configurable countdown to the data input of the own processor SoC (volatile memory). Are from the last 240Sekunden no TAG data packets before, the SoC processor automatically switches to the internal receive test and attempts to its transmission enable channel (channel 3, 867,6MHz) to receive transmission clearances of the adjacent antennas. With the first received transmission enable automatically he returns to receive mode on channel 0 (866,9MHz) and reports its commitment to the POS server (Ready, see chap .: 4.3.3). The time period for the receiving test is also configurable (default: 1 second).

The room itself is also brand hardware side secured against a failure of the network connection. Eliminates the network link to Layer 1 basis (Physical layer) turns on the room brand independently in the silent mode and does not send any more shares. Since in this case the TCP tunnel is cut to the server, the POS receiver service receives on the POS server this message and can (unknown status) pass on the event "Link-Loss" after a certain time as a disturbance to the ILOAD. Since the connection of the access pit is redundant to the MSB, this case can be restricted to network cable fault or the failure of the Lantronix interface part of the room brand.

Disturbances within the MSB backbones of INeS be detected by the teaming parameters on the side of the POS server by the double-lined network connections and POS internally reported. Here, both fiber optic network terminals of the POS server are of different switches (and pathways) bonded to the MSB and logically coupled to each other via a switch-Fault-Tolerance. Here, STP (preferably 802.1W) as the protocol used on the switches to change in case of link-down by a connection to the 'standby adapter "and reconnect promptly on a different path. The speed of this path change is highly dependent on the adjusted convergence time of the STP on the switches. Report Intel IANS driver all events occurring, the suitable depending on the event state (s) start reactions for the respective scenarios transparent about the Windows Management (COM / DCOM) to the operating system and the POSSoftware. The Layer 2 switch, the network adapter is based on the ad hoc event, and is configured by default to failback so that the restoration of the links (network connection) can react.

The IANS teaming (Abk. list: Intel IANS driver) connects here in the configuration SFT (Switch Fault Tolerance) two network adapters to a virtual network card which connect to two separate switches of the MSB backbones. After appropriate connection to the server configurable

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

automatically reselects the first adapter for Primary adapter, the second adapter is to link up in the standby mode. Now, the Primary adapter makes a mistake on the standby adapter is automatically activated and directs network traffic while retaining the MAC address to the alternate path. For this method, it takes no special adjustments to the ports of the switches, only one STP-compatible routing between the switches is required (F125 uses RSTP between access boxes). The convergence time may be configured here directly and be adapted to the stipulations of MSB (RSTP <6 seconds).

This IANS configuration (Abk. list: Intel IANS driver) also allows an active connection monitoring of five active link partners. By ARP requests are thus monitors the availability of the configured gateway and the redundant POS server. The monitoring interval is configurable here, but should be above the convergence time of the STP protocol to avoid unnecessary master-slave switching.

The case underlying software logic described in more detail in Chapter 6.6.1 failover.

6.5 EMCON ("silence")

Under EMCON ("emissions control") refers to a mode of operation of the frigate F125, in which the electromagnetic radiation of the entire system is reduced as much as possible.

Since the POS caused by the radio communications between tags and space marks in normal operation, electromagnetic radiation, the person tracking system also supports the EMCON mode.

Activation and deactivation of EMCON is informed by the ILOAD. This notice is sent to the POS server.

EMCON is active, the POS server immediately sends a negative-send to all room brands. This causes the space marks its cyclic transmission of the transmit enable the tags (see 6.2.1) to be stopped immediately. As a result, all tags that do not have a valid transmit enable running two transmissions, because the transmit enable becomes invalid after one second, so it made a maximum of two transmissions within 3 seconds after activation of EMCON.

If the EMCON mode canceled, the POS server sends a transmit enable to all room brands that record then normal operation described in 6.2 again.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

6.6 Redundancy concept

The redundancy concept of the POS to the F125 is based on the separate positioning of the two POSServer (see Sec. 4.4.6) in various security areas of the ship. Structurally performance-critical components with increased strain (fans, memory, network cards) are redundant in the servers and are actively monitored (see Kap.7.5.5,7.5.6). The network connections to the server are redundantly connected via separate paths with the on-board network (see Appendix A2).

In case of failure of the POS server, the Master in operation POS slave server takes over the tasks of the POS master server, so that a problem-free operation is ensured.

The error analysis is carried out on the basis of cyclic interrogation of the relevant connection partner of the virtual network interface (see Kap.6.4). In this case are stored in the configuration among the possible five inspection of the gateway and the redundant POS server. A result of the partner check an error, this event is transmitted directly from the Windows Management at the POS services. This then lead, depending on the fed-back error status appropriate action one.

6.6.1 case distinctions failover from the normal master slave operation:

1. POS master server hardware failure, no longer function:

Events can master side no longer be evaluated. The POS slave server detects via ARP request as an event

- Gateway MSB is reachable
- POS Server01 (Master) can not be reached

Action (failover reaction): POS slave server classifies to this event to POSMaster up and takes over the NMEA communication to the ILOAD servers and then sends the fault of a POS server to the ILOAD. In order for the failover has taken place and the service measure POS Server01 can be initiated.

Second POS master server network failure on the gateway: The master server can not communicate to establish the connection partners (Gateway, POS server02) more.

event: lack of communication partner gateway and POS server02

Measure: The POS master server (POS Server01) classifies the "Undefined" POSSlave-server and waits its turn to the restoration of communication. Analogous to case 1 done this advancement of the POS Server02 for POS master server. If communication for the POS Server01 restored, classifies this up for POS slave server.

Third POS master server network error for POS Server02:

- Gateway to the MSB still functional

event: POS Server02 does not answer

Measure: The POS master server maintains POS master status and signals the fault of the POS slave server (POS Server02) to the ILOAD. Thus initiating the service measures POS Server02 can take place.

4th POS slave server hardware failure, no longer function:

Events can not be evaluated by the POS slave server. Please refer Case 3rd

5. POS slave server network failure on the gateway:

The POS master (slave) servers can not establish communication with the connection partners (Gateway, POS Server01) more.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

event: lack of communication partner gateway and POS Server 01

Measure: Downgrade to "undefined" POS slave servers for POS Server02, the POSMaster server remains in its POSMaster status and signals the fault of the POS slave server due to disconnection. If the connection is restored to the partners, the high levels takes place for POS slave server (See *Case 2*)

6. POS slave server network error to the POS master server (master server):

event: lack of communication partners POS Server01

Measure: Promote the POS Server02 (in the POS Master status *see Case 1*)

6.6.2 case distinctions for starting up a server in the POS system:

Generally, the POS servers are configured, the check services at the start of a POS server if a Raise is possible in a normal operation. For this purpose, the partner information from the table **settings** POS MySQL database used. Here the individual IP addresses and all communication partners are stored. Can none of the communication partners are achieved when the server starts, the POS server remains in the status "undefined slave".

1. POS server startup and POS Master is in operation:

event: Communication Partner Gateway and master server available

Measure: Promote the POS server in the POS slave mode (status)

Second POS server startup and no POS server running:

event: Communication Partner Gateway is reachable, but no POS Master responds

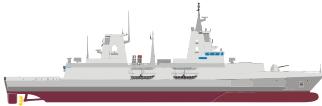
Measure: Promote the POS server in the POS Master mode (state), acquisition of communication to ILOAD.

Third POS server start and Gateway can not be reached:

event: Communication Partner Gateway is unreachable

Measure: POS server remains in the status "undefined slave. Following the network and the configuration of the POS server should be checked. Possibly. the adaptation of the data in the network settings or the settings table in the POS MySQL database on the POS server.

(Due to the direct switching logic and event-based recognition **event**) the connection partner, a whereabouts of an individual POS server in the status of a POS slave server is excluded in normal operation so far done here no further differentiation. Suffers the operating system of a POS server to crash, this can be equated in the switching logic to a hardware defect.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

7 software

The complete software solution for this project is an individual adaptation to the requirements of the POS concept. Here, standardized modules were made by SIS from the HT104 series used. Therefore, the radio-based Raummarken- day communication is largely compatible with the protocol of the HT104 series. The operating system basis for the POS server, the Microsoft Windows Server 2008R2 (64bit) mounted on the IT SiKo guidelines (application server) is tuned is.

The services, which act as an interface between space brands and database are continuously created with Visual Studio C ++ and additionally require the execution of .Net Framework. 4

For the database currently current MySQL Community Server 5.6.13 is used, which is accessed directly from libmysql.dll (local pipe). All software interfaces are fully compiled in x86 and x64 versions, allowing for any necessary port. The server-side software code is written in C ++. The firmware of space stamps and tags based on the 8051Befehlssatz.

Communication between TAG and space brand is further described in Kap.6.2.1. The specially developed firmware packages are listed below:

Firmware packages of POS F125	
HighTAGF100.hex	Firmware File DAY V0.99d 09/09/2013
HighTAGF800.hex	Firmware File Space brand V0.99f 08/12/2013
HighTAGF80A.hex	Firmware File discounts and trade mark V0.99c 08/02/2013
XPortPro_Config.xml	Configuration File Space brand V0.99b 12/08/2013

The configuration parameters are Kap.4.1.3, listed in the components 4.3.3.

The vast majority of the required basic functions, to the extent feasible and appropriate, has been outsourced to the firmware of the room and mark the tag (eg, receiving inspection, sending shares control, etc). The stated goal was to minimize the traffic to be controlled and overheads, as well as network load on VLAN 176th

Due to the large number of brands space is already expected in normal operation with an average of 5002000 TCP packets per second and servers. With "double" occupation this Traffic expected to be amplified by another third of what server side leads to an immense burden on the TCP port. Since this interface and the UDP NMEA data is flowing, to ensure so that this remains enough resources. An application-driven prioritization of UDP traffic would be borne by the data accuracy of the POS system and is not planned for the scenario.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

7.1 The software description of the room brand

7.1.1 The LAN-Tronix-Xport

Each of the space trademarks used in this project is through a Lantronix XPort Pro Evolution network OS server (network connector), which converts the data of the RFID transceiver to the network, connected to the MSB. The web front end of the Lantronix XPort Pro is addressed via the port 80 of the respective IP address and serves only the configuration and status checking.

In this web front end and all communication parameters are visible to the POS servers and adjustable and can optionally be used for network diagnostics. Therefore, access is protected by a correspondingly strong password (see password list).



Figure 39: The XPort Pro space brand

On delivery, the space marks are regularly on the static (VLAN 176) IP 10.1.76.100 preconfigured (ET / AT stock). In exchange case the network configuration to those of reimbursable space mark is adjusted via the web front end. The configuration file (XPortPro_Config.xml) is stored in non-volatile on any Xport so that at any time can be restored without specifying individual parameters of the factory settings.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

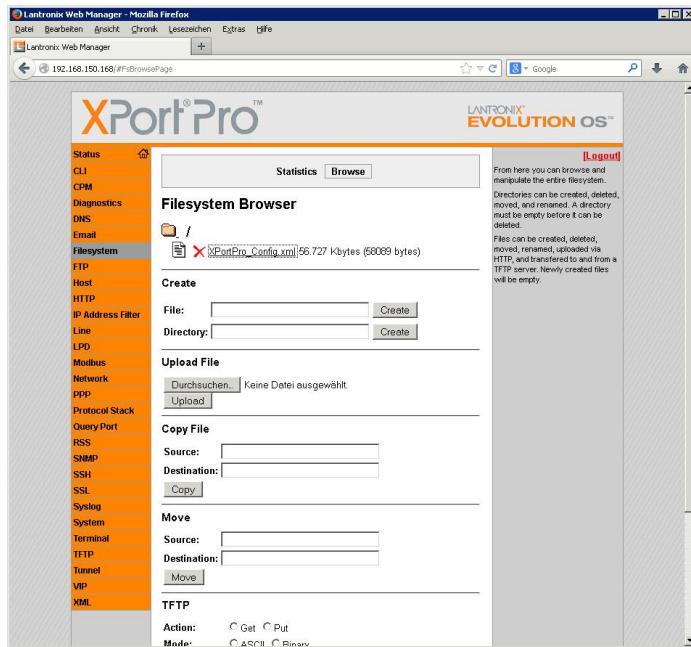


Figure 40: Configfile as XML

The configuration of the IP address space mark after logging onto the web front end of the XPort Pro.

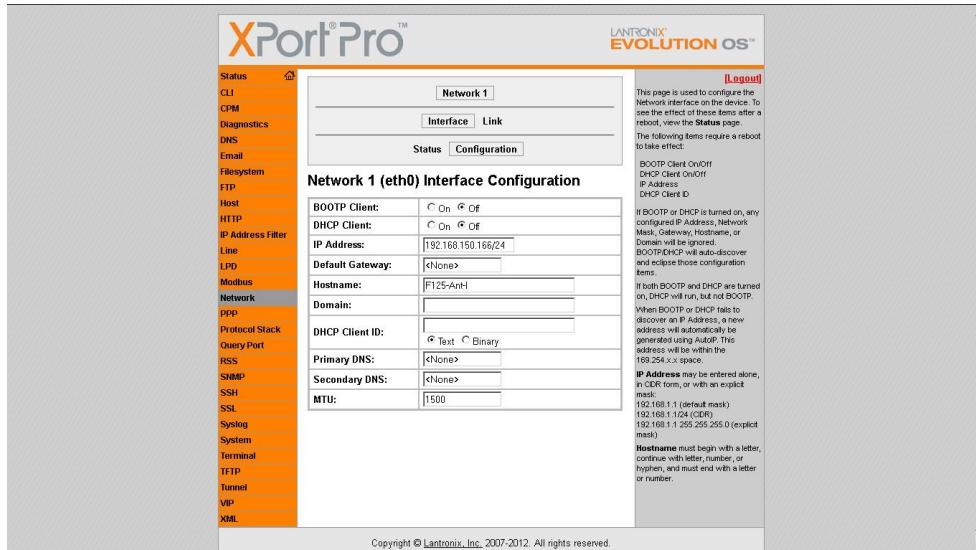


Figure 41: The IP configuration of the Lantronix XPort Pro

The configuration of the static IP address space marks must be made in the case of exchange in the web front end. For this, proceed as follows:

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

- Connecting the AT-room marker to the management and diagnosis station (direct)
- Open the browser and specify the default IP (<http://10.1.76.100>)
- Specifying user: admin, password: s. Password List
- On the left side opens under Network ->

In Webfrontend the IP address of the AT-room brand is matched only, it can be determined from the specific tag or the old space tag ID recursively from the personal tracking summary order or directly from the table receiver of the POS MySQL database. The POS server matches the restart of its POS services with the configuration of the exchanged or installed space brand, and so will automatically matching the stored in the POS configuration MySQL database secure. Changing the IP configuration requires a restart to the space brand.

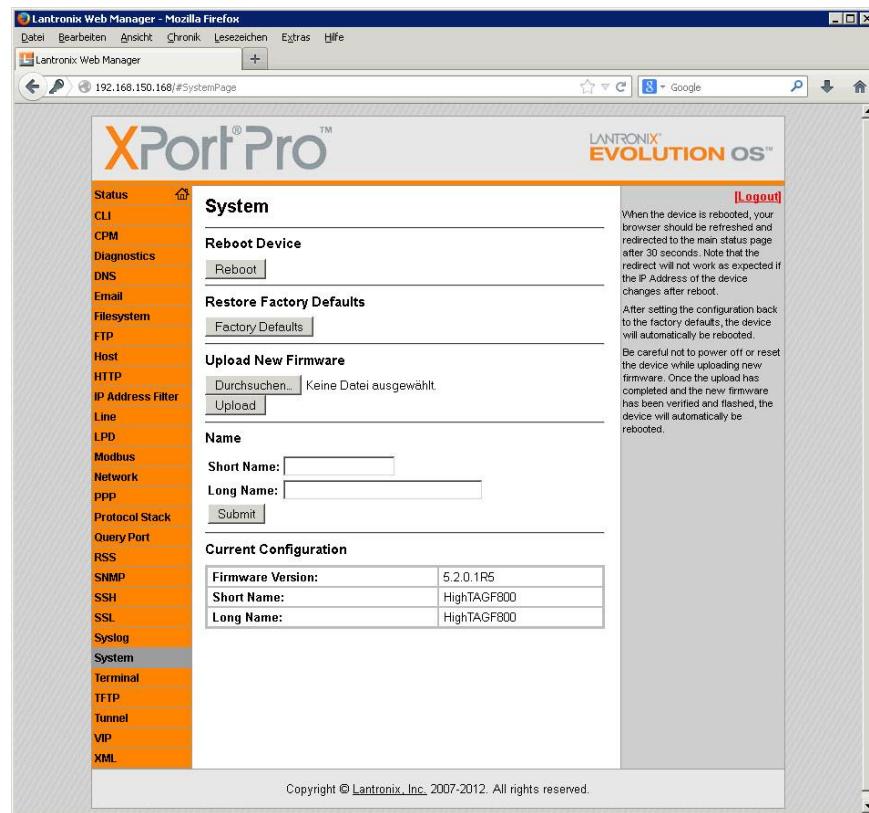


Figure 42: The reboot of the space marks in the system site of the web frontend

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

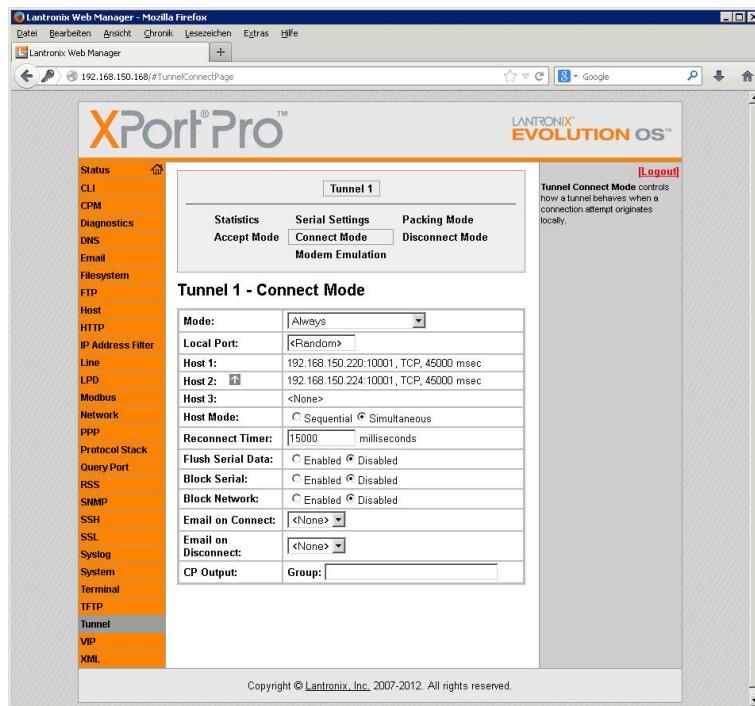


Figure 43: Tunnel ConnectMode

Here, the tunnel ports, and transmission parameters for the two POS server are set and therefore the data transmission from the space 259 brands VLAN176 (POS) controlled. Since the individual parameters (all) are predefined and up to the IP address is not variable, is intended to dispense with a further consideration here.

The firmware of the SoC RFID chips is specifically adapted to the requirements of the POS concept regarding radio silence and constant exchange between transmitting and receiving mode at intervals of milliseconds (ms). Since overlap in the radio wave range data packets of the same thickness and or otherwise the "stronger" wins, it is mandatory transmitting clearances in the immediate reception range (every day should be up to 30 receiver shares independently received by location) different from tackten (cyclic). Second, send and receive channels are provided channel separation of 0.6 MHz, in order to exclude any influence of the data channel by channel sharing in general. Both transmission strength and reception attenuation of localization can be adjusted. The setting parameters are all tabulated in Section 4.3.3,

7.1.2 The PosMonitorTCP

The PosMonitorTCP software is a service and management tool that covers all specific space brand parameters and individual, temporary adjustments to the room configuration allows brand.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Basically: The requirements of the POS MySQL database override the temporary regulations from the PosMonitorTCP with every new and restart of POS services. If permanently changed are settings in the system, they must be maintained in the table receiver of POS MySQL database (by DBMS MySQL Workbench).

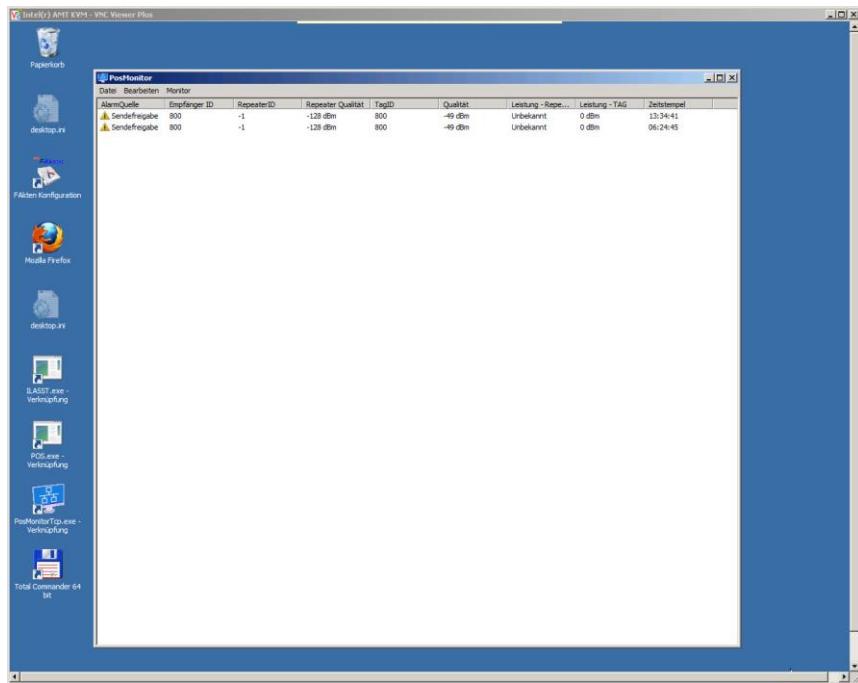


Figure 44: PosMonitorTCP

The POS MonitorTCP also allows the display of individual data packets received per room brand and additionally following information on the received data back:

Data PosMonitorTCP	
Alarm source (alarm)	Value (default F125: alarm, sabotage)
TolD:	Value (16bit) (default F125: ID of the space mark)
TagID:	Value (16bit) (default F125: ID of the tag of the received)
Quality:	Value (8-bit) signal strength of the received packet (dBm)
Power DAY:	Value (default F125: -10 dBm)
Time stamp:	System time data reception

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

The POS MonitorTCP is an indispensable tool to quickly access single room brands and check their configuration and their data reception for the inventory and fault diagnosis. Generally, the POS MonitorTCP is only included in the software supplied with the POS server. In the case of service and diagnostic analysis on the POS server is made via the remote control software VNC viewer.

The PosMonitorTCP is in its function by the service SIS POS receiver, which must be located in the start status, dependent.

7.1.3 adjustment of the transmission approvals

Config parameters (transmission enable)	
Timer ticks / second (TicksPerSecond)	Value (8bit) (default F125: 240)
Interval: (TxApprovalIntervall)	Value (8bit) (default F125: variable 10-40)
Randomized interval: (Options)	Value (true, false) (default F125: cyclic)

As described above, aimed at by the precise configuration of the interaction space marks and tags, the tags highest possible number space brands transmit releases, based on the optimum value of 30 received space brands transmission approvals per second to provide. To realize this proviso, an internal timer of the RFID processor is used which dissolves in 1 second 8 bit steps (256). Order to graduate as finely as possible, the default value for the F125 here to 240 steps (sog.Ticks) is set. In addition, an interval is set according to which number of steps a transmit enable is in a second. This transmit enable interval acts as a step-splitter, 240, for example (steps) / 12 (interval) = 20Sendefreigaben per second, the result should be an integer. This has the following meaningful,

$$240/10 = 24; 240/12 = 20; 240/15 = 16; 240/16 = 15; 240/20 = 12; 240/24 = 10; 240/30 = 8; 240/8 = 30$$

It should be ensured that the granting of a multiple (eg interval 8-16-24) in direct reception range of side by side that are available space marks can be excluded.

The parameters of the transmit enable signals are in the table in the receiver POS MySQL database in the columns TicksPerSecond, TxApprovalIntervall, Options set and also be controlled from here. Temporary these values can be changed via the PosMonitorTCP to POS calibration purposes, the (pre) defined settings are restored, however, by the service restart.

7.1.4 Adjustment of Status monitoring of ambient brands

Each room brand has an integrated algorithm for checking your sending and receiving ability. This checks the data received on the SoC RFID processor in the history in principle. Does the room brand in a defined period (240s here) received data and output to the server, it is considered operational. This internal countdown starts again with each packet received on channel 0th Received no data packets of tags for this defined period of time, the space brand goes into self-analysis mode and tries for a defined period

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

from one second to receive data packets from the released end of channel 3 (867,6MHz) from an adjacent space brand. Once a valid data packet would be received, the unit will immediately return to normal reception mode and the countdown is reset. that this validator also fails only in case the room brand is based on a disturbance of the receiving and transmitting unit and reports the status of "disturbed" over the TCP tunnel to the POS server.

Reception test (test period, TimeToRxCheck):	1-255 s (default F125: 240)
Reception test (test period, RxCheckTimeOut):	in s (8-bit) (default F125: 1)

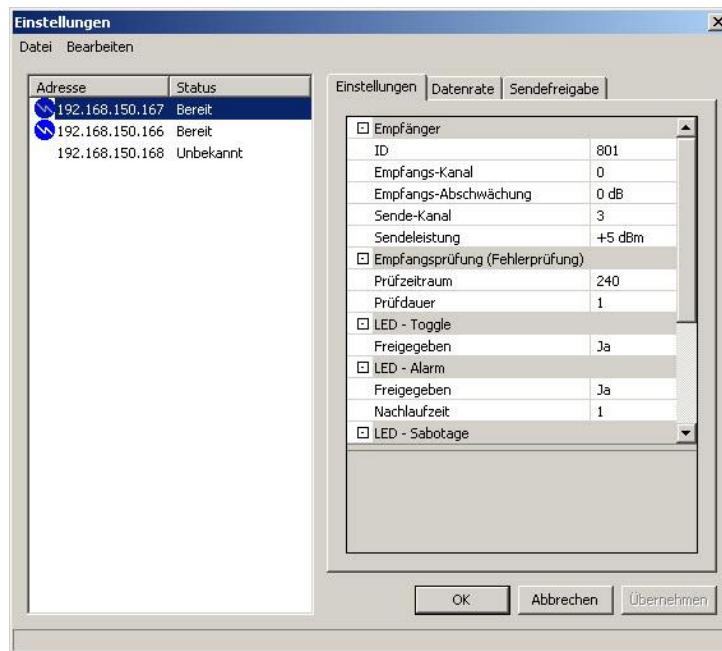


Figure 45: Settings in PosMonitorTCP

These parameters are in the table receiver (TimeToRxCheck, RxCheckTimeOut) stored in the POSMySQL database and transferred from here at initial service startup.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

7.2 Firmware Description of the tag

The firmware of the HTF100 based on the SIS HT104 and its Protocol. F125 concept Specifically were performed here adjustments relating to the send and receive behavior and the channel frequency allocation. For the realization of a battery life of min. 6 months of WatchdogBetriebsmodus has been adapted to the reception of minimalized sending shares. The software has been modified to the effect that a valid room brand transmit enable the condition of the shipment data has been explained. From these two key requirements the proviso that the TAG receives a maximum 35-50ms permanent time awake to receive a space brand transmit enable and characterized about 30 transmission approvals per second must be sent by the space marks in the reception area of the tag yields.

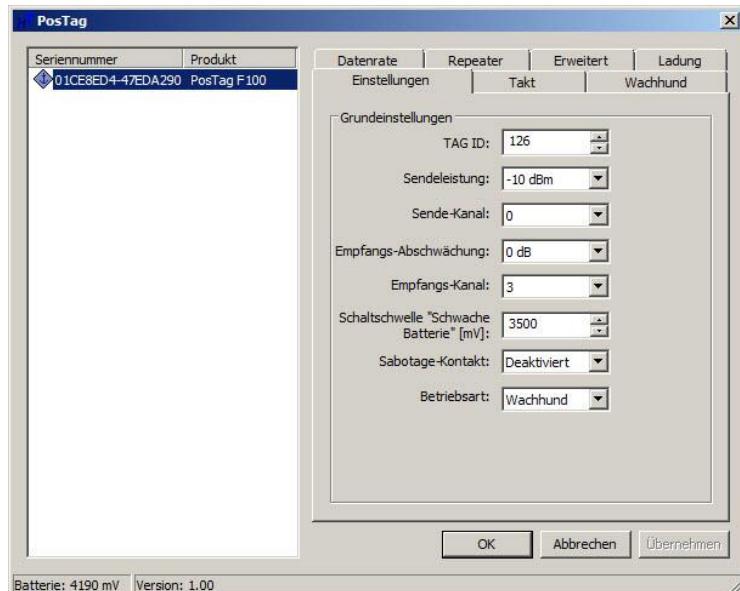


Figure 46: PosTag configurator

7.3 The software for logon and logoff Client

The software of the logon and logoff clients (PosActivator) is installed on the management and diagnosis station and through them communicating with the two POS servers. Prerequisite for the two are connected to the COM ports logon and logoff marks and the start of the PosActivatorSoftware on the management and diagnosis station which is connected to the POS network socket of the respective wax article. The main task of the mobile POS clients the three possible actions (logging out and disable) to synchronize a tag directly to the POS MySQL database and display them suitable.

Note: The reception radius of the logon and logoff brands is about 20 cm, the distance between the tag to the space marks must be maintained for proper waste and sign-up process.

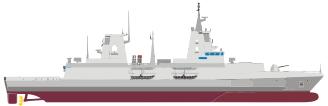
F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6



Figure 47: Point-Aktivator

The management and diagnostic station automatically establishes a TCP connection on port 10002 on both POS servers and checks the POS server status of both servers. (Figure 47: POS Activator). be visualized currently following status (in the status bar):

- Total: Number of currently logged on to the database TAGs
- Inactive: Number of disabled TAGs
- Signed Out: Number of reported on shore TAGs

Initial on the client side of the POS server check against the service SIS POS on both servers. In this way the drain and application in the POS MySQL database will come in shore or on-board realized. The following settings can via the menu item **Edit -> Preferences** be made:

- Interfaces logon and logoff marks (for example, COM1, COM2)
- IP addresses of the two POS server (for example, 10.1.76.1)

Via the menu item **Deactivate** it is possible to disable a tag. This is (the day must be signed out in advance) only with Tags in status landfall possible. After selecting this option you will be prompted to enter the asset number of the tag, which is located on the back panel next to the Marine coupling clip. Then this tag is set in the database to inactive and will no longer be recognized in the accounts of the current manning levels.

Initializing a tag via the charging cradle on board. By plugging in the charger firmware automatically activates the device. Via the menu item **Activate** is this TAG

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

its inventory number from the POS database activated and is now in sector 66 and can now be recorded from any room brand on board.

The acknowledgment of the successful discounts and registration is both visually and acoustically. The screen will show eg the tag as successfully logged out simultaneously sounds an identical announcement by the system speaker management and diagnostic tool, as well as the signaling of the red LED on the logout brand. When signing this works in the same way, only that signaled the mark with a green-lit LED that the registration was successful.

7.4 The KVM access from the management and diagnosis station

Access to the POS server is basically the management and diagnosis station. Special cases are here with one power supply and / or mainboard failures in the POS servers are, they are then no longer differentiate remote and must be diagnosed (aboard the ship) locally. are for these special cases an additional PS / 2 keyboard and mouse on board. This is where due to the redundant design of the POS server and the device the manufacturer's service.

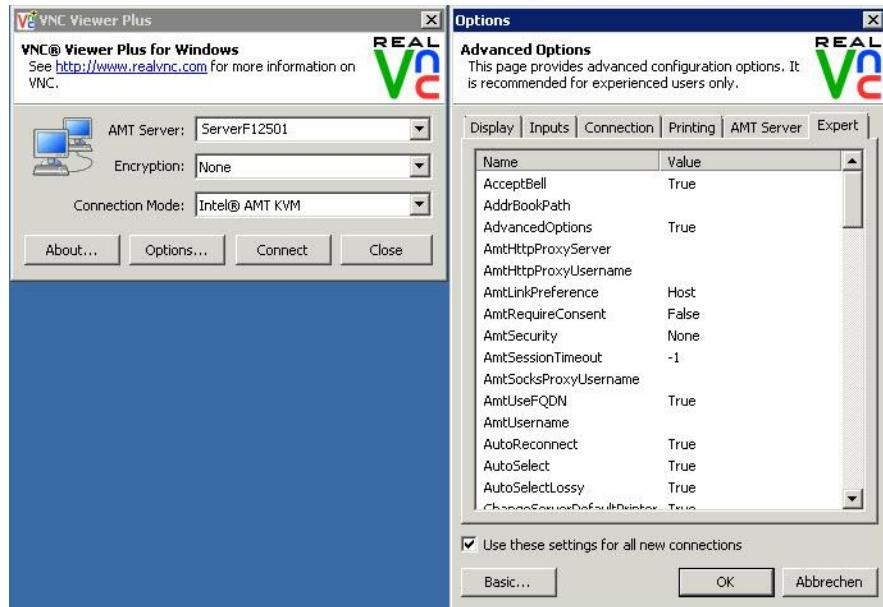


Figure 48: Log on VNC Viewer

Using the VNC Viewer Plus remote control software connects directly to the integrated Intel AMT KVM interface of the computer is made, be transferred with the all screens (consoles) to the management and diagnosis station. Integrated here are all our power and energy options which allow the "hard" switching on and off of the server and allow a view of the event log file of the MEBx.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

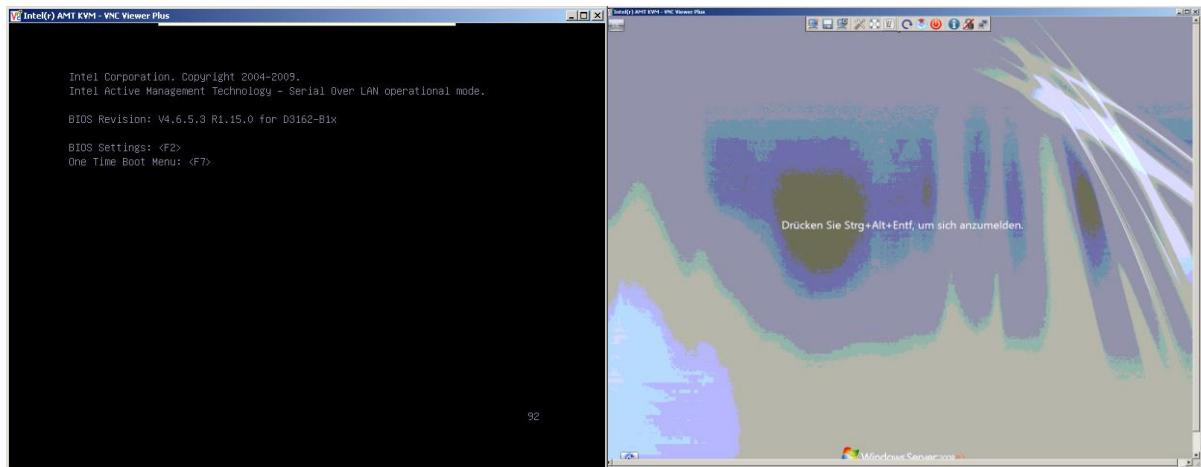


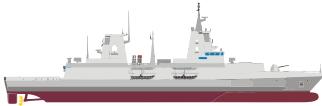
Figure 49: The VNC Viewer in action (left in the BIOS / OS log of the POS server)

This tool provides all the benefits of an integrated Lights Out Management (LOM) and the regular Remote Desktop Services. Since the complete system functionality is coupled with the administrative access, this access should be reserved for trained service personnel (MES 3).

For normal operation, these service functions are not necessary.

The functionality of the integrated Intel AMT 8.1 is provided via the MEBx setup of BIOS available (s. 7.5.2). On the management and diagnosis station solely those of the client software (VNC Viewer V2.3) is.

All information on handling and the support options can be found in the manual (VNC_Viewer_Plus_User_Guide.pdf) of the program directory.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

7.5 The software on the POS servers

7.5.1 The BIOS adjustments

In respect of conformity IT SiKo and the runtime behavior must be adjusted basic settings in the BIOS the POS server in advance. This may (can) through the KVM, as shown above, or accessed via the <F2> key when the server restarts. Alternatively it is possible to choose on the power button of the KVM the "Boot to BIOS" option.

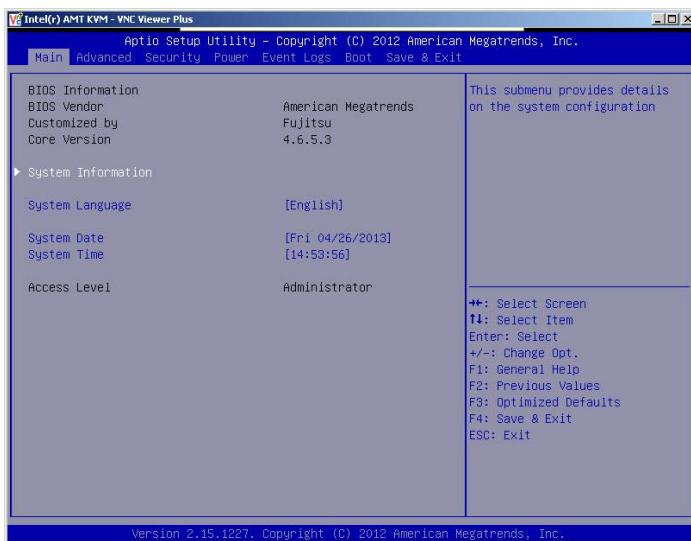


Figure 50: Status screen of the BIOS

The individual modifications are shown and described, are the basic settings for the project:

Config parameters (BIOS)	
Power; Power Failure Recovery	Always ON
advanced; SATA mode	Raid 1
advanced; SATA Mode; Hot plug	Enabled (for both SSDs)
advanced; USB configuration; USB Port Security	Disable all ports
advanced; AMT Setup	Once during configuration: Boot to MBEx
Security; Administrator Password	Lt. IT BW directive min. 24 points
Boat; boot Options	Intel Volume 0

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Boat; Boat Removable Media	Disabled
Boat; quiet boot	Disabled

Power> Power Failure Recovery

This option ensures that the server to restart automatically after a power failure.



Figure 51: Power Failure Recovery

USB Configuration-> USB Security Disable All Ports

This parameter is a prerequisite of ITSiKo guidelines on the use of USB devices on board (this is prohibited)



Figure 52: Turn off USB

Security> Administrator Password

By a loud Directive minimal 24 digit password (minimum 1 capital letter, 1 special characters, numbers 2, rest small letters) is protected against unauthorized access the BIOS to define a change in the parameters of access, authorized personnel.

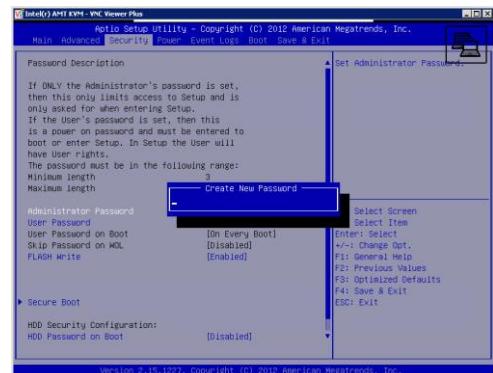


Figure 53: Set an administrator password

F125 frigate	Technical Documentation personal tracking system	
Date: 11/08/2017		Revision: 1.6

7.5.2 The MEBx parameter

The configuration of Intel AMT 8.1 BIOS is functional only locally on the server directly possible. The key combination <CTL + P> to go during boot into the Intel AMT configuration and is invited as the first password to define. For the configuration F125 also the administrator password (identical requirements) the BIOS has been selected here (see list of passwords).

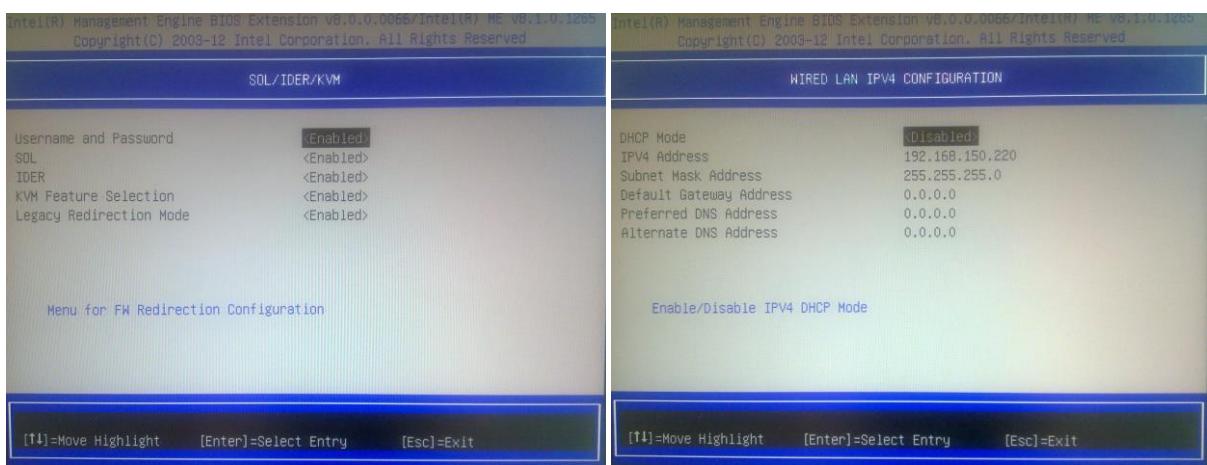


Figure 54: AMT configuration in the BIOS

Basically, the Intel AMT module is operated in professional mode, as the Enterprise mode requires an active domain. It follows the proviso that should be selected with identical IP address assignment to the current operating system of the host name of the server case-sensitive identical to the host name of the server in the operating system. If discrepancies occur at this point, a continuous console access to the server is not guaranteed.

Figure 55: Intel AMT external access and operating system

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Config parameters (MBEx, Intel AMT)	
hostname	Name of the server (identical to the OS)
IP address	Server IP address on the IANS (eg 10.1.76.26).
FWUpdate	enable
DHCP mode	disable
KVM; SOL IDER KVM	all enable

Intel AMT can be requested by the integrated KVM Web server from any browser on the same network as Port 16992 and the aforementioned password protection. This allows a look at the current status and the LOG file, without the computer must be located in normal operation. Even a dedicated turning and changing the MBEx basic configuration is possible here.

Of course, access to the AMT interface is also integrated within the operating system, which not only displays the network and configuration data, but also a finely graded list of the collected access via AMT provides to the server.

7.5.3 The Raid configuration

The two integrated into the POS server SSDs ensure the claims of the POS with respect to the performance and shock and vibration resistance. To increase the reliability further, these are engaged in a RAID1 configuration, which is managed by the mainboard side Intel Rapid Storage Controller and controlled. With the key combination <Ctrl + I> can be achieved in the boot process, the main menu of the memory controller.

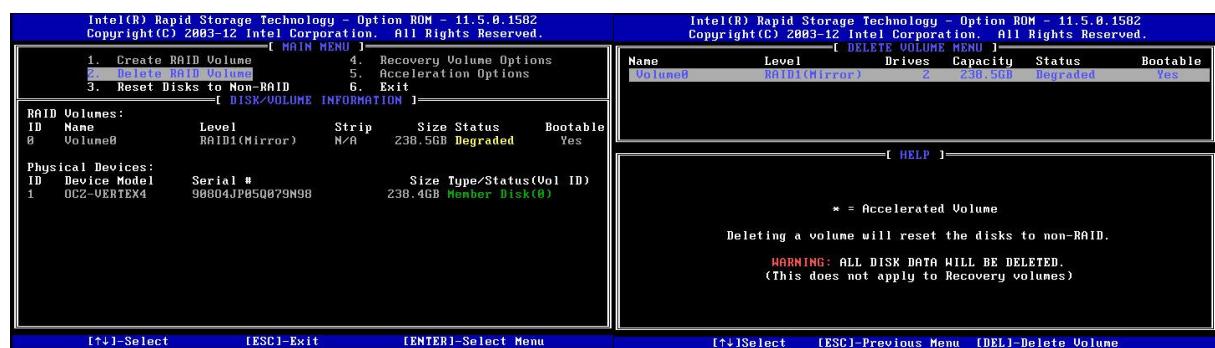


Figure 56: The Intel Rapid Storage Controller

F125 frigate	Technical Documentation personal tracking system	
Date: 11/08/2017		Revision: 1.6

In the operating system the collected information (Rapid Storage Tool RST; see Chap.

7.5.6) state through the RST Service Client in the task bar. Here then run possibly also the error with respect. Of storages (RAIDs) and can be seen at first glance in the taskbar.

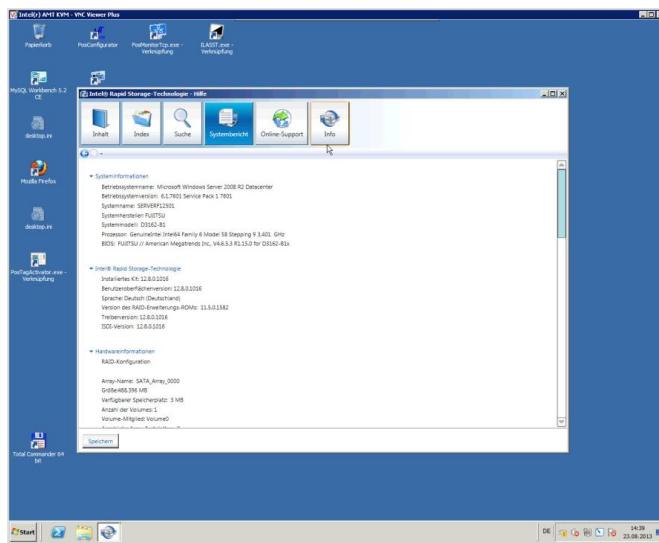


Figure 57: The degraded RAID in BS (OS)

7.5.4 The operating system

As the operating system of the project POS, for development of software (2010), currently available Microsoft server, elected 2008 R2. Forming the 64bitige operating system platform for all available on the POS server software components of the POS. For the implementation of the POS software packages both .Net Framework 3:51 and .Net Framework 4 is required as a system requirement.

According to IT SiKo the configuration requirements CertBw password and account lockout policies and CERTBw IT security configuration W2K8R2-W7 are v2.6 here. apply. In the IT security configuration of the area above registration of the POS server is implemented as an application server.

On the management interface of the POS server is running (as in Kap.7.4 described) of the autonomous IntelAMT KVM server, which all service functionalities maps via direct console access to the outside. In addition, the following addressed by the operating system of the POS server software services are listed:

Service software on the POS	
Intel Management and Security Status	Intel AMT access MBEx (reading)
Intel RST 12.xx	Management Storage Controller
System Guard V4.03	Fujitsu Management motherboard, fan management

F125 frigate	Technical Documentation personal tracking system	
Date: 11/08/2017		Revision: 1.6

MySQL Workbench 5.2 CE	Graphical interface for database management (DBMS)
PosMonitorTCP	Space Brands Service Tool (s. 0)
PosConfigurator	TAG configuration (ausschließlich F. Service)
SIS-POS service	Evaluation of the TAGs and communication database
SIS POS receiver service	Communication space brands and Data Transfer
POS ILOAD-Simu	Simulation of ILOAD Status (Only for software FAT)

7.5.5 The AGV system Guard

The AGV system Guard is a tool for monitoring the primary motherboard sensors of the POS server. both the temperatures and the three system fans are monitored.

The tool has a built-in aging monitoring, which is used for the system fan to the early detection of a possible failure of components. For this purpose, in a configurable distance (F125: 1 time daily) approached the maximum fan speed and compared against the stored values. Enter here differences on, an event is triggered, which runs in the event log of the system.

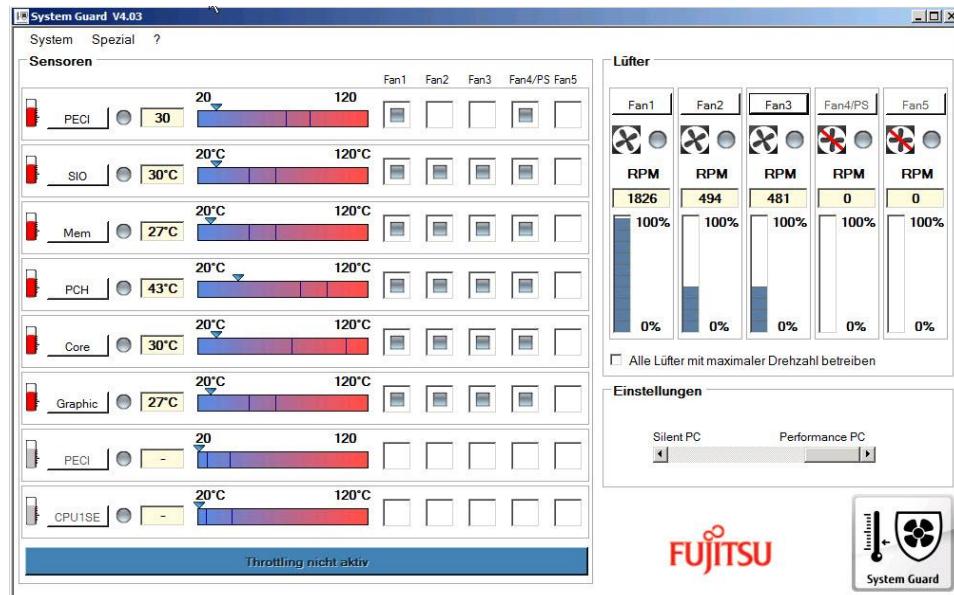


Figure 58: The AGV system Guard

In this event down the appropriate service action (see Kap.11.7 maintenance, see spare parts and maintenance documentation) should then be made "fan replacement".

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

7.5.6 The RST Service Client

In Intel Rapid Storage Tool the current monitoring status of the hardware raids of the POS server is displayed in the taskbar of the server. If a fault occurs (Figure 59: Program window of RST on MS Windows Server 2008R2 (OS) on the storage system, a preliminary diagnosis should be based on the status display of the RST. This status information a service notification from the manufacturer must (UAN ANS Active Network Sea Systems) carried out in order. possibly as soon as possible to initiate an exchange of the POS server.

Depending on the severity of the disorder manually switch the POS master server may be necessary to ensure trouble-free operation.

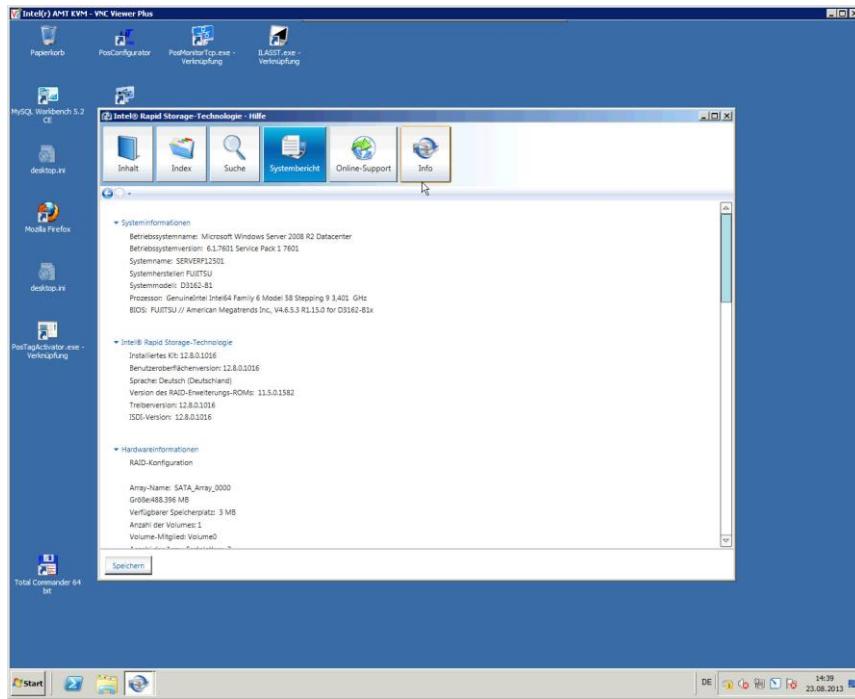


Figure 59: Program window of RST on MS Windows Server 2008R2

7.6 The MySQL server on the POS servers

The POS MySQL database based on a MySQL Community Server 5.6.13 x64. During the Softwarerevisionierung in Q4 / 2013, version 5.7 release is available, which is planned for production use. A task-based view of the functions of MySQL Workbench, and their handling is scope of training and can be done as part of the TD only exemplary. The POS MySQL server is installed separately after installing and configuring the operating system. The actual initialization of the database is done when installing the POS software on the POS servers. In initial setup of the POS software via msi file of the POS server to the POS database schema fitted on which the import of the master tables (posdb.sql) takes place.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

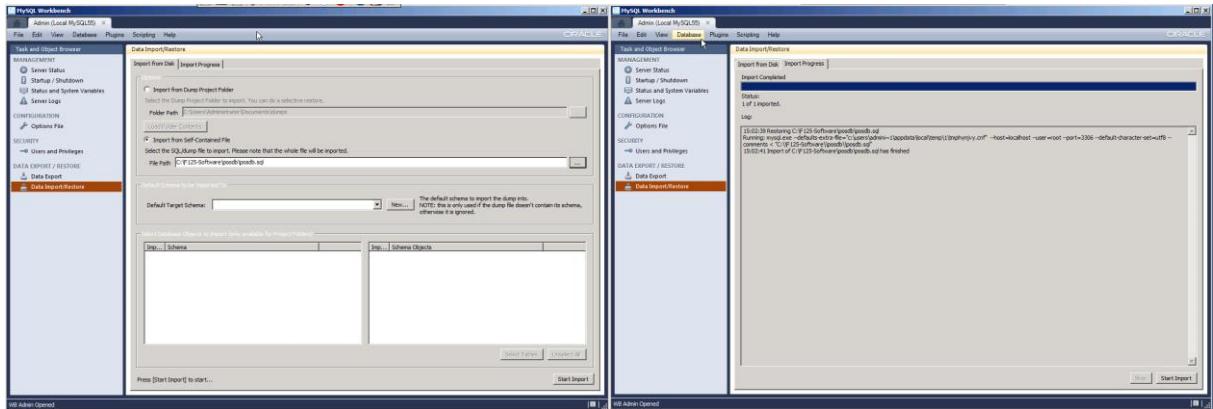


Figure 60: Manual import PosDB.sql

The POS MySQL database based on the InnoDB scheme and is characterized POS concept compliant data from a period of at least 24 hours. The schematic diagram (see Figure 61) The data flow diagram of the F125 provides an overview of the functions assigned to the individual services in the communication with the database.

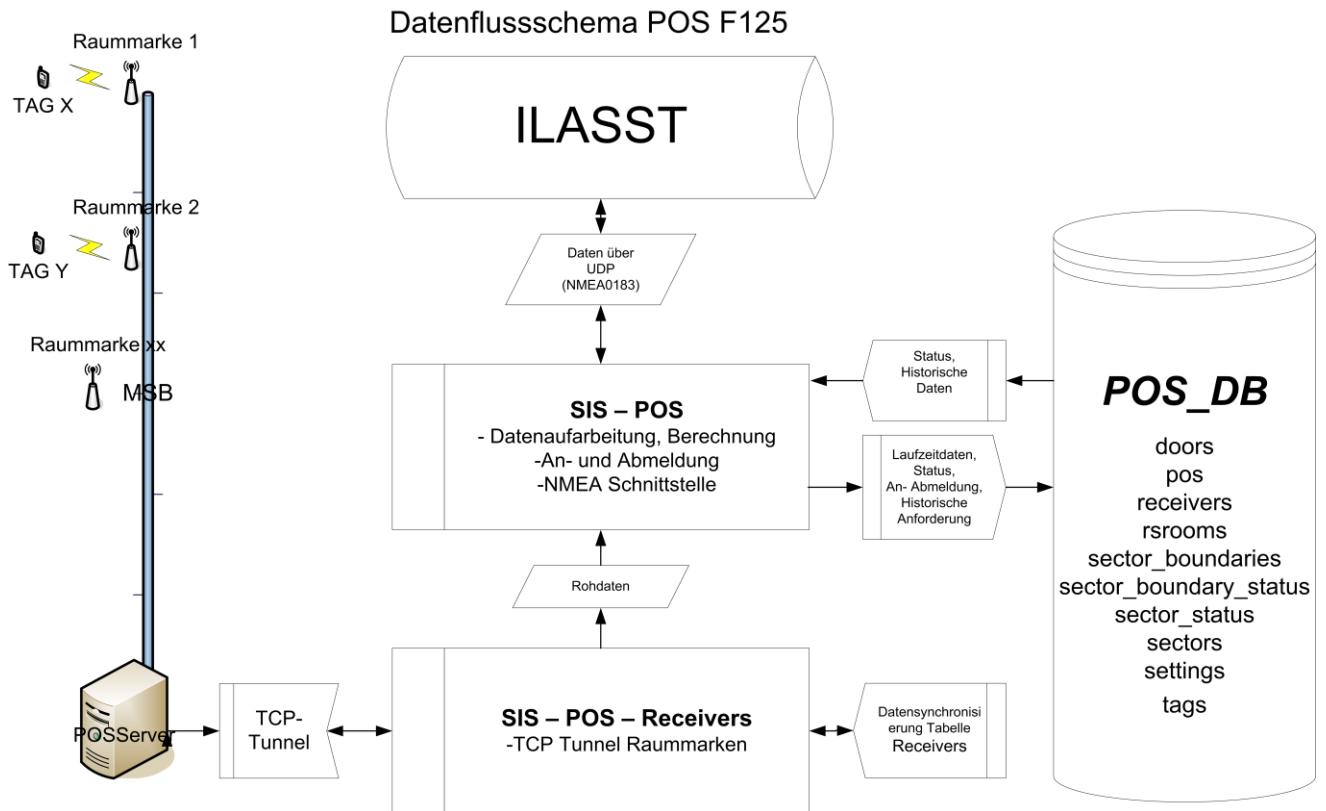


Figure 61: The data flow diagram of the F125

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

7.6.1 The structure of the table structure on the POS database

In the POS MySQL database tables in the logic statically (eg settings) and dynamic (eg tags) are distinguished. The static components are used for initialization of services SIS Pos receiver and SIS POS and also be interrogated only at service startup. The dynamic parts will be described at runtime by the SIS-POS service with data.

In the dynamic data, a distinction between status data and runtime data. State data will be overwritten repeatedly at runtime in the associated field, since they must not be used for the history evaluation (see Chap. 7.6.1.3). Runtime data are historically relevant data, which is then with a time stamp (timestamp) which are continuously stored in the database.

The state of the database structure described below applies currently to functional testing on board as a supplement capability and may not necessarily form the final stage of the POS MySQL database. As it after commissioning test is still a calibration Adjustment of POS overall system after the termination "power of the country," supplements are not excluded in individual functions at the present editorial stand.

7.6.1.1 The table "Doors"

The door table represents the logical link between the available door contacts and the SektorID. The IndexID is a definition of the interface specification for ILOAD (s. Appendix B), (the DevNum for system identification of the reporting system as shown in Figure 62-> Column **description**).

Main feature of this table is the logical security of "radio quiet" rooms, which do not have own space marks (see Sec. 3.6). Functionally, the system can be supplemented by simply adding new entries at this point, without having to modify the calculation logic of the SIS Pos service.

This table is a **static table**, which is loaded once into memory at service startup.

Query 1 doors			
Filter:			
	id	sectorid	devnum
▶	1	62	16110-001A-302 Wasserdichte Klapptür 09D0
	2	81	16110-001A-226 Wasserdichte Klapptür 10B20.2
	3	80	16120-001A-033 Wasserdichte Luke FHD Hinten 2
	6	64	16110-001A-251 Wasserdichte Klapptür 05C4
	7	64	16110-001A-060 Wasserdichte Klapptür 05D0
	8	64	16110-001A-010 Wasserdichte Klapptür 06F0
	9	64	16120-001A-110 Wasserdichte Luke FGD06
	10	65	16110-001A-303 Wasserdichte Klapptür 10E0
doors 1			
Apply Cancel			

Figure 62: The Doors Table

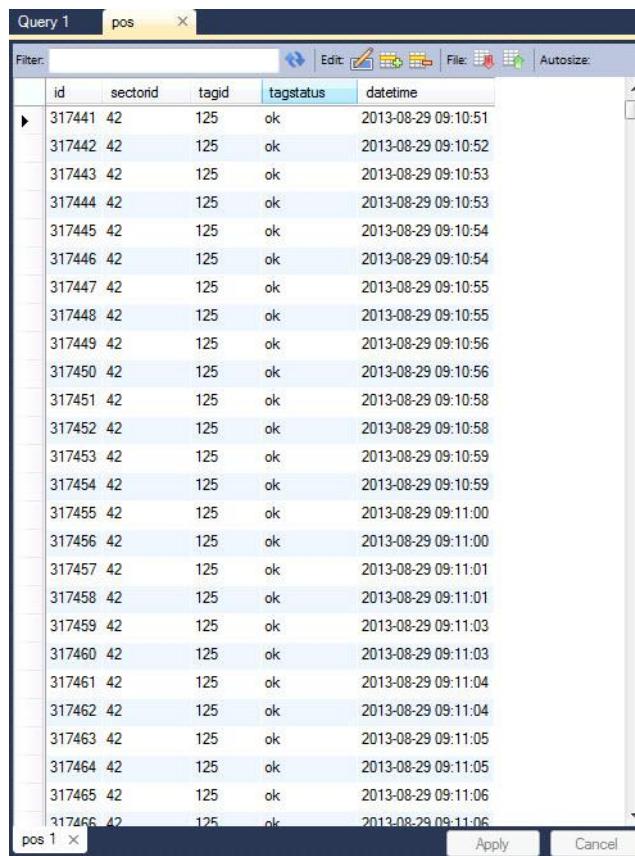
F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

7.6.1.2 The "Pos" Table

This table is an integrated **Runtime data table**. This can be easily seen (0 up to 4294967295) at the POS DB (POS MySQL database) to the Indexing (under alter table) INT (10). (24hx3600sx200TAGs) are in this table since all the TAG information of the vessel are taken for at least 24 hours, in a second by second arrival of the tag data packets of a maximum of 17.28 million records assumed to be assumed in sekündlichem arrival of each data packet.

Following relation in this case forms of each tuple (one of the n-times the number of accumulated data sets) of this table:

On index "id" 317,441 is saved: The TAG "TagID" 125 which "datetime" = 09:10:51 am 29-08-2013 was seen in 42 sector "SectorID" =, has the "tag status" OK.



	id	sectorid	tagid	tagstatus	datetime
▶	317441	42	125	ok	2013-08-29 09:10:51
	317442	42	125	ok	2013-08-29 09:10:52
	317443	42	125	ok	2013-08-29 09:10:53
	317444	42	125	ok	2013-08-29 09:10:53
	317445	42	125	ok	2013-08-29 09:10:54
	317446	42	125	ok	2013-08-29 09:10:54
	317447	42	125	ok	2013-08-29 09:10:55
	317448	42	125	ok	2013-08-29 09:10:55
	317449	42	125	ok	2013-08-29 09:10:56
	317450	42	125	ok	2013-08-29 09:10:56
	317451	42	125	ok	2013-08-29 09:10:58
	317452	42	125	ok	2013-08-29 09:10:58
	317453	42	125	ok	2013-08-29 09:10:59
	317454	42	125	ok	2013-08-29 09:10:59
	317455	42	125	ok	2013-08-29 09:11:00
	317456	42	125	ok	2013-08-29 09:11:00
	317457	42	125	ok	2013-08-29 09:11:01
	317458	42	125	ok	2013-08-29 09:11:01
	317459	42	125	ok	2013-08-29 09:11:03
	317460	42	125	ok	2013-08-29 09:11:03
	317461	42	125	ok	2013-08-29 09:11:04
	317462	42	125	ok	2013-08-29 09:11:04
	317463	42	125	ok	2013-08-29 09:11:05
	317464	42	125	ok	2013-08-29 09:11:05
	317465	42	125	ok	2013-08-29 09:11:06
	317466	42	125	ok	2013-08-29 09:11:06

Figure 63: Table POS

This dynamic runtime table is exclusively powered by the POS service with records from the TAGPositionsermittlung and is cleared by cleanup procedure after 24 hours.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

7.6.1.3 The "receiver" Table

The table receiver is developmentally a mixed table with static and dynamic data, but no runtime table. The table contains all the customized configuration data of the space makes and takes dynamically recent status of these (the space marks) on.

All properties case sensitive (eg options) are individual configuration parameters of the space brand and are matched at the start SIS Pos receiver to the RM. (See chap. 4.3.3)

Columns of the table receiver	
id	Net Equip ID (RaummarkenID) (Autom.)
devnum	Asset tag of the space brand
companion	Opposite function (currently n. 0)
Sektorid	SektorID in the area mark is
address	Ip address d. RM (UNIQUE)
port	Data port (transmit) the space brand
status (dynamic)	Current status (disconnected, paint functions, ok)
special_funktion	Function allocation (outside deck, "radio silence spaces" Hangar)
RxAttenuation	Receiving attenuation (in dB)
RfOutputPower	Transmission power of the area marks (channel 3) in (in dBm)
TimeToRxCheck	Room brand interference (period until the antenna changes in the transmission channel)
RxCheckTimeOut	Time for lists in the transmit channel
Options	3 = cyclic transmission enable, 7 = random
TicksPerSecond	Classification sharpness of the transmission approvals per second (ticks) (default: 240)
TxAprovalIntervall	Interval in ticks between the transmission approvals

The configuration data of the area marks are theoretically controllable in all parameters over the POS MySQL database. In practice, the approach has proven to match only the kalibrierrelevanten and individual data in order not to let the data volume grow disproportionately in service startup. 259-room brands and seven parameters of this initial startup takes approximately 30 seconds when all space in the status brands are located "Ready". Nevertheless, there is always the option of using the DBMS MySQL Workbench (installed on the POS servers and the management and diagnostic station) in addition einzupflegen parameters without recompiling the program code.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Except for the "status" column the "receivers" is a table **static table, which is loaded once into memory at service startup.**

Query 1 receivers x														
Filter:	Edit: File: Autosize:													
121	37840-003A-0157	0	41	10.1.76.170	10001	disconnected	None	0	5	240	1	3	10	3
122	37840-003A-0158	0	41	10.1.76.171	10001	disconnected	None	0	5	240	1	3	10	3
125	37840-003A-0165	0	41	10.1.76.174	10001	disconnected	WeatherDeck	0	5	240	1	3	10	3
126	37840-003A-0188	0	41	10.1.76.175	10001	disconnected	WeatherDeck	0	5	240	1	3	10	3
137	37840-003A-0164	0	41	10.1.76.186	10001	disconnected	None	0	5	240	1	3	10	3
147	37840-003A-0234	0	42	192.168.1...	10001	ok	None	0	5	240	1	3	10	3
148	37840-003A-0166	0	42	192.168.1...	10001	ok	None	0	5	240	1	3	10	3
149	37840-003A-0167	0	42	192.168.1...	10001	ok	None	0	5	240	1	3	10	3
158	37840-003A-0168	0	42	192.168.1...	10001	ok	WeatherDeck	0	5	240	1	3	10	3
185	37840-003A-0169	0	43	10.1.77.43	10001	disconnected	None	0	5	240	1	3	10	3
186	37840-003A-0170	0	43	10.1.77.44	10001	disconnected	None	0	5	240	1	3	10	3
187	37840-003A-0070	0	43	10.1.77.45	10001	disconnected	None	0	5	240	1	3	10	3
188	37840-003A-0171	0	43	10.1.77.46	10001	disconnected	None	0	5	240	1	3	10	3
205	37840-003A-0173	0	43	10.1.77.63	10001	disconnected	None	0	5	240	1	3	10	3
217	37840-003A-0174	0	44	10.1.77.75	10001	disconnected	None	0	5	240	1	3	10	3
218	37840-003A-0176	0	44	10.1.77.76	10001	disconnected	None	0	5	240	1	3	10	3
222	37840-003A-0177	0	44	10.1.77.80	10001	disconnected	None	0	5	240	1	3	10	3
232	37840-003A-0066	0	45	10.1.77.90	10001	disconnected	None	0	5	240	1	3	10	3
233	37840-003A-0178	0	45	10.1.77.91	10001	disconnected	None	0	5	240	1	3	10	3

Figure 64: Table receiver

7.6.1.4 The table "rsrooms"

The "rsrooms" (radio silence rooms) table operates the computing logic of the radio silent spaces which, as described in section. described 3.6, are not equipped for safety reasons with room brands. "Rsrooms" is a purely **static Table** which is loaded once into memory at service startup.

Columns of Table rsrooms	
id	SektorID the radio-quiet area
ReceiverId	The antenna is damped space mark, which initiates the transition
Threshold	Threshold for switching in dB must be calibrated on board,

Query 1 rsrooms x		
Filter:		
62	176	-96
64	86	-96
65	173	-96
80	127	-96
81	168	-96
*	HULL	HULL

Figure 65: Table Radio Silence Rooms

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

7.6.1.5 The table "sector_boundaries"

Query 1 sector_boundaries			
id	transition	status	description
0	66	ok	Interne Verwendung
10	11	malfunction	Grenze Plattformdeck Abt I nach II
23	25	malfunction	Grenze Zwischendeck Abt I (FD) nach II
24	25	malfunction	Grenze Zwischendeck Abt II nach III
25	26	malfunction	Grenze Zwischendeck Abt III nach IV
26	27	malfunction	Grenze Zwischendeck Abt IV nach V
27	28	malfunction	Grenze Zwischendeck Abt V nach VI
28	29	malfunction	Grenze Zwischendeck Abt VI nach VII
29	30	malfunction	Grenze Zwischendeck Abt VII nach VIII
30	31	malfunction	Grenze Zwischendeck Abt VIII nach IX
31	32	malfunction	Grenze Zwischendeck Abt IX nach X
32	33	malfunction	Grenze Zwischendeck Abt X nach XI
33	34	malfunction	Grenze Zwischendeck Abt XI nach XII
34	35	malfunction	Grenze Zwischendeck Abt XII nach XIII
36	66	malfunction	Grenze Hauptdeck Abt III (FD) nach IV
38	37	malfunction	Grenze Hauptdeck Abt V nach VI
39	39	malfunction	Grenze Hauptdeck Abt VI nach VII
40	40	malfunction	Grenze Hauptdeck Abt VII nach VIII
41	41	malfunction	Grenze Hauptdeck Abt VIII nach IX
42	42	malfunction	Grenze Hauptdeck Abt IX nach X
43	43	malfunction	Grenze Hauptdeck Abt X nach XI
44	44	malfunction	Grenze Hauptdeck Abt XI nach XII
45	45	malfunction	Grenze Hauptdeck Abt XII nach XIII
47	66	malfunction	Grenze H-Deck Abt XIII nach XIII (FD)
48	37	malfunction	Grenze B-Deck Abt V nach VI
49	49	malfunction	Grenze B-Deck Abt VI nach VII
50	50	malfunction	Grenze B-Deck Abt VII nach VIII
52	53	malfunction	Grenze B-Deck Abt X nach OPZ (FD)
57	58	malfunction	Grenze C-Deck Abt X nach X
59	62	malfunction	Grenze D-Deck Abt IX nach X
65	14	ok	Grenze Stauung nach P-Deck Abt IV
66	15	malfunction	Grenze Stauung nach P-Deck Abt V
67	16	malfunction	Grenze Stauung nach P-Deck Abt VI
68	17	malfunction	Grenze Stauung nach P-Deck Abt VII
69	18	malfunction	Grenze Stauung nach P-Deck Abt VIII

Figure 66: Table sector_boundaries

The "sector_boundaries" table manages the sector boundaries within the POS system and the "Transitions" the sector boundaries reflects the purpose of degradation. This table is dynamic in the "status" and contains no runtime data.

7.6.1.6 The table "sector_boundary-status"

Query 1 sector_boundary_status			
id	boundaryid	status	datetime
39	65	ok	2013-09-11 11:19:23
40	65	ok	2013-09-11 13:46:48
41	65	ok	2013-09-17 06:52:03
42	65	ok	2013-09-17 07:39:58
43	65	ok	2013-09-18 15:07:14
44	65	ok	2013-09-19 06:03:58
45	65	malfunction	2013-09-19 06:53:05
46	65	ok	2013-09-19 06:53:10

Figure 67: The table "sector_boundary-status"

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

The table "sector_boundary-status" all changes in the status of the sector boundaries in runtime data and thus forms the basis for all historical overviews, which can be requested by ILOAD.

7.6.1.7 The table "sector_status"

The "sektor_status" table is a pure run-time table and detects any change in the sector status of the entire ship. It serves mainly the historical evaluation against the ILOAD (see Chap. 7.6.1.3), but does demand due only changes with "datetime" on. This table has a generic term of 24 hours in accordance with concept.

Query 1 sector_status				
Filter:				
	id	sectorid	status	datetime
▶	1	42	ok	2013-08-30 07:11:07
	2	42	ok	2013-08-30 10:49:03
*	NULL	NULL	NULL	NULL

sector_status 1 Apply Cancel

Figure 68: Table sector_status

7.6.1.8 The "sectors" Table

The table sectors recorded the current status of the sectors on the basis of present in function room brands. Depending on where the failure of a space mark occurs, the transition (Inclusion in) is made of tags is located in the now degraded sector in the target sector purely quantitative basis set out in the POS MySQL database sector boundary numbers and Sektorenzuschlagungen. The logic underlying degradation in Chap. 3.2.2 described in detail.

Columns of the table sector	
id	SektorID (ongoing)
transition	ID of the transition sector (s. 37840-K-0100-D-POS Rev.H)

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

status	Current sector status (ok, malfunction)
description	Sector designation (s. 37840-K-0100-D-POS Rev.H)

Note: **Radio silence rooms and special sectors (outer cover (66), shore (67)) have not set their status due to the system, are therefore generally held in the status OK.**

Query 1 sectors				
Filter:				
	id	transition	status	description
*	49	57	malfunction	
	50	50	malfunction	
	51	51	malfunction	
	52	52	malfunction	
	53	59	malfunction	
	55	55	malfunction	
	57	64	malfunction	
	58	58	malfunction	
	59	63	malfunction	
	62	0	ok	Funkgerätera...
	63	59	malfunction	
	64	0	ok	Hinteres Mast...
	65	0	ok	Vorderes Mas...
	66	0	ok	Außendeck
	67	0	ok	Landgang
	80	0	ok	26a
	81	0	ok	53a
	82	66	malfunction	Brücke (63a)
*				

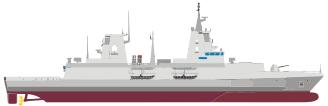
Figure 69: Table Sectors

7.6.1.9 The "settings" table

The table settings contains all the communication requirements for the applications running on the POS server services. Here is the address and port requirements for the ILOAD server, firewall ports and port are maintained for the management and diagnosis station initial. The system is designed to be flexible here to see if you can make adjustments with regard to the firewall requirements immediately.

Query 1 settings			
Filter:			
	name	value	description
▶	ilasst_address	localhost	Adresse des ILASST Servers
	ilasst_port	55555	UDP-Port, auf dem der ILASST Server hört
	pos_port_rx	55556	UDP-Port, auf dem der POS Server hört
	pos_port_tx	1234	UDP-Port, den der POS Server zum Senden verwendet
	tag_activator_port	10002	Port, über den die An-/Abmeldung von TAGs auf dem POS Server gesteuert wird
*			

Figure 70: Table Settings

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

This table is designed a static and is loaded once at the start of services SIS and SIS POS POSReceivers into memory.

7.7 The arithmetic logic of the SIS POS service

The calculation logic of the raw data, which are provided by the space available brands, follows a simple principle. Primary applies the position of the strongest tag data packet signal at a time (within one second) as a secured position, since the tag transmits once per second. That is, it is classified in this sector temporarily.

placed on this logic, the following special cases for special transitions access:

Radio silence rooms are secured by means of a combination of 2 in the access space marks (rake-logic), which are installed at a small distance from each other. One of these brands space receives the TAG with subdued reception (reduced Empfangsleistung-> close range), with the result that the TAG in close proximity and relative calm (min. 1 second) must be in the radio silent room before admission. Then, the entry event (event) is triggered which waits a certain time (15 seconds) via mini timer.

- If the TAG now nowhere more localized, he must have entered the radio-quiet area and this struck internally in the database sector of the radio-quiet area.
- Will he still received after the countdown of the inserted dampened brand, he still faces the radio silent room, the countdown starts again.
- Will he recorded after the countdown from other brands space on the ship, but not the TAG carrier has the muted brand leave the area in front of the radio-silent room.
- At this point, please note again that BDC has no radio silent areas in the strict sense, but only sectors. The separation eg sector 26 and 26a takes only before the POS server.

The exterior doors of the ship (Citadel area) are only protected by a space brand in direct door area. Accordingly, these outer-space brands are subject to a special arithmetic logic (equipped provided). a TAG is with the strongest signal in the reception area of the door area mark a mini timer is also set, the current signal strength value written to the POSMySQL database and waits for incoming signals below the tag.

- If the TAG has not been pinpointed again after the countdown, it is added to the outdoor deck.
- If the DAY after the countdown still in the area of foreign brand, the countdown will restart, the record is further classified in this sector.
- If the TAG been detected after the countdown from another space mark, the timer is deleted and added to the tag data of the newly-located position.

Parallel to this logic, the preparation of the data for the NMEA interface takes place through the ministry SIS POS. the status of the ship sectors in data transmission are incorporated only at this point. That means that all quantitative considerations, which include the status of the sectors find only at this level instead, it follows that although the POS server have the exact position data of the TAGs are by calculating in the sector status tags in the wrong

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

le the degradation of (their) sector for display in the BDC calculated quantitatively added to the target sector.

7.8 The dependencies of services

For decent start and the determination of the POS server status between the two POS servers, it is crucial that the chronologically precise starting order of the services is stored in the operating system.

Decisive for the functionality of the service POS receiver preceding departure of POSMySQL server. Here should hinder the MySQL service an unplanned crash POS MySQL database, none of the follow-services can be fully and is terminated automatically.

In so far applies to for analysis fehlerbehaftetem
Start behavior following check list for the POSDienste the POS server:

- RpcSS (RPC), Microsoft, Automatic
- DcomLaunch (DCOM server Prozessstart), Microsoft, Automatic
- RpcEptMapper (RPC Endpunktzuordnung), Microsoft, Automatic
- MySQL (mysqld), Oracle, Automatic
- SIS POS receiver (posrecvsvc), SIS, Automatic
- SIS POS (posrecvsvc), SIS, Automatic

Start with faulty behavior within the Microsoft operating system environment, a failure of the operating system files is near, here the virus scanner (Symantec Endpoint) check for abnormalities and perform a system check of the BS.

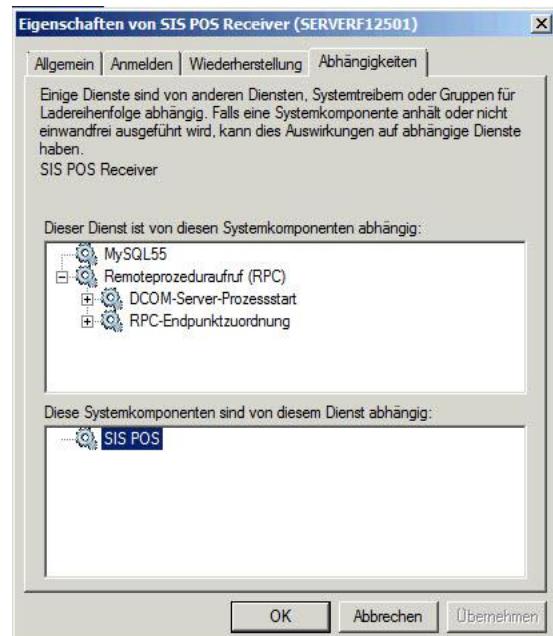


Figure 71: SIS POS dependencies

8 Installation and setup of POS software

The installation and setup of the POS is also described in a separate document, document number 020-290461.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

9 operation

9.1 Safety

In environment of personal tracking system, the safety regulations following standards shall apply.

- DIN EN 60664 - Insulation coordination for equipment within low-voltage systems
- Never connect, or solve connectors under load or in operation (24V DC)
- DIN EN 60352 - solderless electrical connections
- DIN EN 60529 - protection provided by enclosures
- DIN VDE 0870 - electromagnetic interference
- DIN EN 60999-1 - Connecting devices - elktr. Copper conductors - Safety requirements for screw terminals and screwless terminal blocks
- DIN EN 60664-1 Connectors - Safety requirements

The safety for maintenance and repair of the system (Kap.11.1) must be observed.

9.2 commissioning of the plant

For (re) start of the POS is assumed here that:

1. The POS hardware is entirely in perfect, installed and in working order. (See Section 11.6.2)
2. The 24V DC power supply for the POS is switched on. In addition, the two different server rack must be checked breakers on their functioning.

For this, the (re) start preliminary work is applicable safety instructions and regulations must be observed.

Note: The POS server should be started in succession. After starting the first POSServers the functionality of the entire POS can be controlled (incl. Indicator in ILOAD). normal operation is started after a successful POS start of the second POS server restored from the fail-over logic of the POS.

This is followed by testing the error-free commissioning of the POS server:

- combine management and diagnosis station with network socket of VLAN176
- Starting the management and diagnosis station and registration with the administrator account
- Starting the VNC viewer and remote login to the server (in a row) with the administrator account.
- Check the Windows event logs for warnings and errors (after 4 minutes because there are some delayed service startup)
- Testing the SIS application protocol on warnings and errors (see Fig. Software documentation)

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

If the POS server started successfully, should be controlled through the MySQL Workbench whether the latest version of PosDB.sql loaded (this is not the case, this must be made up manually).

Then (if not already active) activated via the charger at least 5 tags.

After that the mark is connected to the management and diagnosis station started POSActivator software to re-log the tags and then logged the required number tags in the POS (it should be registered in any case the 5 activated tags to the correct operation of the ensure POS, they can again be deregistered and disabled) after the test.

If the POS now in normal operation should be seen in the ILOAD logged tags with their position. An internal control over the pending tags can also be performed via the table item in the mysqlDb. Registered tags are listed as sending. On the table receiver can be controlled if all space brands work.

9.3 shutdown of the plant

If the POS shut down for long periods (eg for a yard-stay), the tags should to conserve battery charge, be disabled. For this, the

- Management and diagnosis station connected to the network socket VLAN176
- Starting the management and diagnosis station and registration with the administrator account
- Connecting the drain and mark applied to the management and diagnosis station
- Starting the PosActivator software and deactivate the tags.

Subsequently, both shut down POS server sequentially.

1. Shut down the POS server:

- combine management and diagnosis station with network socket of VLAN176
- Starting the management and diagnosis station and registration with the administrator account
- Starting the VNC viewer and remote login to the server using the Administrator account
- Shutting down the server with the reason "hardware maintenance".

2. Check the state of the server:

- By default, the power LED (green) is off after the shutdown, the network LinkUp LED goes. the power LED lights yet, the device must hold the start button are turned off, and the network link-up LED goes through for 5 seconds.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

9.4 The operation of the system

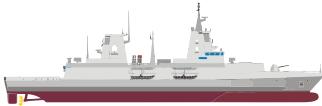
The system is operated exclusively through the management and diagnosis station. Therefore, neither keyboard nor monitor are connected directly to the central processing units.

The operation is divided here into the task of waking-being and that of the administration.

The software of the logon and logoff client is the only tool of the waking state, and is described in its function in chapter 7.3 in detail.

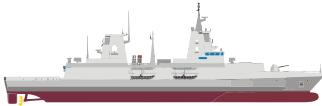
The administration of the plant takes place depending on the service task directly from the notebook to the VLAN 176 or via the KVM access through the server. The necessary modules and software packages are fully recognized under Chapter software and explained.

Operation of the POS is described BEYOND in a separate document (Operation Manual), Document Number 026-290780.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

10 troubleshooting

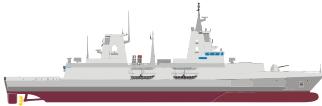
Error indicator (disorder)	Measures for fault diagnosis of the room brand	Further measures / repair measure
room brand Device in ILOAD to fault	<p>(The first identification of the faulty device Flat number / location / IP address)</p> <ul style="list-style-type: none"> -over the reference ILOAD -about the "description" in the "receivers" in the database of the POS server <p>2. accessibility test of spatial brand</p> <ul style="list-style-type: none"> -ping IP address, login Web Interface 	<ul style="list-style-type: none"> -Remote login to the server, search on the MySQL Workbench m. Notebook -with diagnostics and management station (admin)
RM unreachable via network	<p>exam if Link-Up LED lights on Lantronix XPortPro</p> <ul style="list-style-type: none"> -this open space covers brand -if not, reset (by interrupting the power supply after the status LED (yellow) lights up briefly) 	Network audit on the side of Accessbox In network IO space brand defective, exchange
RM Link-Up LED and status no reaction	<p>Examination 24V DC power supply</p> <ul style="list-style-type: none"> -Examination breaker 	Examination board further distribution
RM accessible via network, anyway disorder	<p>Check whether TAG (Ref Day on man) Will be received</p> <ul style="list-style-type: none"> - DatenLED (green) does not flash every second - DatenLED (green) flashes every second 	No data reception room brand exchange (if necessary, changing circuit board) Check whether fault still exists in the POS monitor on the server
RM still receives data, fault	<p>3. Examination RM-status TCP Monitor Server</p> <ul style="list-style-type: none"> -Select Settings in RM with the correct IP and check status (ready or fault) -Check parameters of the RM (see Sec. 4.3.3) -Data reception (reference date) check (s. Chap. 7.1.2) on the monitor 	When: settings of the RM can not be called up, loading bar runs on timeout. exchange (if necessary, changing circuit board)
IP of RM in POSMonitor gray (n. Selectable)	<p>Examination of the IP tunnel for Lantronix</p> <ul style="list-style-type: none"> -"Kill" the existing tunnel (s. Kap.7.1.1) -Rebuild with POS monitor connection 	put chop before the IP RM in the monitor, check data input
RM only fault if no tag is near	<p>Testing for sending shares adjacent room brands</p> <ul style="list-style-type: none"> -Change in the POS monitor receive channel of RM from 0 to 3 -Data input POS monitor should be visible sending shares of min. 2 space marks about 15-20Stk per second. 	If no transmission enable arrives: Recalibrating the transmission power of the neighbor brands
RM sporadically accessible	<p>Check the network connection</p> <ul style="list-style-type: none"> - Check with ping response times -fluctuating latency high (> 20ms) 	Network cable Check Switch, Network Testing

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

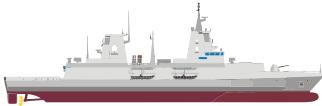
Space brands housing damaged	- na replacement necessary	Exchange of brand space
cable damaged	Accessibility test of spatial brand	Possibly. Changing cables MARS

Error indicator (disorder)	Measures for fault diagnosis of the TAG Further measures /	repair measure
TAG housing damaged		exchange
TAG shows weak battery in ILOAD	determine owner-day inventory - activate, log in here and spend your day - reload the old tag with charger	With shortened capacity (<6M) DATE purpose of battery replacement to UAN Sent
TAG not recorded in ILOAD to 12h, but is in reception range of a RM	Check transmitter / receiver unit DAY: - perform day connected to or unsubscribe brand. Red = ashore; Green = On Ship	No LED lights, TAG defective or discharged, exchange
TAG can not book themselves on the mark	DAY before the first log-on Enable means of the charger. -Day is already should log (see news activator)	
TAG does not respond to Anbzw. Logout (LED lights up the brand with no color change within 10 seconds)	- You're welcome 15 comply seconds distance between logon and logoff attempts by the same tag! -Deactivate (off) and activating the means of charging TAG	TAG lights red after activating at trade mark. Unless: exchange
TAG is not displayed on the ship (disorder)	Review Status TAG (Logged Enabled)	TAG Status shore
TAG Stock Number unreadable	Examination of TagID with POS Monitor Serial , Access to inventory number in the database	generate new labels

Error indicator (disorder)	Measures for fault diagnosis of the central unit	Further measures / repair measure
ILAAST disorder central unit (no. 1)	1. Determine the CPU affected -Remote Application Management and diagnostic station	Not possible -> s. Server connection error on KVM Possible -> Diagnosis via KVM

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Server connection error on KVM	Test server hardware in the rack -illuminates the PowerLED -illuminates the link UP NIC	when both no, Check supply voltage if no LINK-Up, Electric wire- , Network testing , defective if necessary NIC
missing supply voltage	Examination breaker -Check supply cable	if both correct: Hardware test server
Hardware test server test power supply function (server configuration)	- green LED on the power supply lights? - short start-up of fan	If not: NT-exchange If yes, repair by UAN
Start Windows can not load the system files	Check if disk is defective (SSD Raid 1 Volume)	If not: Restore Image play If yes: SSD diagnostic / Exchange
Start error MySQL DB	Check mysql.err -Check all dependent services -possibly extended restore in my.ini	No success: Restore Image play
Start errors SIS POS service	Check the access to the database in the POS.INI -Check started on MySQL DB correctly -Check the application log files	Login if necessary, check korrigieren DB protocol on detection logic errors in DB: Restore Image
Network Testing	Check whether server via direct cable connection can be accessed via KVM Viewer (notebook via NW cables connect)	If so, the other connections work ?? If so: Gateway test; firewall test If not; Fiber NIC error Hardware Support UAN ANS
Gateway test; firewall test	Ping to gateway; Firewall, POS Server 2	If errors: communicate network support.
Degraded RAID 1	Check whether the second disc still connected -Calling Intel RST tool, there the Smart Data SSD is available	If so: SSD diagnostic / Exchange If no: Connect and restart the server
fan noise	Noise testing when it is open - Determine which fan	Possibly. exchange the affected Fan
BIOS CMOS Failure	CMOS battery discharge	exchange CR2032
Boot failure of integrated components	Testing, not boot which driver / service	Support call open to UAN ANS.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Server Status both Slave	Verification transparency between both servers	A server has no connection to the gateway: Network Troubleshooting
Processor utilization above 70%	block checking whether process (e) one or more cores -Check the criticality (via Remote Assistance ANS)	Server restart, evaluation of the status
Recurring application errors, and memory protection fault within the OS	Verification of system memory (ramtest) on external medium. Prior to that USB port switch on.	Error: exchange affected RAM module If not: Restore Image play

Error indicator (disorder)	Measures for fault diagnosis of management and diagnostic station	Further measures / repair measure
Device no longer boots up	Check state with power supply	If yes: Battery defective If not, send instrument.
hardware failure	Testing of the device	Send in the device.
Start Windows can not load the system files	Check if disk is defective	If not: Restore Image play If Yes: Repair UAN
Start error integrated components	Testing, not boot which driver / service	Support call open to UAN ANS.
Start errors Aktivatorapplikation	Check the network connection to the central processing units -login and logout brands both available	test network Testing COM ports

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

11 Maintenance and repair of personal tracking system

11.1 safety

As part of the maintenance and repair measures to be taken to the appropriate safety must be complied with in accordance with BGV A1 and plan for their implementation. In addition, subsequent production sites, offices must be observed:

- For activities on ladders and scaffolding (possibly sharing space mark) is also for the backup job to designate a person (BGV C 22, § 5).
- Stability and viability for ladders and scaffolding are to be ensured. (BGV C22, Section 6, BGV C28, §3, §5).
- Possibly. PPE against falling provide (hangar) (BGV C 22, § 12, BGV C28, § 11))
- Securing of the hazardous area from falling objects (BGV C28, § 9)

For the area of the electrical voltages, the basic rules of the BGV A3, which are to be implemented apply.

- Test: visible damage, presence of circuit documents and warnings, proper clamping connections (§ 5)
- Protective measure low voltage (SELV / PELV)
- No special measures for activation is necessary for work on 24VDC power plant because no body flow is given by the supply voltage. (BGV A4, § 4, DA to § 4 para. 2 and paragraph 3)
- Boundary conditions for working on live parts with regard to the selection of staff, depending on the rated voltage

rated voltages	Work	EF EUP L
AC to 50 V DC to 120 V	All work, as far as a threat, for example, ruled by arcing,	XXX
Electrician:	EF	
Electrotechnically instructed person: EUP Elektrotechnischer		
Laie:	L	

In Instandsetzung- and repair of electronic components to pay attention in order to avoid defects by static electricity is the use of suitable antistatic and grounding (ESD).

11.2 supplies / equipment

no supplies or equipment needed for the operation, maintenance and repair of this equipment. All are subject to wear individual components of the system are listed below in the maintenance instructions and linked to corresponding measures.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

11.3 Maintenance Schedule

Maintenance designation	Interval Number.	Person.	KAT MES Skill		Site maintenance	No.	
TAG battery charge	6M	1	48	02	SK02	ship	3700-8
Sight and noise testing fan	12 M	1	48	01	SK02	ship	3700-2
perform server maintenance	30 M	1	48	03	SK03	MARS	3700-1
Maintenance and repair work Interval Number.	Person.		KAT MES Skill		Site maintenance	No.	
exchange Gehaeuseluefter	malfunction	1	48	02	SK03	ship	3700-3
Exchange room brand	malfunction	2	48	02	SK02, SK01	ship	3700-4
exchange man-day	malfunction	1	48	02	SK02	ship	3700-5
Exchange network socket	malfunction	1	48	02	SK03	ship	3700-6
Exchange Bicker power supply	malfunction	1	48	03	SK03	arsenal	3700-7
Spare diagnostic station	malfunction	1	48	02	sk01	ship	3700-9
Exchange CPU	malfunction	1	48	03	SK03	arsenal	3700-10
Replacement CPU fan	malfunction	1	48	02	SK03	ship	3700-11
Exchange data storage	malfunction	1	48	03	SK03	arsenal	3700-12
Replacement memory module	malfunction	1	48	03	SK03	arsenal	3700-13

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

11.4 Maintenance of the TAG

The LiPo battery is under a slight self-discharge, but is generally designed for 200 to 500 charge cycles. At least every 14 months, in normal use every 6 months, the LiPo battery needs to be charged reason (see 4.2.2) in the charging cradle. For this, the TAG must remain about 4 hours in the charging cradle.

Place of delivery:	ship
Measures designation:	TAG battery charge
Total Running Time:	4h
Business Category:	200 (Operation Maintenance)
Measures number:	3700-8
Maintenance Level:	MES2
Materialerhaltungsart:	PM
Person. Conditions:	KAT.:48, SK02, 0.2h
Measures interval:	6M

Material to be used:

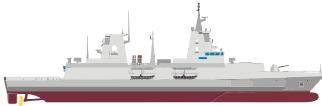
Material Name:	Collecting charging cradle POS RFID
TKZ:	3700-RFID-12
HSTK:	CD504
Reference unit:	1 piece

If the voltage of the LiPo battery in the tag below the threshold voltage of 3.5V, this is reported as LowBatMeldung via POS server to the ILOAD. Here incorrect LiPoAkkus TAG can be selectively loaded, identified and, if necessary, be replaced.

Defective tags are replaced with new devices from the ET pool. They can be submitted to the UAN order GW or repair.

Except for the recommendation by the manufacturer to trickle charge no regular maintenance tasks apply.

A repair of the tag is not provided. The component is displayed and returned to the UAN or manufacturer for warranty or repair.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

11.4.1 Replacing person day

of execution	ship
measures designation	replacing person day
action number	3700-5
Business category	920 (replacing = Removing + embed)
Maintenance Level	MES2
Materialerhaltungsart	CM (unscheduled)
Person. conditions	KAT. 48, SK02, 0.5h
measures interval	Only if defective

Material to be used:

material name	Personnel Tracking DAY
TKZ	ANS_POT_F125
HSTK	CD504 (ANS)
reference unit	1 piece

The manufacturer reserves the right to update the internal firmware for Major updates of the tag via service notice to the AG.

11.5 Maintenance of the room brands

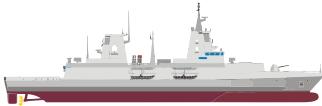
The room brands of POS are specified as maintenance-free component, thus accounting for up to Major firmware update from the manufacturer all maintenance and repair tasks for the AG. To ensure the functionality of the POS in use is recommended to reproach an onboard ET pool.

11.5.1 Maintenance (exchange) of space brands

the replacement of this component due to the positioning of the brands in room ceiling height and above doors, the special requirement arises to 2 persons (backup). Depending on the situation, the work on a stepladder or scaffolding is necessary. ***The installation and removal of this component occurs with standard tools, it's no special tools required.***

The necessary work and safety regulations for working on ladders and scaffolding must be observed. Possibly. are to be borne against falling according to PSA.

Prior actions: The spare room brand must be pre-configured for your later of use (s. Chap. 7.1.1) It is the IP address of the defective area brand to identify with the TCP monitor and configure the ET-room brand with that address. This can also be done via direct cable connection with the service notebook.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

of execution	ship
measures designation	Exchange room brand
action number	3700-4
Business category	921 (replacing = Removing = installing a new part)
Maintenance Level	MES2
Materialerhaltungsart	CM (unscheduled)
Person. conditions	KAT. 48, 2Personen, SK02, sk01,1,5h
measures interval	Only if defective
Standard tools needed	Phillips screwdriver (medium, small), needle nose pliers, spanner M8 and M22, electricians knife, 3mm allen key, heat gun
consumables	Heat-shrinkable tube 4: 1 (VG-screw)

Is a sector in ILOAD displayed as disturbed, belonging to this sector space marks can be identified on the list of sectors. If no external damage can be seen on the housing, the faulty space brand can by pulling the power connector (for the housing must be opened) be restarted. The room brand restarts after plugging the power connection with the function parameters of the POS start.

Material to be used:

material name	Personal tracking room brand
TKZ	ANS_POT_M125
HSTK	CD504 (ANS)
reference unit	1 piece

Does the space mark after the restart still not a replacement of the circuit board, the next option to be suppressed one sector.

Note! If the housing is a space mark pressed by a mechanical impact or broken, can not be guaranteed for the given IP. Although the room brand continues to receive data, at least the housing should be replaced.

The following steps apply to the replacement of the entire room tag for the board! (For orientation, the picture may 72: 3D exploded view of the Space brand used).

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

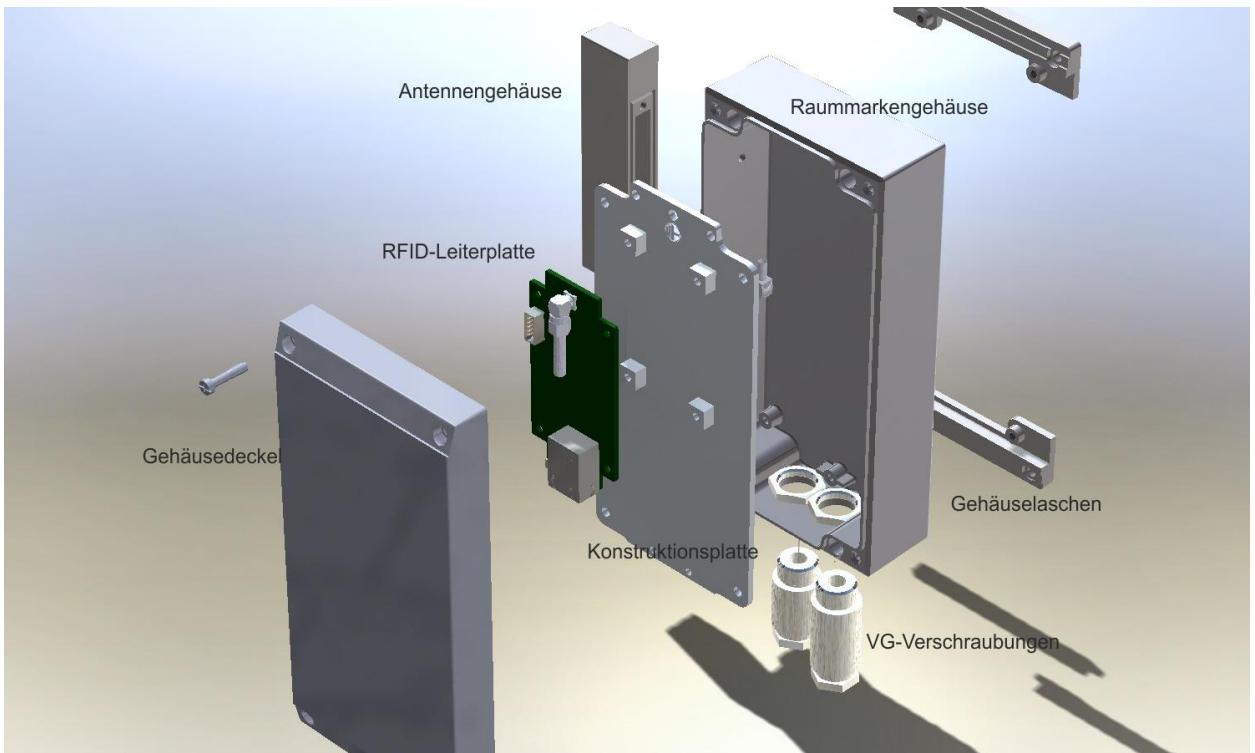


Figure 72: 3D exploded view of the Space brand

(To which tools are needed to in section 4.3.5 "Installation steps the space brand" can reread.) To do this, proceed as follows:

1. (**Enfällt if only the printed circuit board is exchanged!**) First, the two are Schrumpfschläuche on the screw on the housing side so severed with a knife that coats the cable is located underneath are not violated. The shrink tubing residues are completely removed.
2. This is followed by screwing of the housing 4 with the housing cover screws, it severing of the cable tie for the network and the power connector on the printed circuit board.
3. After pulling out the plug for the network and power connection of the circuit board follows.

The following steps are only performed when only the printed circuit board is replaced!

4. First, the patch antenna, which is connected by a screw connection to the printed circuit board is unscrewed at the threaded mount on the printed circuit board.
5. Thereafter, the 4 Phillips screws are removed, with which the circuit board is fixed to the structural panel. Subsequently, the circuit board is carefully removed from the case and replaced with a replacement board.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

6. The new circuit board is with the 4 screws on the construction board (Sicherungsunterlegscheiben / varnish must not be forgotten!) Fixed and fixed the patch antenna with the screw again to the circuit board.
7. The network and the power connector are inserted into the exchange board, then attached with new cable ties with the printed circuit board and subsequently screwed, the housing with the lid 4 with the screws.

If the housing together with the circuit board replaced the step 4 and the steps now to be described below is executed.

8. The VG glands on the housing are screwed and carefully pulled both network and power cables through the screw openings. The network connector must be opened far enough to pull out from the space brand housing remains the only wire manager on the network cable (see Figure 21: placement of the copper wires of the network cable in the wire manager). **When pulling out the network cable its shield must be fully preserved.**
9. Now the broken housing can be removed and a new one together with printed circuit board at the location to be mounted.
10. Before the network and power cables are plugged into the chassis, a new heat shrink tubing over the cables and the nut is threaded.
11. The network and the power supply plug into the exchange board, then fixed with new cable ties to the circuit board. This is followed by screwing the BG and VGVerschraubung to the housing and the Verschrumpfen of shrink tube by means of a hot air gun (see 4.3.5).
12. Now the housing is screwed to the cover with the screws 4 below.

commissioning:

1. When connecting the operating voltage, the power LED (yellow) lights up briefly
2. The configuration of the specific antenna data by the server. For this purpose, start the service SIS POS receiver (posrecvsvc) new to a POS server. This writes the data to the flash memory of the antenna and check the configuration (please note dependencies of services.)
3. Check the status of the brand in the space TCP monitor on the POS server (status ready signaled correct operational readiness)

For information on replacing the space mark is made at this point in addition to the documentation 290461_Installations_Dokumentation_Rev10.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

11.6 Maintenance of the POS server

Also the POS server is constructed as a low-maintenance system component from COTS components with extended service life, which offers maximum reliability and GW of such components (see MTBF of the server reliability data). Since the server itself has its air cooling four internal fans, these rotating components have the lowest expected lifetime among the included components.

11.6.1 Preliminary maintenance or repair measures to be implemented

1. Shut down the serviceable server:

- combine management and diagnosis station with network socket of VLAN176
- Starting the management and diagnosis station and registration with the administrator account
- Starting the VNC viewer and remote login to the server using the Administrator account
- Shutting down the server with the reason "hardware maintenance".

2. Control of the state and disconnecting the wiring of the server:

- the power LED (green) By default extinguished after shutdown, but the network link-up LED is still on. the power LED lights yet, the device must pass for 5 seconds and hold the start button are turned off, and the network link-up LED goes out)
- Dissolving and removing the 24V power supply of the server. Loosen the thumbscrew of the D-Sub high-current connector at the front of the server and remove the plug.
- Remove the network connector on the front of the server. The fiber-optic fiber cable connections are connected by an LC connector with the network card of the server, which can be removed by slight pressure on the locking lugs. Then the RJ45 connector of KVMAanschlusses must be removed. Both cables are to be stored at the side so that they are not damaged when pulling out the 19-inch withdrawable.

3. Remove the server from the rack:

- Releasing the lateral four screws, which fix the retaining tabs of the server against the Hutmutternschiene. At the two retaining clips of the server can now be pulled slowly out of the rack. It should be noted that the air seal between each server in the rack in the process is not damaged.

11.6.2 Measures After maintenance or repair performed

1. Installation of the serviced device (possibly even replacement device) into the rack:

It should be noted that the air seal between each server in the rack in the process is not damaged. The server should be bolted with four Phillips screws holding the plates against the Hutmutternschiene.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

2. Connect the wiring and commissioning of the server:

The interface cables have to be plugged in recursive order of removal back to the appropriate connections and to check their seat vibration resistance. After turning on the server the operation lamp followed by the network link-up LED should light up first.

3. Examination of error-free start-up of the server:

- combine management and diagnosis station with network socket of VLAN176
- Starting the management and diagnosis station and registration with the administrator account
- Starting the VNC viewer and remote login to the server using the Administrator account
- Check the Windows event logs for warnings and errors (after 4 minutes because there are some delayed service startup)
- Testing the SIS application protocol on warnings and errors (see Fig. Software documentation)

11.6.3 Regular maintenance tasks at the POS server (ANS_POS_F125)

It is to carry out a visual or sound check at the server in the calendar annually. It has to listen for irregular and unusual noises of the system fan. For this purpose, it is also recommended remotely (via management and diagnostic station) run the AGV system Guard to control the fan speed and a trial basis to adjust the fan when the abnormalities to maximum speed. are now bearing or unbalance noise to be heard, replacement of the fan in question is necessary (Measure 3700-3).

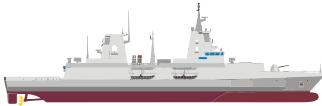
11.6.3.1 sight and noise testing fan

of execution	ship
measures designation	Sight and noise testing fan
Business category	340 (function test)
action number	3700-2
Maintenance Level	MES1
Materialerhaltungsart	PM
Person. conditions	KAT.:48, SK02, 0.5h
measures interval	1A
TKZ to measure	ANS_POS_F125 (personal tracking central processing unit)

11.6.3.2 perform server maintenance

In the context of the 30-month maintenance cycle at the Naval Arsenal a visual inspection for dusting of the system is carried out and replace the fan **a pre-dusting the overall system.**

done the maintenance, installation and removal of this component with standard tools, it's no special tools required.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Place of delivery:	arsenal
Measures designation:	Perform maintenance
Business Category:	281 (Scheduled inspection)
Measures number:	3700-1
Maintenance Level:	MES3
Materialerhaltungsart:	PM
Person. Conditions:	KAT .: 48, SK03, 1.5h
Measures interval:	30 M
TKZ to measure:	ANS_POS_F125 (personal tracking central processing unit)
Standard Tools Required	Phillips screwdriver (medium, small), needle-nose pliers

The server maintenance can be done only if it is a remote from the rack POS server. Here, the necessary safety measures relating to the installation and removal of the server must be observed.

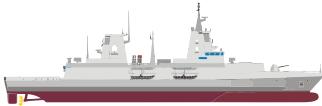
In this measure, a proactive replacement of the CMOS button battery (CR2032) of the mainboard is recommended operation or storage after 3 years.

Material Name:	CMOS battery
TKZ:	CR2032
HSTK:	4M310
Reference unit:	5 pieces

The manufacturer's recommendation is due to the mechanical stress Replacing the fan every 23 years for 24/7 operation of the plant. Here, the structure of an ET pools is recommended.

Material Name:	case Fans
TKZ:	NF-F12 PWM, 1x NF-B9
HSTK:	5501N (Noctua)
Reference unit:	1 piece (2p. Required)
Material Name:	CPU fan
TKZ:	NF-B9 PWM
HSTK:	5501N (Noctua)
Reference unit:	1 piece (1 pc. Required)

The necessary for the exchange or performing operation steps are described in the technical documentation and the management manual and can be performed if necessary also by trained personnel on board the ship.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

The recommendation by the manufacturer asks to schedule this service in an already necessary throw-around service windows and to be carried out by the UAN.

The implementation of firmware updates and software updates will be planned by the UAN for the project, announced in accordance with ON and scheduled accordingly.

With Leading Major updates (BIOS, software, OS updates) a procedure must be agreed for the deployment phase to ensure the continuous operation of the overall system.

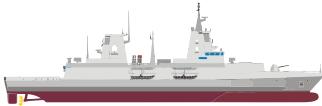
11.7 Maintenance and repair work at the POS server

Because of the redundancy within the central processing unit on board of the vessel, only the replacement of the fan and the CMOS battery is provided in the event of a fault on demand and for maintaining the operation of both servers.

done the repair of this component with standard tools, it's no special tools required.

Place of delivery:	ship
Measures designation:	Replacing chassis fan
Measures number:	3700-3
Business Category:	921 (replacing = Removing = installing a new part)
Maintenance Level:	MES2
Materialerhaltungsart:	CM (unscheduled)
Person. Conditions:	KAT.: 48, SK03, 1.0 h
Measures interval:	Only if defective
Standard tools needed	Phillips screwdriver (medium, small), needle-nose pliers

Place of delivery:	ship
Measures designation:	Replace CPU fan
Measures number:	3700-11
Business Category:	921 (replacing = Removing = installing a new part)
Maintenance Level:	MES2
Materialerhaltungsart:	CM (unscheduled)
Person. Conditions:	KAT.: 48, SK03, 1.0 h
Measures interval:	Only if defective

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Material to be used:

Material Name:	case Fans
TKZ:	NF-F12 PWM, 1x NF-B9
HSTK:	5501N (Noctua)
Reference unit:	1 piece (2p. Required)
Material Name:	CPU fan
TKZ:	NF-B9 PWM
HSTK:	5501N (Noctua)
Reference unit:	1 piece (1 pc. Required)

Safety note: (Replacing the fans *run exclusively with a separate power connection!*)

11.7.1 Replacing the CPU fan:

First, plug the CPU fan from the motherboard is disconnected. After that, the 4 clamping hooks fixed to which the fan to the CPU cooler by hand are removed, the cooler is now taken out of the chassis. Subsequently, the replacement fan with one hand can be held at the position at the CPU cooler from the condenser, at the grip, the clamping hooks. With the second hand 4, the clamping hooks with the new CPU fan are successively connected. Finally, the connection to the motherboard via the plug restored (see also the following figures).

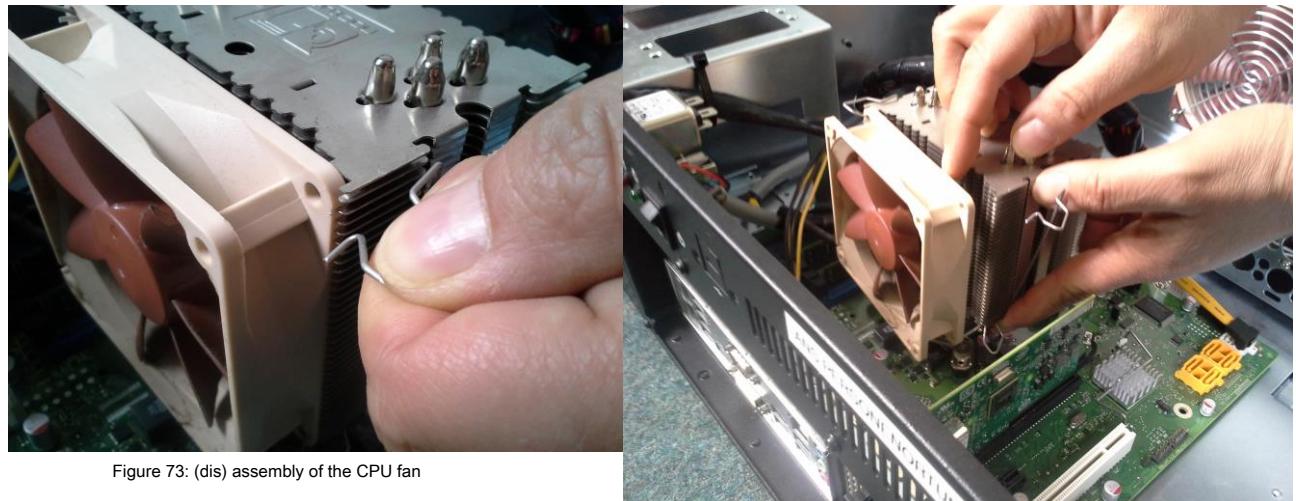


Figure 73: (dis) assembly of the CPU fan

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

11.7.2 Replacing the case fans

First, the connector of the chassis fan is disconnected from the motherboard. Thereafter, the shock absorber 4 rubbers to be touched one after the other with the needle-nosed pliers and pulled so far towards the housing interior that is tapered so that it fits through the mounting openings of the housing fan. Now, the case fan can be carefully removed from the case. Subsequently, the replacement fan can be held at the position at the POS server housing with one hand, on the grip the shock absorber rubbers. With the second hand 4, the shock absorber rubbers with the new housing fan are successively connected. Finally, the connection to the motherboard via the plug restored (see also the following figures).

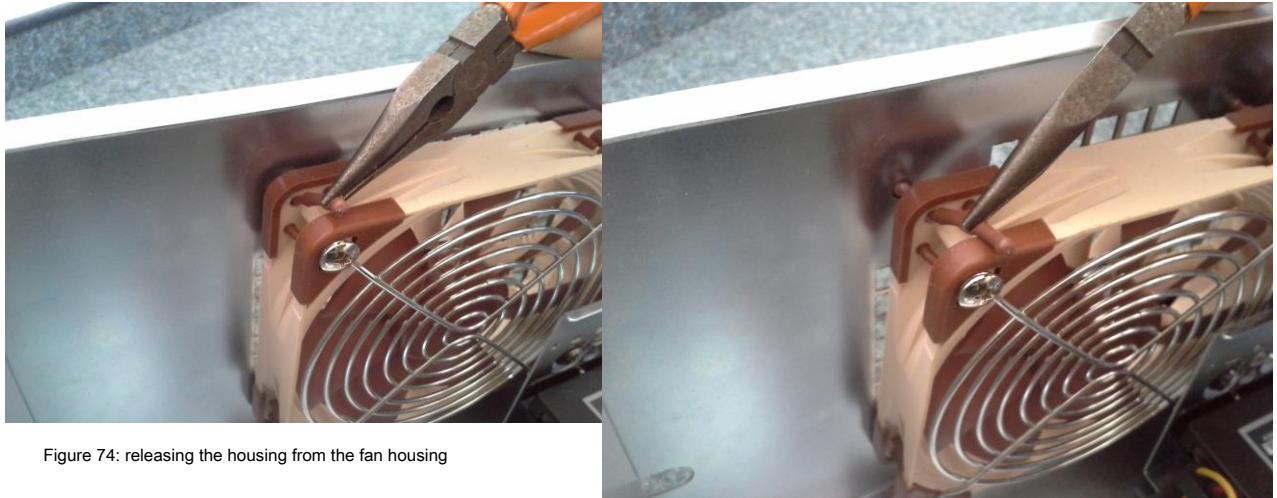


Figure 74: releasing the housing from the fan housing

11.7.3 Replacing the power supply Bicker

A special case is the replacement of the 24V used DC power supply, the SSD raid represents and the RAM modules. This should be done regularly in consultation with the UAN ANS, but decreased in the specific case of failure with the repair by the Arsenal downtime of the unit

Place of delivery:	arsenal
Measures designation:	Exchange Bicker power supply
Measures number:	3700-7
Maintenance Level:	MES3
Business Category:	921 (replacing = Removing = installing a new part)
Materialerhaltungsart:	CM (unscheduled)
Person. Conditions:	KAT.:48, SK03, 2.0H
Measures interval:	Only if defective
Standard tools needed	Phillips screwdriver (medium, small), needle-nose pliers

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Material to be used:

Material Name:	Bicker power supply
TKZ:	BES-540C
HSTK:	DE393

Safety note: replacement of the power supply (only with separate mains connection!)

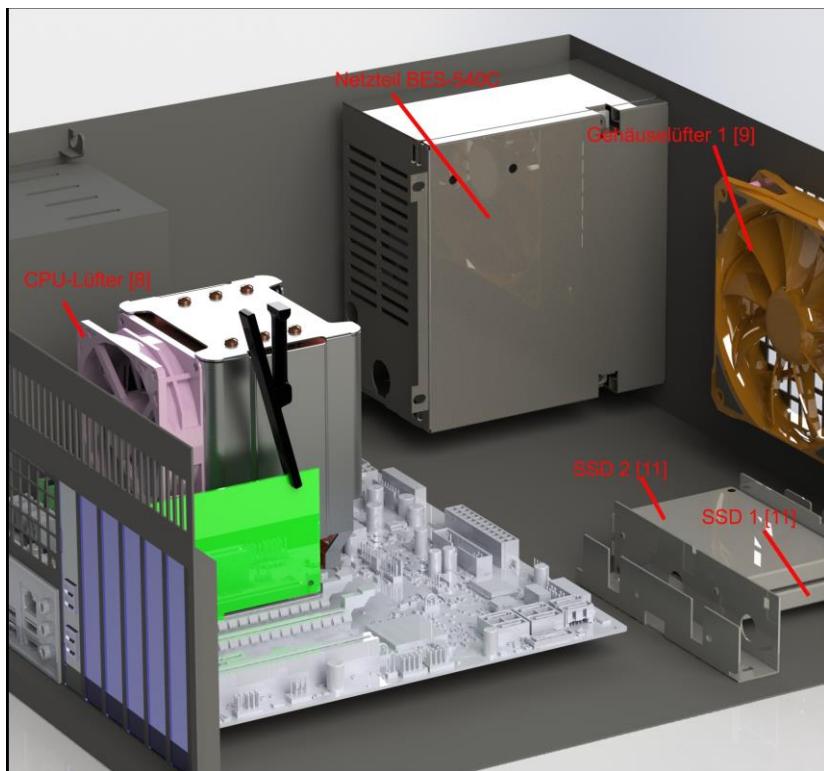


Figure 75: Server Interior 1

- all power connections are drawn from the power supply to the POS server components - ie motherboard (ATX 24pin, 4PolATX12V), hard drives and possibly directly connected fan. Thereafter, the power supply is unscrewed with the loosening of the screw 4 on the back side that connect the power supply to the housing. the power supply can now be taken out to touch gently and without other POSHardwarekomponenten.
- the replacement adapter is positioned at the position in the POS server housing from the opening on the rear side and held with one hand, that the power supply can touchieren any other POS server components that the 4 holes congruent for the screw connection with which the housing are. Now the four screws are screwed again for screwing the case back into the power supply, so that it is re-attached to the back side (use locking compound to secure the screws!). Now all connections to the POS server are

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Components restored - so the motherboard and the hard disk, possibly to directly connected fans. Subsequently, the connection is restored to the current. **the fans after switching on and the POS server starts to rotate**, the POS server can be installed in the server rack again. For this, the power cord is first separated again after the housing cover is screwed back onto the case and then the POS server pushed back into the rack and the 4 screws in the server screwed (locking compound for the screws renew!) Lastly, all the connections necessary for necessary to restore correct operation connected (2XLWL 1X network Ethernet, current) are turned on and the POS server. **do not turn the fan after the replacement of the power supply, the POS server must be handed over to the UAN ANS for repair.**

11.7.4 exchange of the data memory (SSD) of the central unit

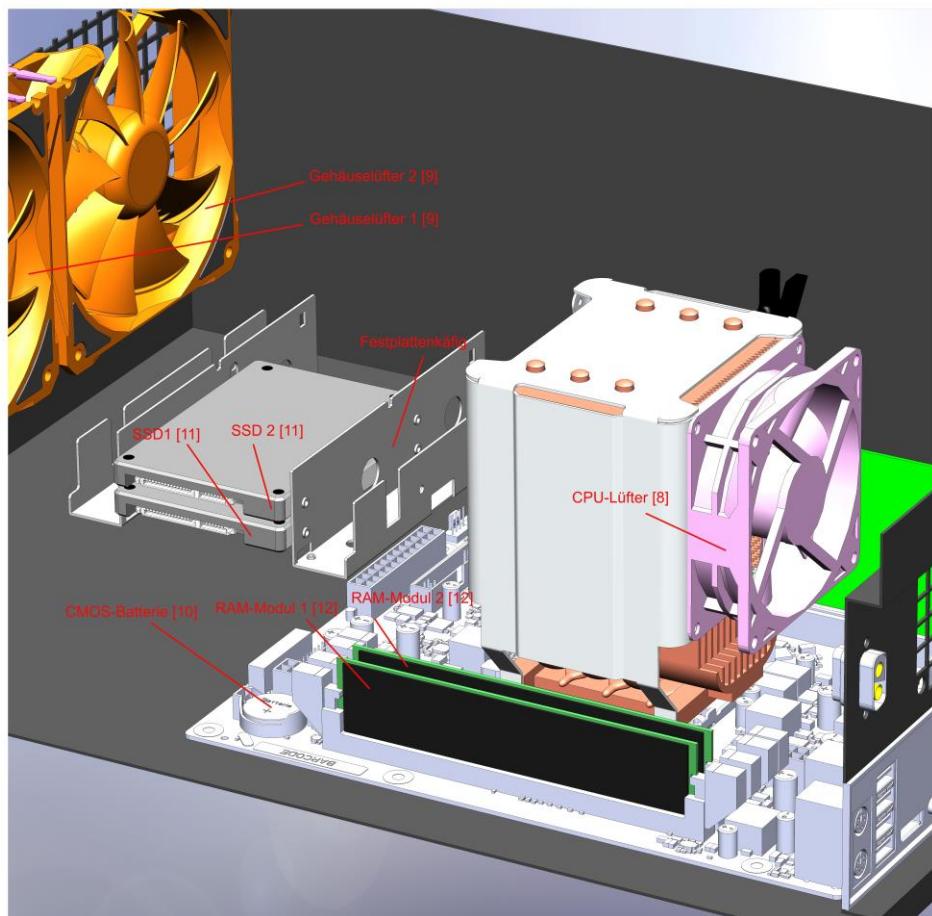
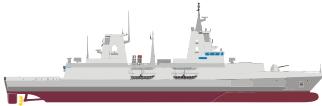


Figure 76: Server Interior 2

To replace the disk (SSD) the necessary security measures with respect to installation and removal of the server must be observed. There are measures in advance (11.6.1) and after maintenance (11.6.2) perform.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

Note 1: If only an SSD be replaced (RAID degraded SSD lifecycle reached) is to disconnect only the faulty device, replace and restart the server. The restoration of the RAID volumes of existing functional unit (SSD) is performed automatically by the integrated RAID controller. A mix-up the equipment shall be hereby excluded in advance.

Note 2: When replacing the SSD only replacement devices are allowed fulfill the following minimum specification. The following applies that always two identical and firmware identical devices are to be used to eliminate errors in the rebuild of the RAID volumes by the RAID controller. Therefore, this must be agreed in advance of the action with the manufacturer.

Form Factor SSD:	2.5 inches
Interface:	SATA
SATA connection	6Gb
Overall height 2.5 ":	Max 9.5 mm
Manufacturer Warranty:	Ages 5 and up
MTBF:	> 2 million hours
Write IOPS 4K:	> 80K
Capacity from:	> 240 GB
TBW (min):	> 200TB (240GB), 400TB (512GB)
Command Set Support	GC TRIM, SMART, NCQ, ATA / ATAPI-8

1. After removing the central unit, the housing cover is open and disconnect the power supply and SATA cables from the SSDs.
2. Thereafter, the data carrier cage to be solved from the server housing (4 Phillips head screws)
3. The defective SSD (s) out of the cage bolts (4 Phillips screws) and replace it with the new device
4. Then insert the device and cage again correctly and screw. Here, the thread lock re-apply in order to prevent loosening due to vibration.
5. Finally, restore the wiring devices precisely and close the cover.

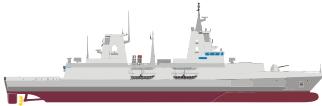
F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	



Figure 77: SSD Plextor M6 Pro 256GB, SATA (PX-256M6P)

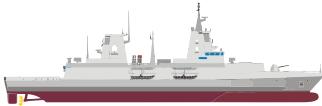
In case of replacement of both media, the recovery of the RAID volumes is additionally carried out in the BIOS, and then perform the import of the Restore images of the central unit.

In case of replacement of a data carrier (SSD) is sufficient to restore the RAID integrity by the RAID controller. This is done automatically in the background when the operating system of the central unit.

Place of delivery:	arsenal
Measures designation:	Exchange data storage
Business Category:	921 (replacing = Removing = installing a new part)
Measures number:	3700-12
Maintenance Level:	MES3
Materialerhaltungsart:	CM (unscheduled)
Person. Conditions:	KAT.: 48, SK03, 2h-3h
Measures interval:	Only if defective
TKZ to measure:	ANS_POS_F125 (personal tracking central processing unit)

11.7.5 exchange memory module (s) of the central unit

To replace the disk (SSD) the necessary security measures with respect to installation and removal of the server must be observed. There are measures in advance (11.6.1) and after maintenance (11.6.2) perform.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Note: For the exchange of physical memory (RAM) is important in addition to ESD protection measures, since these components are sensitive to contact end load.

In advance of the action is ideally perform a memory test from the external medium (MemTest86 +) to which the defective memory module can be detected. As an interim solution and the operating system integrated test "mdsched" may alternatively be used.

All spare modules used have minimal specification DDR3 RAM suffice (4GB PC3-10667U CL9) and should always type DC are used. The mixing of different modules from different manufacturers can lead to unpredictable errors.

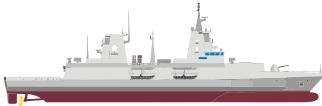
Place of delivery:	arsenal
Measures designation:	Replacement memory module
Business Category:	921 (replacing = Removing = installing a new part)
Measures number:	3700-13
Maintenance Level:	MES3
Materialerhaltungsart:	CM (unscheduled)
Person. Conditions:	KAT.: 48, SK03, 1h-3h
Measures interval:	Only if defective



Figure 78: Kingston ValueRAM DIMM 4GB, DDR3-1333, CL9-9-9

1. After removing the central unit, the housing cover is open
2. By applying pressure to the two hold-down the RAM module (s) released from its slot and remove carefully.
3. After the new module (s) Installation and push firmly into the slot so that both hold-down latch again with the retaining tabs in the module (felt).
4. Finally calculator close and be in operation.

Note: A re-run the memory test before commissioning can be useful.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

11.7.6 replacement of the entire CPU

To replace the CPU POS security measures necessary for installation and removal of the server must be observed. There are measures in advance (11.6.1) and after maintenance (11.6.2) perform.

Place of delivery:	arsenal
Measures designation:	Exchange CPU
Business Category:	290 (replacing removing-installing)
Measures number:	3700-10
Maintenance Level:	MES3
Materialerhaltungsart:	CM
Person. Conditions:	KAT.: 48, SK03, 2h
Measures interval:	Only if defective
TKZ to measure:	ANS_POS_F125 (personal tracking central processing unit)

11.8 Maintenance of the network socket

The network can is a maintenance-free component and therefore exchange as ET-part in the event of mechanical damage. For the **Replacement or repair** Reference is made at this point in addition to the documentation AU20110005-D001_Installations_Dokumentation_ANS.

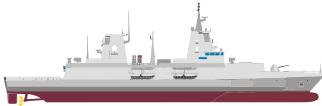
done the maintenance, installation and removal of this component with standard tools, it's no special tools required.

11.8.1 Replacing network socket

Place of delivery:	ship
Measures designation:	Replacing network socket
Measures number:	3700-6
Business Category:	920 (replacing = Removing + embed)
Maintenance Level:	MES2
Materialerhaltungsart:	CM (unscheduled)
Person. Conditions:	KAT.: 48, SK03, 0.75 h
Measures interval:	Only if defective

Material to be used:

material name	Personal tracking network socket
---------------	----------------------------------

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

TKZ	1966290000
HSTK	D8857 (Weidmueller)
reference unit	1 piece

11.9 Maintenance of management and diagnostic station

The management station is designed as a low-maintenance component. Here are the general guidelines for the care and maintenance charge the LI-ION batteries are only to be observed. Here, the guideline applies that a battery per month by 2-5% disarms itself (highly dependent on temperature, the warmer the faster). Thus, the recommendation is accompanied by the device in the course of a year at least once grundzuladen (60-80%) to ensure the function of the battery.

11.9.1 Spare diagnostic station

of execution	ship
measures designation	Spare diagnostic station
Business category	923 (Separate-connecting a device)
action number	3700-9
Maintenance Level	MES2
Materialerhaltungsart	CM
Person. conditions	KAT.: 48 sk01, 0.5h
measures interval	Only if defective

Material to be used:

material name	Personal tracking diagnostics Portable
TKZ	LE6420XFR1
HSTK	DB281 (DELL)
reference unit	1 piece

The maintenance instructions of the POS are additionally described in a separate document.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

attachment

A POS interface description for MSB

The Multi Service Board Network (MSB) is realized by the product "Integrated Network for ships" (INeS) the variant for F125 (INeS F125).

The integrated network for ships - short INeS - is a unified, based on IPv4 Ethernet network for data transmission for various services on board ships. The network builds on modern COTS products that offer common industrial and networking standards and implement.

All active network components (Layer 2 switches, Layer 3 switches with routing functionality) can be managed. These components are the network side via respective fiber optic cabling to each other. The network-side connection of terminal devices is also possible via fiber optic or via copper cabling to these network components.

In the expression for the class F125 is a two-level network architecture, which is divided into a backbone and access layer:

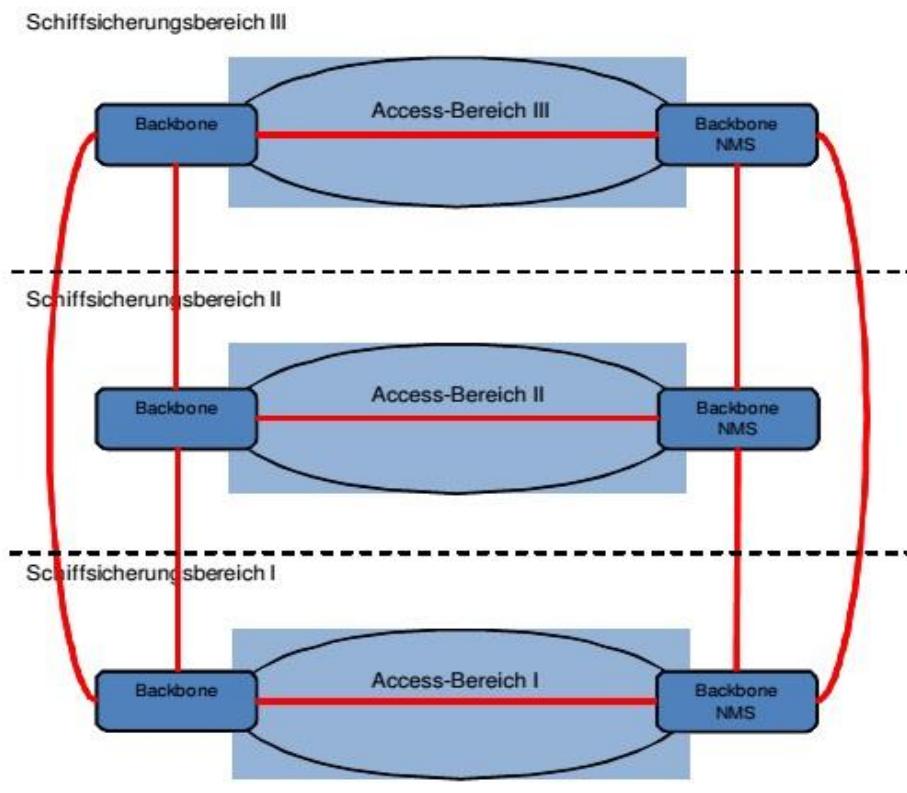


Abbildung 2-1: Netzwerkarchitektur INeS F125

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Depending vessel protection area are provided two backbone units, each containing a Layer 3 backbone switch and partly also a network management server (NMS). The backbone units are meshed with each other connected by means of 10Gbit fiber optic connections.

the associated access area is connected to the two backbone switches a vessel protection area:

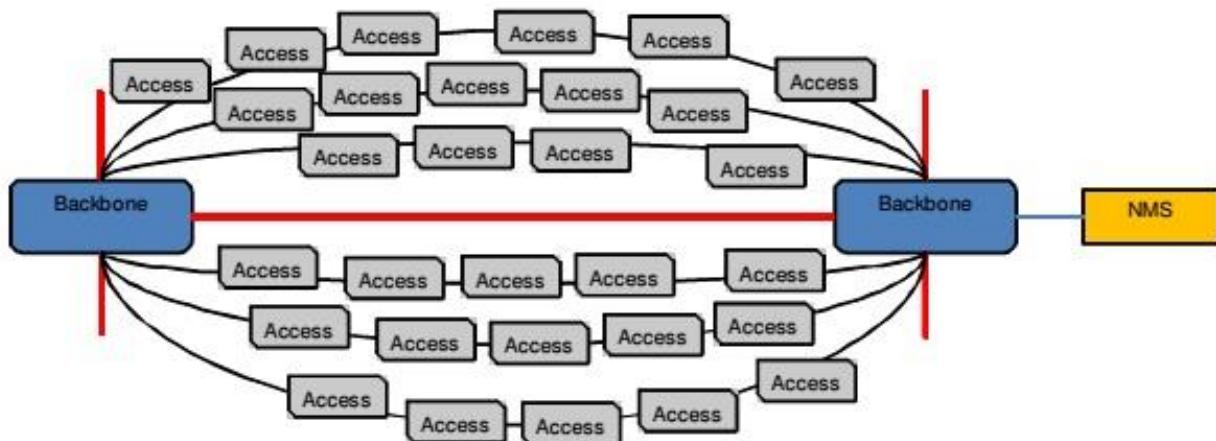


Abbildung 2-2: Architektur Access-Bereich

Figure 80: Architecture Access area

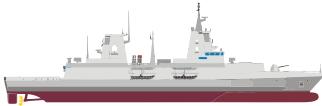
The access area by chains of Access Units (these include, inter alia, a respective access switch) realized. The connection of the chain links with each other and the connection of the chains to the backbone switches by means of Gigabit fiber optic connections.

Using the Rapid Spanning Tree Protocol (RSTP) are redundant paths disabled to activate them if necessary (if a connection fails or a component again). RSTP allows sufficient tree structures arise, each optimized paths in the network to the requirements of Ethernet.

all decentralized components (clients) are usually connected to the different systems (10 / 100Base-TX or 10 / 100Base-TX with PoE) to the Access Units. central components (server) are connected to the backbone units usually (10/100 / 1000Base-T, 100Base-FX or 1000Base-SX).

This architecture provides not only the required redundancy for a good distribution of the connecting ports on the ship (port density) with optimum cable management.

A total of 6 backbone switches, 3 network management servers and 150 access switches are widely available ship, which (for the connection of terminal devices 2100 connection port type 100Base-TX which 600 as

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

PoE ports executed) in the access layer and an additional 64 ports 10/100 / 1000Base-T and up to 80 optical fiber connection ports in the backbone Layer implement (see Figure 81: Schematic diagram compound of the POS server with the ILOAD servers)

A1 interface tasks

The interface between MSB and personal tracking system consists of the following components:

- Ethernet interface for two redundantly via fiber-connected POS servers with ILO management
- Ethernet interface for decentralized component space marks (259 pieces)
- Ethernet interface for managing notebook (5 POS network sockets)

The tasks and services that interface consist of:

- Available for communication between POS server space and brands make considering CoS
- Available for communication between the POS server and ILOAD make considering CoS

A2 network connection Physically

Connections to 1000Base-SX ports of the network are described as follows to make:

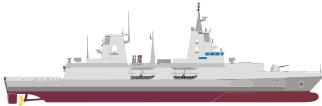
The connection is made by means of optical fiber breakout cable that has two or more multi-mode fibers (50/125 microns, OM3 +), from each of which a network connection for transmitting and one to be used for receiving data. The determination of the grain is done in consultation with the competent UAN. Unused fibers are to be sealed in an appropriate form so that they can be used if necessary later.

As a wavelength of the light used for the transmission of 850nm is set at 1000Base-SX.

The attenuation caused by the terminal-side Versteckerung should not exceed 0.3dB. The Versteckerung is also the responsibility of the subsequent system.

The responsibility in terms of Versteckerung and measurement is controlled as follows:

- The fiber optic cables between the backbone units of the MSB and the servers of the person tracking system can be assembled by the competent UAN and measured. The cables get cable numbers from the MSB number range and are listed in the MSB cable plan.
- the reversible Versteckerung as well as the measurement of the cable assemblies will be carried out as a provision of the consortium for the Cu CAT.6 cable between the backbone units of the MSB and the servers of the person tracking system. The cables obtained wire numbers from the number range of personal tracking system and displayed in the POS cable plan
- The space marks are connected directly to an Access Unit (no network socket). ANS mounted on the side of the room marks the Ethernet cable. The module mounting on the side of the Access Units carried out by the authorities responsible for network infrastructure UAN. The cables obtained Ka

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

belnummern from the number range of the personal tracking system and are represented in the POS cable plan.

- The network sockets are connected directly to an Access Unit. ANS mounted the network socket. The module mounting on the side of the Access Units carried out by the authorities responsible for network infrastructure UAN. The cables obtained wire numbers from the number range of personal location and are listed in the POS cable plan.

A3 network connection Logically

For the system personal tracking system (POS) is a logical segment (VLAN corresponding IEEEStandard 802.1Q) is defined in the MSB, which is considered far ship. This segment is assigned one IP subnet.

According VLAN properties per network connection port to be defined.

This, as well as cross-segment communication / or. from other segments (routing, access control lists) is realized according to the tables in the appendix.

prioritization

To allow a request equitable allocation of network resources to the connected systems and devices are made via corresponding entries in the tables attached the following information:

- Type of traffic (continuous uniform data rate, Irregular (high traffic bursts)) caused by the individual terminals
- The amount of the generated by the individual terminals average data traffic for an extended period considered
- Average duration of bursts
- Required minimum bandwidth
- Acceptability of packet loss (loss of Ethernet frames) requirements regarding the transmission times on the network (latency)

The statements on these issues are recorded from the perspective of the connected system in Annex 2 (column "type of traffic," "Average data rate", "duration of bursts", "burst repetition", "guaranteed minimum bandwidth," "criticality packet loss" "requirements for max. latency", "Priority mode").

According to this from all connected systems should be disclosed, the configuration of the network as regards the prioritization and / or reservation of bandwidth by the MSB occurs. The definition is in Appendix 2 (columns "guaranteed minimum bandwidth", "CoS priority") documents.

redundancy

For communication to other subnets in the terminals only one Gateway address must be configured. The gateway is the network side designed with multiple redundancy and is the in each case by a

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Backbone switches realized. In case of failure or unavailability of the active gateway (typically 1-2 seconds) within a few seconds takes place the acquisition of the corresponding function by another backbone switch. This is done automatically by the network. During this time there may be (loss of Ethernet frames) to packet loss.

Each switch of the network is connected to the remaining switches of the network via at least two different paths, one of which is active at a time. In case of failure of a component or a compound of the network is automatically activate the use of the redundant path. The switching time is in this case typically about one second. During this time, there may also be a packet duplication, or even changing the transmission order of each packet to packet loss (loss of Ethernet frames) and in rare cases.

The network segment of a vessel protection area is also working to loss of all connections to the backbone switches of the other vessel protection areas autonomously on. In this case, the communication between terminals within the / the separated vessel protection areas is generally further added under the given network configuration.

The basic function of the network (switching, routing, redundancy) is independent of the network management servers. The simple failure of a / the network management server results in no packet loss. Only bound to the network management server service (eg NTP, SNMPMonitoring, port monitoring) will no longer be available if necessary.

The general network service NTP, SNMP monitoring, and port monitoring are redundant.

There are two POS server in two different SSichBer. Installed. Each POS server has one connection each to two backbone units in the same SSichBer. The POS Server uses of the compounds for the data transmission and switches in case of failure of the active compound to the second compound.

send their tag information simultaneously to both POS server room all brands. Both POS servers are active on the network and have the same data.

It is thus redundancy at the device level, but not implemented at the network level.

safety

Each network connection port terminals in the tables in Annex A positive list with up to ten MAC addresses can be defined that will be accepted by the network. When this function for a port of the connection of a terminal with an invalid MAC address leads to a notification of network management (trap) and optionally also to block the ports.

The port status (up / down link Link) monitors with message appropriate changes to network management. In case of loss of a link, the port will be deactivated by the network management after a period of 0.5 seconds. This is indicated in accordance with the tables in the Appendix.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

logs

- At Layer 2, the Address Resolution Protocol (ARP) must be supported.
- Layer 3 Internet Protocol IPv4 to be used for the addressed data exchange.
- At Layer 4 TCP and / or UDP (Unicast / Broadcast) are to be used by the terminal for data transmission. Occasionally, a support IGMP and ICMP is required.

Appropriate definitions of the optional units will be made in the tables in Annex (Annex 2, column "ICMP" and "IGMP support").

A4 General Network Services

Network Time Protocol (NTP)

Within the network, an NTP service is implemented on any network management server. This synchronize to two Stratum 1 NTP server, the DDU and are also configured as peers (symmetric active / passive). Central components of connected subsystems can synchronize their clock via NTP with these three servers. Only in exceptional cases, this service may be used by distributed components.

For synchronization a Aufdatierungs frequenz less 64 seconds is not permitted. Support for authentication or encryption is not configured. The IP addresses of the NTP servers are outside the subnet of the connected subsystems. Accordingly, the communication is done via a provided by the network gateway. The required routing settings are also made through the network.

It is according to NTP Version 4 supports backward compatibility with clients of versions 3 and 2 the protocol.

If the NTP service of the MSB drifts more than 128ms from the UTC because of connection failure to navigation, it will wait for an hour to restore the connection until he synchronized his watch by stepping on navigation. Within a 128ms-range of services operating in the normal mode, which does not include any sudden changes of time.

The configuration of the NTP service of connected subsystems is the responsibility of these systems. This includes in particular dealing with major time differences to the time service of the MSB as a result of faults in the entire system.

Dynamic Host Configuration Protocol (DHCP)

The use of DHCP is for reasons of IT - not permitted safety. The MSB is no DHCPService for general use for IP address assignment available.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Network Monitoring

The network management system of the MSB can also monitor key components of connected systems in addition to the network's components. To this end, the following protocols can be used:

- ICMP (very simple form of monitoring) and / or
- SNMP v2

This is a pure monitoring the status of these components. A configuration via SNMP is not made.

The status inquiry via SNMP is based on changes to be in accordance with the system suppliers and registered with IANA Management Information Base (MIB). The generation of SNMP Traps from the central components is permitted. It is still the responsibility of the system supplier to install an appropriate agent to its central components to configure, operate and unlock the appropriate network interface. Authentication does not take place here in principle.

A5 communication interface (network layer)

In general (ie, after the initialization or reconfiguration) complied with the following parameters within the VLAN used within the MSB in normal operation:

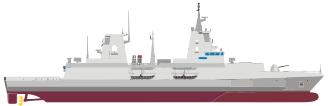
Packet transmission time <50ms

Jitter (delay variations) <20ms

Frequency of packet loss <3%

where exceeding the packet transmission time or jitter should be considered a packet loss.

Any additional interfaces and interface properties are described in the following subsections.

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

B Interface Description personal tracking system ILOAD

All relevant data is transmitted via the MSB to the ILOAD. In addition, the status information of the person tracking system (POS) (eg, the status of the tags and the space marks) are forwarded to the ILOAD and processed. About the ILOAD the personal tracking system (POS) can be disabled (eg EMCON). The need for evaluation states of doors and hatches are also transferred from ILOAD to the POS through this interface.

In case of failure of a network connection to the POS server, the redundant network connection is switched with the same IP without operator intervention. There is no failure or loss of information.

Both POS servers have the same data, but it only provides the master POS server its calculated values to the ILOAD systems. If a fault of the master POS server automatically the slave POS server provides the computed data to the ILOAD systems. This means that the slave POS server takes over the master POS server.

The defective POS server can only be classified as informative secure system after the initialization phase (reading all tags on Spatial brands) again. If at this time, another failure while the POS servers, no reliable evaluation of the data is possible.

As a result, the overall status of the POS is set to "inactive". There is a message to the ILOAD server. If this message fail due to a defect of both POS server, it is for the ILOAD, based on the lack of cyclically failures in the system (every 5 seconds) sent status message of the POS, this classified according to their discretion as "inactive".

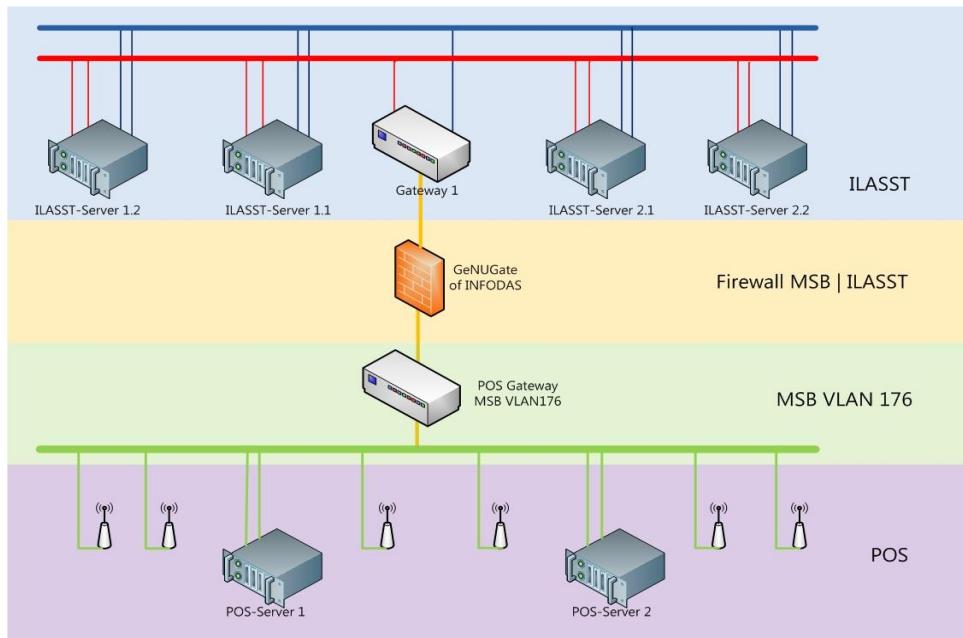
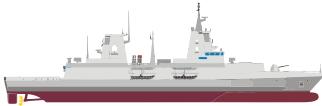


Figure 81: Block diagram, connecting the POS server with the ILOAD servers

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

B1 data communication between and POS ILOAD

The communication between the POS and the ILOAD via the two POS server. The active POSServer sends all information simultaneously in two of the four known ILOAD server.

There is also a communication from ILOAD system for both POS servers. This is required for a position display of tags to retrieve at a certain point in history, as well as for the transmission of status data of the doors and for the shutdown of Poss end modules.

News from ILOAD (status, radio silence, special evaluation) will be sent to both POS server.

All communication is done via the MSB to an Ethernet-based connection.

The couplings are established between fixed to defining ports and can be transmitted through gateways and firewalls.

The interface used is realized via the standard 'NMEA / UDP'. ('NMEA standard 0183' over UDP / IP; NMEA = National Maritime Electronics Association; formerly serial interface - now over UDP / IP).

B2 structure of the UDP / NMEA packages

The individual NMEA packets are packed together independently to one or more UDP packets from the two POS systems. They are then transferred to the ILOAD systems.

The UDP NMEA telegram looks like this:

DWORD	num	4 bytes
WORD	id	2 bytes
WORD	crc16	2 bytes
timespec	timestamp	8 bytes
DWORD	reserved1	4 bytes
DWORD	reserved2	4 bytes
BYTE	data	1280 bytes (maximum)

Only the first three and uses the last field. All others are to impose zero. The "num" field contains the number of the NMEA sentences (see below) in the field "data". It takes advantage of the maximum message size for sending the records. The "id" field is an identifier and is not currently used; this is filled with zero. The "crc16" field contains the checksum, the "data" field contains the actual NMEA sentences.

The unused fields are initialized to zero. In this way, the checksum can be easily computed or verified. The algorithm for calculating the checksum (in pseudo code):

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

```

WORD compute_crc16 (BYTE * str, int len) {

    BYTE bit = 0; BYTE
    accu = 0; WORD crc
    = 0;

    for (crc = 0xFFFF; len; len--, str++) {

        for (bit = 0x80; bit) {

            accu = crc & 0x8000? 0xFF 0x00; CRC = CRC
            << 1; accu ^= * str; if (accu & bit)

                crc ^= 0x1021; /* X ^ 16 + x ^ 12 + x ^ 5 + 1 */ / bit = bit
            >> 1; }}

        return crc; }

```

B3 interface 'standard 0183'

To replace the data NMEA IP / UDP "NMEA 0183" is used protocol. The NMEA 0183 interface is standardized. In NMEA 0183 ("listener") will be between devices which transmit data ("Talker"), and devices that receive data discriminated. While a sender can provide multiple recipients, a so-called multiplexer is necessary for the use of multiple transmitter for common receiver.

Data transfer is in small data units called 'NMEA Sentences', hereinafter referred to as "set". The number of characters per set is limited to 82nd

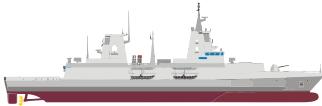
Multiple sets can be combined into a UDP datagram and are then referred to as NMEA telegram. The to be transmitted contents of the telegram is to a maximum of 1280 bytes in the "data" (see above, construction of the packets) limited; with the telegram header is maximized 1,304 bytes.

A set consists of readable ASCII characters and has the following basic structure of the user data in the datagram:

\$ Aaaa, c - c * hh <CR> <LF>

- \$** Start of the set
- aaaa** Set identification
- "** Field delimiter (Hex 2C)
- c - c** Payload data (if necessary with div. Additional field separators)
- *** Checksum separator (HEX 2A)
- hhhh** (Encoded ASCII 2-byte hexadecimal value) checksum
- <CR> <LF>** End of the sentence (HEX 0D 0A)

There are some predefined record formats in the standard that are intended for communication with navigation devices. But it is intended to agree for special purposes on special record formats between the coupling partners.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

B4 Central NTP time of POS systems

The "Network Time Protocol" (NTP) is a standard for synchronizing time across computer networks.

It was specifically designed to enable reliable timing over networks with variable packet runtime. NTP uses the connectionless UDP transport protocol.

The two POS server get the time from the parent MSB servers and act internally and for the connected management and diagnostic station as a time source. This ensures that the database entries with the central ship time take place.

The entire POS works with Coordinated Universal Time (abbreviated UTC). All database queries and evaluations are based on UTC.

B5 records

A cyclical transmission for each record type is done with the defined in the table repeat rate for the number of tags for each sector, and the status of space brands and sector boundaries. Changes are shipped with the resulting dependencies immediately (1-2Sekunden). Other phrases (eg TAG status) are sent in a significantly slower cycle.

The following information is exchanged between the POS and ILOAD:

record	transmitter	cycle	description
PANSSR	POS	If changes immediately (1-2 seconds), otherwise every 5 minutes (programmable)	Overall status of the room brands
PANSSS	POS	If changes immediately (1-2 seconds), otherwise every 5 minutes in the offset to PANSSR (programmable)	Overall status of the sector boundaries
PANSHS	POS	N / A	Overall status of the sector boundaries (historic)
PANSSY	POS	5 seconds	Overall status of the system
PANSST	POS	If changes immediately (1-2 seconds), otherwise every 5 minutes in the offset to PANSSS (programmable)	Overall status of the TAGs
PANSPT	POS	If changes immediately (1-2 seconds), otherwise every 5 minutes (programmable)	Number of tags (sector)
PANSHT	POS	N / A	Number of tags (Sector (historical))
PANSZA	ILOAD	N / A	Time special evaluation freely defined by the user (within the last 24 hours)
PANSFU	ILOAD	N / A is sent 3 times	Silence with all POS server space marks and tags
PANSTS	ILOAD	Adjustable / immediately	Status of the doors and hatches from ILOAD

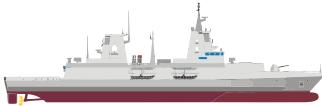
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	Date: 11/08/2017 Revision: 1.6	

Table 1: List of NMEA sentences used between POS and ILOAD

B6 communication POS • ILOAD

The information listed below will be passed cyclically to the four ILOAD server.

Status room brands

\$ PANSSR, RAU, y * hh <CR> <LF>

A	BC	

field	format	surname	description
A	PANSSR	Set identification	Overall status of the room brands
B	ROUGH	room brand	Space tag number RAU = 1-259 number of the room brand For single-digit or double-digit numbers: without leading zeros.
C	y	Room brand status	y = 0 no disturbance is due to y = 1 error (alarm)

Status sector boundaries

\$ PANSSS, SEK, y * hh <CR> <LF>

A	BC	

field	format	surname	description
A	PANSSS	Set identification	Overall status of the section
B	SEK	sector	Sector boundaries numbers SEK = 1-200 number of sectors For single-digit or double-digit numbers: without leading zeros.
C	y	Sector boundaries Status	Status of the sector boundary y = 0 no disturbance is due to y = 1 Malfunction

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Status sector boundaries (historical)

\$ PANSHS, YYYY.MM.DD, hhmmss, SEK, y * hh <CR> <LF>

A	B	C	DE	

field	format	surname	description
A	PANSHS	Set identification	Overall status of the section
B	YYYY.MM.DD	Date historic special evaluation of ILOAD	Year, month, day in UTC The requested from ILOAD date is evaluated by the POS and then returned to the ILOAD.
C	hhmmss	Time of historic special evaluation of ILOAD	Hour, minute, second in UTC The requested from ILOAD time is evaluated by POS, and returned to the ILOAD.
D	SEK	sector	Sector boundaries numbers SEK = 1-200 number of the section For single-digit or double-digit numbers: without leading zeros.
e	y	Sector boundaries Status	Status of the sector boundary y = 0 no disturbance is due to y = 1 Malfunction

The POS sends NMEA sentences of this type only in response to a corresponding request message (section B7, Sonderauswertung'). Each request a special evaluation is answered this type with a full set NMEA sentences which completely describes all the sector boundaries (historic).

system status

\$ PANSSY, u, v, w, x, SUM, SUM 1, y * hh <CR> <LF>

A	BC	DE	FGH	

field	format	surname	description
A	PANSSY	Set identification	Overall status of the system

F125 frigate	Technical Documentation personal tracking system	
		Date: 11/08/2017 Revision: 1.6

field	format	Surname	description
B	u	SYS 'system status	<p>System status of the entire POS</p> <p>u = 0 no disturbance is due to</p> <p>u = 1 disorder</p>
C	v	, POS1 'Server Status	<p>Status of the POS server 1</p> <p>v = 0 no disturbance is due to</p> <p>v = 1 disorder</p> <p>v = 2 Initialization of the POS 1</p>
D	w	, POS2 'Server Status	<p>Status from the POS server 2</p> <p>w = 0 no disturbance is due to</p> <p>w = 1 Malfunction</p> <p>w = 2 Initialization of the POS 2</p>
e	x	FUN 'radio silence	<p>Status of silence</p> <p>x = 0 Radio silence made (POS -> ILOAD)</p> <p>x = 1 Radio silence canceled (POS -> ILOAD)</p> <p>x = 2 Radio silence disturbed (POS -> ILOAD, alarm)</p>
F	SUM	Total number of TAGs	<p>Total number of logged-on tags</p> <p>SUM = 0-450</p> <p>For single-digit or double-digit numbers: without leading zeros.</p>
G	SUM 1	Number of missing TAGS	<p>Total number of missing tags</p> <p>SUM = 0-450</p> <p>For single-digit or double-digit numbers: without leading zeros.</p>
H	y	INIT POS	<p>Request the handover of the ship status ILOAD</p> <p>y = 0 Normal operation ILOAD</p> <p>y = 1 Request the overall status (POS> ILOAD)</p> <p>ILOAD transmitted to this request the complete status of silence and doors to ensure a secure start-up of POS.</p>

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

The POS will assume the "Init" mode radio silence and not issue broadcasting license for the space marks and tags when a message type PANSFU with content received "no radio silence" from ILOAD.

status DAY

\$ PANSST, TAG, u, v, w * hh <CR> <LF>

A	B	CDE

field	format	Surname	description
A	PANSST	Set identification	Overall status of the TAGs
B	DAY	TAG number	TAG number TAG = 1- 450 ID of the tag For single-digit or double-digit numbers: without leading zeros.
C	u	, TAGS 'TAG status	Status of the TAG u = 0 no disturbance is due to u = 1 Disorder (alarm in ILOAD)
D	v	, TAGB 'DAY battery status	Battery status of the TAG v = 0 no disturbance is due to v = 1 Battery is LOW (warning in ILOAD)
e	w	, TAGM 'TAG sighting	When was the last seen DAY w = 0 tag is located and booked w = 1 missing TAG (about 12 hours) (Alarm in ILOAD) w = 2 TAG was 6 (default) read hours from any room brand. (Warning in ILOAD) w = 3 TAG is booked

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

Number of tags in the sector

\$ PANSPT, SEK, yyy, z * hh <CR> <LF>

| | | |

A BCD

field	format	surname	description
A	PANSPT	Set identification	Number of tags in the sector
B	SEK	sector	sector number SEK = 1-78 Number of section For single-digit or double-digit numbers: without leading zeros.
C	yyy	Number of tags in the sector	Number of tags in the sector yyy = 0-450 number in the sector For single-digit or double-digit numbers: without leading zeros.
D	z	sector status	Status of the sector Is a sector inactive, the located there number of persons assigned to the dahinter- / underlying sector z = 0 Inactive z = 1 active

Number of tags in the sector (historically)

\$ PANSHT, YYYY.MM.DD, hhmmss, SEK, yyy, z * hh <CR> <LF>

| | | | | |

A B C DEF

field	format	surname	description
A	PANSHT	Set identification	Number of tags in the sector
B	YYYY.MM.DD	Date at special evaluation of ILOAD	Year, month, day in UTC The requested from ILOAD date is evaluated by the POS and then returned to the ILOAD.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

field	format	Surname	description
C	hhmmss	Time for the special analysis of ILOAD	Hour, minute, second in UTC The requested from ILOAD time is evaluated by POS, and returned to the ILOAD.
D	SEK	sector	sector number SEK = 1-78 Number of section For single-digit or double-digit numbers: without leading zeros.
e	yyy	Number of tags in the sector	Number of tags in the sector yyy = 0-450 number in the sector For single-digit or double-digit numbers: without leading zeros.
F	z	sector active	Is a sector inactive, the located there number of persons assigned to the dahinter- / underlying sector 0 = inactive 1 = active

The POS sends NMEA sentences of this type only in response to a corresponding request message (Section B7, special evaluation'). Each request a special evaluation is answered with a full set NMEA sentences of this type, the tags in the sector is describing all numbers (historical).

B7 communication ILOAD • POS

special evaluation

The information listed below may be given for a special evaluation of ILOAD to both POS server.

It is possible to make a user-defined time within the last 24 hours to display on the ILOAD. The ILOAD is using the following sentence a request for the desired point in history to the POS server. The command for such a special evaluation is sent once from ILOAD and answered by the person tracking system as unique with a complete set, historical 'data.

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

\$ PANSZA, YYYY.MM.DD, hhmmss * hh <CR> <LF>

| | |
A B C

field	format	Surname	description
A	PANSZA	Set identification	Time-defined special evaluation of the TAGs, room brands, system status, sections
B	YYYY.MM.DD	Date special evaluation of ILOAD	Year, month, day in UTC
C	hhmmss	Time of the special evaluation of ILOAD	Hour, minute, second in UTC

radio silence

\$ PANFU, A * hh <CR> <LF>

| |
A B

field	format	Surname	description
A	PANFU	Set identification	Silence with all POS Server
B	A	Radio silence to all room marks and tags	A = 0 no radio silence A = 1 Funkstille

door status

\$ PANSTS, TS, A * hh <CR> <LF>

| | |
A BC

field	format	Surname	description
A	PANSTS	Set identification	Status of the doors and hatches from ILOAD
B	TS	door number	Doors / hatch numbers Number range for the doors / hatches (1 - 99) For single-digit numbers: no leading zeros.
C	A	door status	door status A = 0 ON A = 1 TO

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

B8 list of all doors and hatches:

room	TST	ILOAD object ID	designation
Funk (equipment) space	1	4681_810	WATERPROOF K LAPPTUER-09D0
OPZ	2	4681_648	WATERPROOF K LAPPTUER-10B20.2
CTG	3	4681_803	WATERPROOF LUKE FHD REAR 2
bridge	4	4681_676	WATERPROOF K LAPPTUER-10D20.1
	5	4681_677	WATERPROOF K LAPPTUER-10D20.2
Mast Module aft u. RAM / MAS equipment room	6	4681_811	WATERPROOF K LAPPTUER-05C4
	7	4681_844	WATERPROOF K LAPPTUER-05D0
	8th	4681_816	WATERPROOF K LAPPTUER-06F0
	9	4681_727	WATERPROOF LUKE FGD06
Mast module front	10	4681_832	WATERPROOF K LAPPTUER-10E0
	11	4681_833	WATERPROOF LUKE FJD10
hangar StB	12	4933_008	hangar StB
hangar BB	13	4933_003	hangar BB

Table 2: List of the agreements between the POS and ILOAD door codes

B9 list of all Space brands

ANS day	Siemens days	localization	Systemnr.
030	3784_460		3784003A030
031	3784_461		3784003A031
034	3784_462		3784003A034
035	3784_463		3784003A035
036	3784_464		3784003A036
078	3784_465		3784003A078
033	3784_466		3784003A033
079	3784_467		3784003A079
080	3784_468		3784003A080
037	3784_469		3784003A037

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

ANS day	Siemens days	localization	Systemnr.
032	3784_470		3784003A032
038	3784_471		3784003A038
084	3784_472		3784003A084
081	3784_473		3784003A081
082	3784_474		3784003A082
083	3784_475		3784003A083
145	3784_476		3784003A145
085	3784_477		3784003A085
129	3784_478		3784003A129
130	3784_479		3784003A130
257	3784_480		3784003A257
064	3784_481		3784003A064
135	3784_482		3784003A135
136	3784_483		3784003A136
137	3784_484		3784003A137
138	3784_485		3784003A138
191	3784_486		3784003A191
021	3784_487		3784003A021
023	3784_488		3784003A023
044	3784_489		3784003A044
131	3784_490		3784003A131
132	3784_491		3784003A132
133	3784_492		3784003A133
134	3784_493		3784003A134
141	3784_494		3784003A141
142	3784_495		3784003A142
189	3784_496		3784003A189
190	3784_497		3784003A190
259	3784_498		3784003A259
012	3784_499		3784003A012
039	3784_500		3784003A039
001	3784_501		3784003A001
255	3784_502		3784003A255
002	3784_503		3784003A002
040	3784_504		3784003A040
088	3784_505		3784003A088

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

ANS day	Siemens days	localization	Systemnr.
139	3784_506		3784003A139
086	3784_507		3784003A086
087	3784_508		3784003A087
089	3784_509		3784003A089
186	3784_510		3784003A186
192	3784_512		3784003A192
140	3784_513		3784003A140
222	3784_514		3784003A222
231	3784_515		3784003A231
052	3784_516		3784003A052
048	3784_517		3784003A048
091	3784_518		3784003A091
003	3784_519		3784003A003
004	3784_520		3784003A004
065	3784_521		3784003A065
258	3784_522		3784003A258
046	3784_523		3784003A046
256	3784_524		3784003A256
090	3784_525		3784003A090
092	3784_526		3784003A092
093	3784_527		3784003A093
094	3784_528		3784003A094
221	3784_529		3784003A221
193	3784_530		3784003A193
005	3784_531		3784003A005
195	3784_532		3784003A195
215	3784_533		3784003A215
216	3784_534		3784003A216
217	3784_535		3784003A217
218	3784_536		3784003A218
232	3784_537		3784003A232
143	3784_538		3784003A143
147	3784_539		3784003A147
148	3784_540		3784003A148
053	3784_541		3784003A053
095	3784_542		3784003A095
149	3784_543		3784003A149

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

ANS day	Siemens days	localization	Systemnr.
194	3784_544		3784003A194
219	3784_545		3784003A219
220	3784_546		3784003A220
008	3784_547		3784003A008
009	3784_548		3784003A009
010	3784_549		3784003A010
050	3784_550		3784003A050
011	3784_551		3784003A011
049	3784_552		3784003A049
096	3784_553		3784003A096
097	3784_554		3784003A097
098	3784_555		3784003A098
196	3784_556		3784003A196
197	3784_557		3784003A197
150	3784_558		3784003A150
151	3784_559		3784003A151
056	3784_560		3784003A056
102	3784_561		3784003A102
152	3784_562		3784003A152
153	3784_563		3784003A153
198	3784_564		3784003A198
013	3784_565		3784003A013
051	3784_566		3784003A051
054	3784_567		3784003A054
069	3784_568		3784003A069
014	3784_569		3784003A014
055	3784_570		3784003A055
099	3784_571		3784003A099
100	3784_572		3784003A100
101	3784_573		3784003A101
024	3784_574		3784003A024
199	3784_575		3784003A199
041	3784_576		3784003A041
201	3784_577		3784003A201
202	3784_578		3784003A202
154	3784_579		3784003A154
155	3784_580		3784003A155
157	3784_581		3784003A157

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

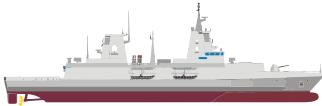
ANS day	Siemens days	localization	Systemnr.
158	3784_582		3784003A158
156	3784_583		3784003A156
160	3784_584		3784003A160
165	3784_585		3784003A165
188	3784_586		3784003A188
015	3784_587		3784003A015
016	3784_588		3784003A016
057	3784_589		3784003A057
058	3784_590		3784003A058
103	3784_591		3784003A103
104	3784_592		3784003A104
105	3784_593		3784003A105
106	3784_594		3784003A106
164	3784_595		3784003A164
200	3784_596		3784003A200
107	3784_597		3784003A107
203	3784_598		3784003A203
204	3784_599		3784003A204
067	3784_600		3784003A067
225	3784_601		3784003A225
226	3784_602		3784003A226
227	3784_603		3784003A227
223	3784_604		3784003A223
166	3784_605		3784003A166
167	3784_606		3784003A167
234	3784_607		3784003A234
022	3784_608		3784003A022
060	3784_609		3784003A060
061	3784_610		3784003A061
144	3784_611		3784003A144
240	3784_612		3784003A240
018	3784_613		3784003A018
059	3784_614		3784003A059
111	3784_615		3784003A111
168	3784_616		3784003A168
205	3784_617		3784003A205
175	3784_618		3784003A175
260	3784_619		3784003A260

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

ANS day	Siemens days	localization	Systemnr.
108	3784_620	Gang_09Z00_RM1	3784003A108
109	3784_621	Gang_09Z00_RM2	3784003A109
224	3784_622	Gang_09Z00_RM3	3784003A224
110	3784_623	UO_M_Messe_09Z02	3784003A110
043	3784_624	Gang_04Z00	3784003A043
233	3784_625	Küchenschleuse_09Z15	3784003A233
206	3784_626	Gang_10B10_RM1	3784003A206
208	3784_627	Gang_10B10_RM2	3784003A208
209	3784_628	Gang_10B10_RM3	3784003A209
228	3784_629	Gang_10C00_RM	3784003A228
247	3784_630	Luftschleuse_RM1	3784003A247
250	3784_631	Luftschleuse_RM2	3784003A250
251	3784_632	Luftschleuse_RM3	3784003A251
252	3784_633	Luftschleuse_RM4	3784003A252
253	3784_634	Luftschleuse_RM5	3784003A253
254	3784_635	Luftschleuse_RM6	3784003A254
236	3784_636	Bruecke_RM1	3784003A236
237	3784_637	Bruecke_RM2	3784003A237
238	3784_638	Bruecke_RM3	3784003A238
239	3784_639	Bruecke_RM4	3784003A239
244	3784_640	Bruecke_RM5	3784003A244
245	3784_641	Bruecke_RM6	3784003A245
246	3784_642	Bruecke_RM7	3784003A246
070	3784_643	Gang_10H00_RM1	3784003A070
169	3784_644	Gang_10H00_RM2	3784003A169
170	3784_645	Gang_10H00_RM3	3784003A170
171	3784_646	Offz_Messe_Schiffslazarett_Verb_platz_RM1	3784003A171
017	3784_647	Kaeltemaschinenraum_vorne_RM1	3784003A017
146	3784_648	E-Werk_X_10S00_RM4	3784003A146
249	3784_649	Kaeltemaschinenraum_vorne_RM2	3784003A249
062	3784_650	Treppenhaus_10P03_RM1	3784003A062
115	3784_651	Treppenhaus_10P03_RM2	3784003A115
019	3784_652	E-Werk_X_RM1	3784003A019
068	3784_653	E-Werk_X_RM2	3784003A068
241	3784_654	E-Werk_X_RM3	3784003A241
020	3784_655	Notausstiegsschacht_10S02_RM1	3784003A020
063	3784_656	Notausstiegsschacht_10S02_RM2	3784003A063
112	3784_657	Gang_10Z00_RM1	3784003A112

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

ANS day	Siemens days	localization	Systemnr.
113	3784_658	Gang_10Z00_RM2	3784003A113
114	3784_659	Gang_10Z00_RM3	3784003A114
172	3784_660	Schiffstechnischer_Leitstand_05Z01_RM2	3784003A172
116	3784_661	Treppenhaus_10Z04_RM1	3784003A116
173	3784_662	Treppenhaus_10Z04_RM2	3784003A173
207	3784_663	Treppenhaus_10Z04_RM3	3784003A207
229	3784_664	Treppenhaus_10Z04_RM4	3784003A229
235	3784_665	Treppenhaus_10Z04_RM5	3784003A235
117	3784_666	PUO_Messe_1_10Z02_RM	3784003A117
045	3784_667	Konditions_und_Fitnessraum_11B04_RM1	3784003A045
047	3784_668	Konditions_und_Fitnessraum_11B04_RM2	3784003A047
212	3784_669	Konditions_und_Fitnessraum_11B04_RM3	3784003A212
213	3784_670	Konditions_und_Fitnessraum_11B04_RM4	3784003A213
214	3784_671	Konditions_und_Fitnessraum_11B04_RM5	3784003A214
210	3784_672	Zitadellenschleuse_11B05_RM1	3784003A210
211	3784_673	Zitadellenschleuse_11B05_RM2	3784003A211
174	3784_674	Gang_11H00_RM2	3784003A174
176	3784_675	Gang_11H00_RM1	3784003A176
071	3784_676	Treppenhaus_11P01_RM1	3784003A071
120	3784_677	Treppenhaus_11P01_RM2	3784003A120
161	3784_678	Treppenhaus_11P01_RM3	3784003A161
177	3784_679	Treppenhaus_11P01_RM4	3784003A177
072	3784_680	Schalttafelraum_vorne_RM1	3784003A072
159	3784_681	Schalttafelraum_vorne_RM2	3784003A159
248	3784_682	Schalttafelraum_vorne_RM3	3784003A248
025	3784_683	Hilfsmaschinenraum_XI_RM1	3784003A025
026	3784_684	Hilfsmaschinenraum_XI_RM2	3784003A026
118	3784_685	Gang_11Z00_RM1	3784003A118
119	3784_686	Gang_11Z00_RM2	3784003A119
121	3784_687	Offz_Kammer_RM	3784003A121
042	3784_688	Artillerie_und_Handwaffen_Werkstatt_12B03	3784003A042
006	3784_689	Gang_12H00_RM1	3784003A006
178	3784_690	Gang_12H00_RM2	3784003A178
179	3784_691	Gang_12H00_RM3	3784003A179
243	3784_692	Gang_12P00_RM1	3784003A243
007	3784_693	Hilfsmaschinenraum_XII_RM1	3784003A007
027	3784_694	Hilfsmaschinenraum_XII_RM2	3784003A027
066	3784_695	Hilfsmaschinenraum_XII_RM3	3784003A066

F125 frigate	Technical Documentation personal tracking system	
	Date: 11/08/2017 Revision: 1.6	

ANS day	Siemens days	localization	Systemnr.
242	3784_696	Hilfsmaschinenraum_XII_RM4	3784003A242
028	3784_697	Treppenhaus_12S03_RM1	3784003A028
073	3784_698	Treppenhaus_12S03_RM2	3784003A073
122	3784_699	Treppenhaus_12S03_RM3	3784003A122
180	3784_700	Treppenhaus_12S03_RM4	3784003A180
074	3784_701	Luftschleuse_12Z00	3784003A074
123	3784_702	Gang_12Z05_RM1	3784003A123
124	3784_703	Gang_12Z05_RM2	3784003A124
125	3784_704	Gang_12Z05_RM3	3784003A125
183	3784_705	127_mm_Geräteraum_13H01_RM1	3784003A183
184	3784_706	127_mm_Geräteraum_13H01_RM2	3784003A184
185	3784_707	127_mm_Geräteraum_13H01_RM3	3784003A185
182	3784_708	ASG_Werkstatt_13H02	3784003A182
181	3784_709	Zitadellenschleuse_13H04_RM1	3784003A181
163	3784_710	127mm_Munitionskammer_Geschosse_13P00	3784003A163
076	3784_711	Notausstiegsschacht_13P02_RM	3784003A076
077	3784_712	127mm_Munitionskammer_Treibladungen_XIII_RM1	3784003A077
126	3784_713	XIII Notausstiegsschacht P	3784003A126
029	3784_714	Hilfsmaschinenraum_XIII_RM	3784003A029
075	3784_715	127mm_Munitionskammer_und_Beladeraum_RM1	3784003A075
127	3784_716	127mm_Munitionskammer_und_Beladeraum_RM2	3784003A127
162	3784_717	127mm_Munitionskammer_und_Beladeraum_RM3	3784003A162
128	3784_718	127mm_Munitionskammer_Treibladungen_XIII_RM1	3784003A128
230	3784_719	127mm_Munitionskammer_Treibladungen_XIII_RM2	3784003A230