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| Imtech NavVision AMCS Engineers Guideline | |
| Automation Competence Center | |
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[2] ACC-NavVision-Operators-Manual v1.6.16

[3] ACC-NavVision-Duty-Alarm-Manual v1.2.10

[4] ACC-NavVision-licenses-Manual v1.2.20

[5] ACC-NavVision-AMCS-HMI-Spec v1.1.19

[6] ACC-Mimic-Manual v1.2.18

[7] ACC-NavVision-Sensorlist-Manual v1.7.16

[8] ACC-SoftPLC-Manual v1.4.18

Introduction

The Imtech NavVision AMCS Engineers Guideline is meant to be a reference book for engineers. It is divided into separate chapters. It will be possible to start a project from scratch and work it all the way through, but also an engineer can be assigned to a specific task in the chain and just take this reference book as help for that specific task.

About the engineers guideline

This manual contains the following sections:

* Section “Starting a project” will elaborate on things you have to check before you start a project. With checklists and flowcharts we will try to set a base for gathering all the necessary information
* Section “Topology” will discuss what order to use when starting a project. How to set up the project with information about the “scope of supply” and where to look at.
* Section “Devicelist” shows the workflow for the devicelist. What do you need to know, what do you need to do.
* Section “Sensorlist” will narrow down the composition of the I/O system as well as create a standard for the LDS and further.
* Section “Mimic” will discuss the way how to make and assign mimics combined with all the knowledge gathered in the earlier sections.
* Section “ACS” will be helpful with composing the ACS
* Section “FAT” shows what needs to be finished before the FAT and what to test before the FAT takes place.

 : For specific information on interfaces, but also in depth information on here mentioned features, as well as here not mentioned features, we refer you to the specific manuals from NavVision that can be obtained through Imtech.Abbreviations list

ACS Automated Control Sequence

AI Analog Input

AM(C)S Alarm Monitoring (and Control) System

AO Analog Output

COM Communication

DAP Duty Alarm panel

DI Digital Input

DO Digital Output

ID Identification

I/O Input/Output

LAN Local Area Network

LPU Local Processing Unit

NMEA National Marine Electronics Association

OWS Operator Work Station

Safety instructions

 *This section provides only a summary of the safety requirements and notes in the following sections. To protect your health and prevent damage to the AM(C)S equipment or vessel, it is essential to read and carefully follow the safety instructions.*

The indications NOTE, CAUTION and WARNING have the following significance:

*NOTE:  
An operating procedure, practice or condition etc., which it is important to emphasize.*

*CAUTION:*

*An operating procedure, practise or condition etc., which, if not strictly observed, may damage AM(C)S equipment or crash NavVision software.*

*WARNING:*

*An operating procedure, practise or condition etc., which, if not carefully observed may result in personal injury or damage to the vessel.*

Revision history

Revisions issued since publication.

|  |  |  |  |
| --- | --- | --- | --- |
| **Issue** | **Date** | **Revision** | **Reason** |
| 1.1.21 | March 12, 2014 |  | initial release |

# Starting a project

## Introduction

When an order is effectuated it will be the sales department that makes the handover of the project to the engineers. In most cases it will be in conjunction with more systems of Imtech, so there will be a project manager and/or a technical coordinator who will be responsible for the overall task. In most cases the sales department will hand over the order to these people. If not in conjunction it will be directly handed over to the responsible engineer.

## Hand over

The order will be handed over at the moment that the sales department has a confirmation of sales. At that point the hand over will consist of the following:

* Order confirmation
* Calculation sheet
* Potential extra work (can be new protocols, etc.)

At this point the interference of the sales department will stop and the engineers will start the process of information gathering with the client. In case there is a project manager or a technical coordinator, this will be done in close cooperation with them.

## Workflow

Handover

Who’s in charge

Project management

Engineer

Gathering information

Figure 1‑1: handover workflow

## Gathering information

Regardless of who is in charge, the information that has to be gathered is the same. The only difference is the department that takes care of the gathering.

As the sales department will have discussed a great deal with the customer, the first item you will have to look at are the order form, the calculation sheet and the list with extra work that the sales agreed upon with the customer. These starting points are to be used to set up the basic system to check on any anomalies and/or give feedback to the customer on the possibilities.

The best way to start is by making a single line drawing in Visio. This way you can check if the network is uninterrupted, that all interfaces are there, that the crucial parts of the system are divided over multiple areas so you don’t get a single point of failure, etc. it’s essential that you start this process as soon as possible. By addressing this in an early state you get rid of the discussions later on in the process where the customer has certain expectations that can’t be fulfilled and/or it will prevent Imtech from losing money on the project. ***Appendix A*** will give you a checklist on everything you need to check upon. Also look at **Chapter 2** on how to start with the topology.

## Procurement

As the checklist is finished, you need to contact purchase to buy all the equipment. Make sure that you give them all the details on serial numbers, part numbers and all other relevant information, so they can buy the right equipment. Keep in close contact with them to make sure that the order will be purchased within the time that is determined to start the project. Loosing time on purchase will decrease the time you can work on the system, which will eventually give a huge time pressure to finish the order in the time that was agreed upon at the moment of selling the order. Also make sure that any delay is always communicated with the customer in an early stage to prevent any miscommunication on the delivery date. ***Appendix B*** will provide you with a purchase order that you can use to write down all necessary information for the purchase department.

# Topology

## Introduction

The topology comprises everything that is in the scope of supply. This stipulates the hardware part of the scope. So every PC, interface and other peripheral is part of this. While the software is part of the scope, as well as protocols etc. it is not to be dedicated as part of the topology. So for setting up the system, we will start with putting together all the hardware that we have and connect them with the right cables. We do this on paper in a so called “single line drawing”.

## Single line drawing

Before starting to draw this in Visio, it would be better to make a sketch on a piece of paper. That way you can check and change the drawing quickly. It is important that you make a clear as possible drawing, so you can check on anomalies. An example as shown in Figure 2‑1 will be the best way to do this.

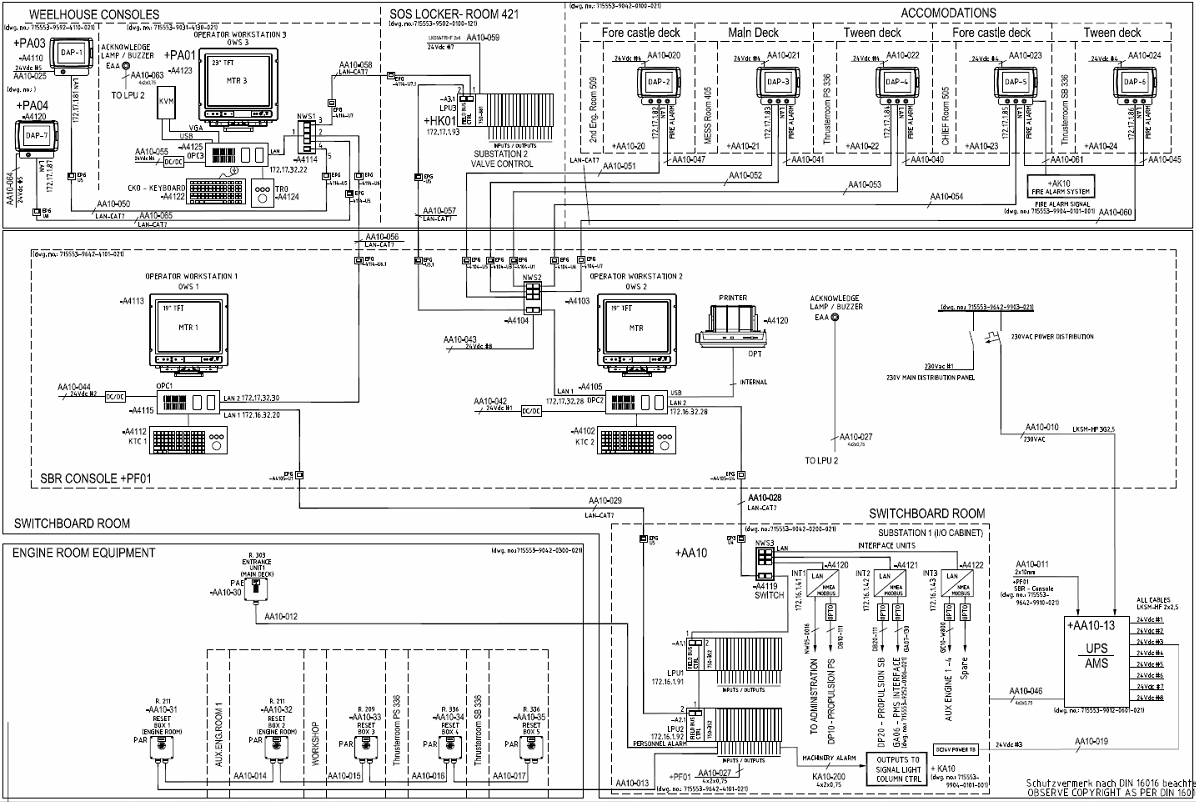


Figure 2‑1: Single line drawing

With this drawing you can check the following items:

* Are all the items in the scope of supply available
* Is the network circle closed and alright
* Are there any “single points of failure”
* Is the whole network reachable from all directions

The following points need to be taken into consideration when checking the topology.

|  |  |  |
| --- | --- | --- |
| Attention point | Explanation |  |
| Single point of failure | It is advisable that the single point of failure is diminished to an absolute minimum. For example, every time we use the Wago PLC 750-881 we need to use both lan-ports so the PLC will become part of the network-ring. Also all the servers need to be in the network-ring. | |
| IP-ranges and IP-conflicts | By checking the network-ring, you can see if all the IP-ranges are well divided. Also it is possible to see if any conflict is imminent. Make sure the main I/O can be reached from all the servers. | |
| Spreading | See if I/O from the same group are well divided over different interfaces, so in case one interface failed, not all the I/O in that group will be lost at the same time. | |
| Protocols | Check which protocols are needed by looking at the drawing and check them against the scope of supply. | |
| Special | IP-cameras take up a lot of network traffic. If possible place the connection on a separate IP-range, away from the main I/O.  Servers need to be separated lateral by watertight bulkhead. If on a different deck, they, at least, have to be separated by a fire retardant floor.  Also check that not all the servers are below the waterline. | |

Table 2‑1: Attention points

## Checking the purchase order

Now that you have it clear how the topology will be, it is best to check the purchase order again (or, for the first time, make it from this point). Things might have changed, so you need to change this in the order as soon as possible. The right workflow will be shown in **Figure 2‑2**. Notice that the moment you see that the topology is not in order, you report back to the manager in charge, whether this is the engineer self or the project manager. Make sure that you fill in the checklist in ***Appendix C***.

## Building the topology

As soon as the main supply of articles has arrived you can start building the typology physically. This can be done by yourself for all the items that are not build into a combined cabinet, or it will be done in the workshop. Either way, pay close attention that it is setup the right way. The sooner you find small errors in the topology, the faster it will be solved.

## Divers setups

In advance there are multiple devices that need to be set up. These devices are to be set up with proprietary software from FT NavVision or with additional settings to make them comply with our standards.

The workstations (pc’s) need to be installed with Windows embedded. This is done by shooting an image on the pc. The BIOS has to be set and small adjustments to other settings has to be made. This is described in the

**ACC-NavVision-AMCS-Embedded-Deployment-manual**.

The Duty Alarm Panels (DAP) need to be installed with the right software to make them compatible with the AMCS system. This is described in the

**ACC-NavVision-DAP-Commissioning-Manual.**

The Ethernet J1939 interface (ICP I-7540D-G) needs to be set up with the right IP-address. This is described in the

**(FTI06026) Software Installation Manual - Ethernet J1939 interface.**

The serial to Ethernet interface (MOXA-UC-7110-LX) needs to be set up with the right software and additional logic. This is described in the

**(FTI06020) Software Installation Manual - Moxa serial interface.**

The Axis IP camera server (P7214) needs to be set up for the system. This is described in the

**(FTI06019) Software Installation Manual - Axis IP camera.**

No

No

Yes

Handover

Who’s in charge

Project management

Engineer

Gathering information

Checking Topology

Topo

Alright

Devicelist

Figure 2‑2: Workflow Topology

# Devicelist

## Introduction

The devicelist is part of the sensorlist and as such described in the

**ACC-NavVision-Sensorlist-Manual v1.7.16.**

This chapter will guide you through the pitfalls and attention points that you need to be aware of when working with the devicelist.

## Checking

There are a few items that you need to check when working on the devicelist. These are very important parts of the devicelist which need special attention.

For all items in the devicelist, you can find additional information in the respective manuals. For example if you connect a Faget EM4000 to a MOXA you can find the following information in the manual:

Speed 9600 Baud or 19200 Baud

Datalink N,8,1

Hardware RS485H

Options DTR,RTS,RTU,MSBFirst,LSWFirst,Interval=500,Timeout=500

These items need to be placed in the devicelist. The same goes for many other interfaces or protocols. Make sure you look them up in the manuals.

Make sure you use the right protocol, interface and port and source. If, for example, a MOXA is used, you need to select the protocol that is connected to that specific port. Also you need to select the interface (i.e. Network Serial 01) for both ports on that MOXA.

### Port and Source

The source is the part where the information is coming from. So in case of a MOXA you have 1 source (the MOXA). On this source you have 2 ports. So the first port will be 1 and the second will be 2.

When working on a protocol (i.e. Modbus), it works the other way around. The port where the protocol is coming in is ”1” and all the ID’s on the Modbus protocol are different sources. So in that case you have a lot of port 1 with different sources (1,2,3,4, etc.)

### IP addresses and MAC addresses

First of all make sure that the IP addresses and MAC addresses are right, and they are in the same row in the devicelist as the actual interface is. If you have the same interface with different ports, make sure that the IP and MAC are the same on both rows.

*:When checking the network ring, make sure that everything with an up- and down address has the right IP-range, so you won’t have any IP conflicts.*

### Connection and ConnectionPort

For the “Connection” you use the same description as you used in the “DeviceId” or it won’t line up in the network layout of NavVision. If you have a ring-network, it should be possible to follow the ring by jumping from “Connection” to “DeviceId” to “Connection” etc. until you close the loop.

When it concerns the ring-network the ConnectionPort shall always be “2” because we describe to which port the network is running. If not in the ring-network, the next available port will be chosen. Make sure that you don’t use double ports.

*: You will never find “1” under “ConnectionPort” in the devicelist.*

## Test the Devicelist

After you finish the devicelist, you can check it by importing it in NavVision and then read the devicelist\_generated.html to see if there are any problems. Once the devicelist\_generated.html is alright and you have checked all previous, you can check if the network-layout in NavVision is good. It should be the same as you draw in the single-line-drawing.

If you have built the topology, you can now check all the network alarms to see if they give the right alarms. If not, start over again until this is alright.

No

Yes

Gathering information

Checking Devicelist

Properties

Devicelist

Alright

Devicelist

Checking Network and

Alarms

Sensorlist

Figure 3‑1: Workflow Devicelist

# Sensorlist

## Introduction

The sensorlist is the place where we put all the information about I/O’s in the NavVision system. In fact we link the I/O’s to the specific devices, link the specific elements to the I/O and assign all the special extras such as unit-type, data-type, name etc. We can even assign all kind of logic to an I/O in the sensorlist. In fact the sensorlist, together with the devicelist, is the basis of the complete setting-up of the NavVision system.

All the information on setting up the sensorlist is described in:

**ACC-NavVision-Sensorlist-Manual v1.7.16.**

## Checking

In the devicelist, everything has to be alright because every mistake will be translated into the version of NavVision on the workstation. Because there is a lot you can adjust, it is very important that you now all the ins and outs of the sensorlist. Although everything is explained in depth in the sensorlist, we will stipulate here some of the more important issues.

### Item

The name you give under “Item” is the name that will show up in the logbook and the alarm list. It is absolutely necessary that you choose a descriptive name so operators have a clear and easy understanding on the alarm or log-entry. Don’t make it too long and keep it at the item that you are describing. If the ship or yard has its own numbering for items, it is possible to include this in the “Item.”

### Sensortype

Sensortype is nothing more than saying what kind of behaviour that particular I/O will show. Normally it will be standard, but on the same element there can be different I/O’s with different behaviour. Especially with complex elements as valves etc. it is possible that there are a lot of different sensortypes, all connected to that one element. For example, a valve can be started, stopped, open, closed, in failure etc.

To make it a little bit easier, we put together the most common elements with their use of diverse I/O with different sensortypes. In ***Appendix E*** you will find an overview of these examples.

### Module, Pin,Type and Count

You know that module and pin numbering is very important in the Wago modules. If you make a small mistake here it is imminent that the fields will be shifted or some modules won’t be recognized. Also the “type” is quite important although NavVision will alter that for you if you make a mistake.

For mapping issues in case of, for example, Modbus, it is even more important. If the “module” (register) is wrong, the communication will not work at all or incrementally. When you need to read bitwise (Count = 1), the “pin” is very important. Reading the wrong Bit will result in the wrong result. “Type” will tell NavVision which Modbus function to use. “Type” is also use to implement NMEA sentences

Count is also very important. Standard NavVision will read 16 Bits. If this is what you need it is OK. But pay attention that you need to set the “count” to 1 for bitwise and on 32 in case you need to read a Dword.

### Min and Max

Min and Max are linked to the values in instruments, tank-bars etc. Mostly you can do the tanks in advance as you can get the data form the yard. For other instruments like oil temperature etc. you can use the standard values. If you get information at a later time or change instruments on the system, do not forget to change it in the sensorlist as well or you will lose your values at the next import.

## Test the Sensorlist

After you finish the sensorlist, you can check it by importing it in NavVision and then read the sensorlist\_generated.html to see if there are any problems. You can also check the sensorlist\_generated\_diff.html. Here you will find all the failures, changes and comments together with the reference of what it was to make it clearer why it is changed. The ultimate goal is to clear the sensorlist\_generated\_diff.html.

Once the sensorlist\_generated.html and the sensorlist\_generated\_diff.html are alright and you have checked all previous, you can check if everything looks good in NavVision itself.

No

Yes

Gathering information

Checking Sensorlist

Properties

Sensorlist

Alright

Sensorlist

Checking Network and

Alarms

Mimics

Figure 4‑1: Workflow Sensorlist

# Mimic

## Introduction

As the mimic is the HMI that we use to let operators interact with the ship, it is necessary that we use some standardization to look after the minimum criteria that we want for NavVision. For that reason we have a set of standard mimics that we use as a starting point for new mimics. Also first drafts will have to pass by our designer for his authorisation.

Everything about making and assigning mimics can be found in:

**ACC-Mimic-Manual v1.2.18**

## Making a mimic

The main thing we can say about a mimic is: “start on time and follow the rules.” While you have only 8 hours for drawing and assigning a mimic, you can understand that there is not much room for mistakes. To make it easier for you, just hold on to the following, small, reminders.

### Show examples

Starting off with the basic example mimics, you have a good starting point to discuss with the actual client. If the client isn’t the actual user, make sure that you ask the client to discuss the mimics with the owner, the owner’s representative and/or the users among the crew such as the chief engineer and the captain.

By involving all these people in the decision process you will get some extra discussion as a down-side. In the long run it will give you the advantage that you will not have to change the mimic over and over again when new decision makers appear.

### Use standard mimics

There will be a variety of standard mimics available that will be the building stones of divers sorts of mimics. Think of engine, AC or tank-mimics. Starting with these mimics will give you the benefit that the layout and a great deal of the assigning is already done.

### Keep in touch with the client

Nothing is more frustrating than finding out that you have changed the mimics over and over again just to find out that the client didn’t even have a say in it or didn’t even see it. Make sure that you show the draft mimics to everybody who has to say something about it. Do not develop for your project leader, who then shows it to the shipyard, after which you can change things, just to find out that after all the alterations they finally show it to the client.

## Assigning a mimic

To assign a mimic, the sensorlist needs to be finished. You need to know all the fields that need to be assigned, but also you need to know what kind of conditions you must apply or which type of instrument to use. So it is very important that you gather this information in time.

No

Yes

Gathering information

Use standard mimics

Mimics

Alright

Mimic

Get approval by the mimic freeze time

ACS

Assign the mimics

Figure 5‑1: Workflow mimics

# ACS

## Introduction

ACS or “Automated Control Sequence” is the logic that we build into our system to automate certain events. This can be done with the SoftPLC but also with the Autoswitch function that is available under settings. A simple example is the fact that we start a Bilgepump for a certain amount of time when the bilge gives a high alarm. But also calculating total power or more difficult calculations are possible.

## Information

Make sure that you have detailed descriptions from the client on what they want to have as ACS before you begin. If something is not clear or ambiguous, be sure to discuss this with the client first, before you continue

## Test

As far as possible, test the ACS in the setup. Use simulation-mode if necessary. Better to test it and change it beforehand, then to discover it doesn’t work on the ship.

# Appendix A “handover checklist”

|  |  |  |  |
| --- | --- | --- | --- |
| Information | Documentation | Order number | Check Handover |
| Order Confirmation |  |  |  |
| Calculation Sheet |  |  |  |
| Extra Work |  |  |  |
| I/O list |  |  |  |
| Protocols |  |  |  |
| Protocol Mappings |  |  |  |
| Hardware Documentation |  |  |  |
| Mimics |  |  |  |
| ACS |  |  |  |
| GA drawings |  |  |  |
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# Appendix B “purchase checklist”

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| --- | --- | --- | --- |
| **NavVision Licenses** | Article code | Typenumber | Quantity |
| LEISURE | 10010996 | FTI05000 |  |
| AMCS 1 st Workstation | 10010997 | FTI05100 |  |
| AMCS 2nd till 10th workstation | 10010998 | FTI05101 |  |
| AMCS 11th and more workstations | 10010999 | FTI05102 |  |
| Viewer or mimic 1 st workstation | 10011001 | FTI05200 |  |
| Viewer or mimic 2nd till 10th workstation. | 10011002 | FTI05201 |  |
| Viewer or mimic 11th and more workstations | 10011003 | FTI05202 |  |
| Moxa interface (including hardware) | 10011004 | FTI05300 |  |
| PLC interface | 10011005 | FTI05301 |  |
| CAN interface (excluding hardware) | 10011009 | CAN interface |  |
| CCTV interface | 10011010 | FTI05303 |  |
| Duty Alarm Panel | 10011011 | FTI05400 |  |
| Serial Communication (excluding hardware) | 10011012 | FTI05401 |  |
| LEISURE | 10010996 | FTI05000 |  |
| AMCS 1 st Workstation | 10010997 | FTI05100 |  |
| AMCS 2nd till 10th workstation | 10010998 | FTI05101 |  |
| AMCS 11th and more workstations | 10010999 | FTI05102 |  |
| Viewer or mimic 1 st workstation | 10011001 | FTI05200 |  |
| Viewer or mimic 2nd till 10th workstation. | 10011002 | FTI05201 |  |
| Viewer or mimic 11th and more workstations | 10011003 | FTI05202 |  |

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| **NavVision ServerClient** | Article code | Typenumber | Quantity |
| AMS PANEL PC 24VDC 19 INCH | 10007902 | 950.522.0100 |  |
| AMS PC 24VDC, 15" TFT, RAM 2042MB CFC 4GB XP | 10008189 | 950.522.0020 |  |
| EPC BOX C2D NAUTIC DC | 10011044 | 603001026 |  |

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| --- | --- | --- | --- |
| **NavVision Display** | Article code | Typenumber | Quantity |
| DISPLAY 19" TOUCH MTE T190 NAUTIC BEIJER DESIGN | 10011046 | 603001022 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NavVision Trackball** | Article code | Typenumber | Quantity |
| TRACKERBALL VANDALPROOF, IP68, LASER OPTICAL | 10013263 | TSA50F8-FRB |  |

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| **NavVision Keyboard** | Article code | Typenumber | Quantity |
| WIRELESS TRACKBALL KEYBOARD, USB | 10011041 | AK-44100-TFU-B/US/K |  |

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| **NavVision Serial Interface** | Article code | Typenumber | Quantity |
| MINIRISC BASED COMPUTER W/2 SER P DUAL LAN SD | 10011068 | UC-7110-LX |  |

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| --- | --- | --- | --- |
| **NavVision Serial Interface - Optical Isolation** | Article code | Typenumber | Quantity |
| OPTICAL ISOLATED RS-232 TO RS-422/485 | 10002563 | 485LDRC9 |  |

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| --- | --- | --- | --- |
| **NavVision Matrix Printer** | Article code | Typenumber | Quantity |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NavVision Laser Printer** | Article code | Typenumber | Quantity |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NavVision Switch** | Article code | Typenumber | Quantity |
| NETWORK SWITCH (8 PORTS) | 10007894 | FL SWITCH SFNT 8TX |  |
| NETWORK SWITCH (5 PORTS) | 10007895 | FL SWITCH SFNT 5TX |  |

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| --- | --- | --- | --- |
| **NavVision Bridge AMS Alarm Panel** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| ILLUMINATED SWITCH, 2.8mm TABS, GREEN | 10011050 | MPI002/28/GN |  |
| PLUG W/CAGE CLAMP | 10011055 | 769-610 |  |
| ONE CONDUCTOR FEMALE PLUG | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP DIM (BLAUW) | 10014412 |  |  |
| GEGRAVEERDE KNOP MUTE (ROOD) | 10014413 |  |  |
| GEGRAVEERD PANEEL 3 KNOPS PANEL 3 | 10014417 |  |  |

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| **NavVision Bridge BNWAS Alarm Panel** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| PLUG W/CAGE CLAMP | 10011055 | 769-610 |  |
| ONE CONDUCTOR FEMALE PLUG | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP TIMER (GROEN) | 10014411 |  |  |
| GEGRAVEERDE KNOP DIM (BLAUW) | 10014412 |  |  |
| GEGRAVEERDE KNOP MUTE (ROOD) | 10014413 |  |  |
| GEGRAVEERD PANEEL 3 KNOPS PANEL 2 | 10014416 |  |  |
| RVS PANEEL KLEIN (1 DRUKKNOP + BUZZER ROOSTER) | 10015636 | RVS PANEEL KLEIN 1 DRUKKOP + BUZZERROOST |  |

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| **NavVision Cabin AMS Alarm Panel** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| PLUG W/CAGE CLAMP | 10011050 | MPI002/28/GN |  |
| ONE CONDUCTOR FEMALE PLUG | 10011055 | 769-610 |  |
| GEGRAVEERDE KNOP ER DUTY (GROEN) | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP DIM (BLAUW) | 10014412 |  |  |
| GEGRAVEERDE KNOP MUTE (ROOD) | 10014413 |  |  |
| GEGRAVEERD PANEEL 3 KNOPS PANEL 3 | 10014417 |  |  |

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| **NavVision Cabin BNWAS Alarm Panel** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| PLUG W/CAGE CLAMP | 10011055 | 769-610 |  |
| ONE CONDUCTOR FEMALE PLUG | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP TIMER (GROEN) | 10014411 |  |  |
| GEGRAVEERDE KNOP DIM (BLAUW) | 10014412 |  |  |
| GEGRAVEERDE KNOP MUTE (ROOD) | 10014413 |  |  |
| GEGRAVEERD PANEEL 3 KNOPS PANEL 2 | 10014416 |  |  |
| RVS PANEEL KLEIN (1 DRUKKNOP + BUZZER ROOSTER) | 10015636 | RVS PANEEL KLEIN 1 DRUKKOP + BUZZERROOST |  |

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| **NavVision Cabin AMS/BNWAS Alarm Panel** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| PLUG W/CAGE CLAMP | 10011055 | 769-610 |  |
| ONE CONDUCTOR FEMALE PLUG | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP BRIDGE DUTY (GROEN) | 10014409 |  |  |
| GEGRAVEERDE KNOP ER DUTY (GROEN) | 10014410 |  |  |
| GEGRAVEERDE KNOP DIM (BLAUW) | 10014412 |  |  |
| GEGRAVEERDE KNOP MUTE (ROOD) | 10014413 |  |  |
| GEGRAVEERD PANEEL 4 KNOPS PANEL | 10014418 |  |  |
| RVS PANEEL KLEIN (1 DRUKKNOP + BUZZER ROOSTER) | 10015636 | RVS PANEEL KLEIN 1 DRUKKOP + BUZZERROOST |  |

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| **NavVision ECR AMS Alarm Panel** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| PLUG W/CAGE CLAMP | 10011055 | 769-610 |  |
| ONE CONDUCTOR FEMALE PLUG | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP TIMER (GROEN) | 10014411 |  |  |
| GEGRAVEERDE KNOP MUTE (ROOD) | 10014413 |  |  |
| GEGRAVEERDE KNOP ON/OFF (BLAUW) | 10014414 |  |  |
| GEGRAVEERD PANEEL 3 KNOPS PANEL 1 | 10014415 |  |  |

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| **NavVision Cabin AMS/BNWAS Alarm Panel** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| PLUG W/CAGE CLAMP | 10011055 | 769-610 |  |
| ONE CONDUCTOR FEMALE PLUG | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP TIMER (GROEN) | 10014411 |  |  |
| GEGRAVEERDE KNOP MUTE (ROOD) | 10014413 |  |  |
| GEGRAVEERDE KNOP ON/OFF (BLAUW) | 10014414 |  |  |
| GEGRAVEERD PANEEL 3 KNOPS PANEL 1 | 10014415 |  |  |
| Timer Reset Box | 28710164 | 93.0.354 |  |

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| **NavVisionCabin BNWAS Alarm Panel (1 button)** | Article code | Typenumber | Quantity |
| SOUNDER, PCB VOLTAGE 15-28V | 10011047 | 41.S01P240ALF |  |
| CRIMP TERMINAL FEMALE 2.8x0.8, RED, PK=100PCS | 10011048 | FDD1-110(8) |  |
| ILLUMINATED SWITCH, 2.8mm TABS, RED | 10011051 | MPI002/28/RD |  |
| PLUG W/CAGE CLAMP | 10011055 | 769-610 |  |
| ONE CONDUCTOR FEMALE PLUG | 10011057 | 769-110 |  |
| GEGRAVEERDE KNOP ON/OFF (BLAUW) | 10014414 |  |  |

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| **Non Listed Items** | Article code | Typenumber | Quantity |
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# Appendix C “Scope checklist (after engineer review)”

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| --- | --- | --- | --- |
| Not in scope | New sale/free | Order number | Signature (sales) |
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# Appendix D “Progress list with timesheet”

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Engineering Topology | Amount | finished | Time/hours | Total time spent |
| Master |  |  | 8 |  |
| Fail Save Clients |  |  | 4 |  |
| Duty Alarm Panel |  |  | 1 |  |
| Printer |  |  | 1 |  |
| Alarm Panel |  |  | 0,5 |  |
| Serial/Network Interface |  |  | 4 |  |
| Camera |  |  | 0,5 |  |
| VGA Frame grabber |  |  | 2 |  |
| Firewall |  |  | 4 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Engineering HMI, ACS, HC, TLC | Amount | finished | Time/hours | Total time spent |
| Mimics |  |  | 8 |  |
| Automatic Control Sequences |  |  | 32 |  |
| Hours Counters |  |  | 0,2 |  |
| Trim / List compensation |  |  | 3,3 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Engineering IO | Amount | finished | Time/hours | Total time spent |
| Digital Input |  |  | 0,1 |  |
| Digital Output |  |  | 0,1 |  |
| Analog Input |  |  | 0,25 |  |
| Analog Input PT100 |  |  | 0,1 |  |
| Analog Input Thermocouple |  |  | 0,1 |  |
| Analog Output |  |  | 0,25 |  |
| Serial Input |  |  | 0,2 |  |
| Serial Output |  |  | 0,1 |  |
| PMS (standard IO mapping) |  |  | 8 |  |
| FDS (standard IO mapping) |  |  | 8 |  |
| HVAC (standard IO mapping) |  |  | 8 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Engineering Classification | Amount | finished | Time/hours | Total time spent |
| Drawing approval |  |  | 4 |  |
| FAT |  |  | 16 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Total Engineering | Amount | finished | Time/hours | Total time spent |
| Sum of all engineering hours |  |  |  |  |

# Appendix E “Sensortypes”

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **On/Off status only contact** | AMCS |  |
|  | *Status*  On ─ | ─────── DI >────── | *Sensor Type*  ─ Standard |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Running only contact** | AMCS |  |
|  | *Status*  Running ─ | ─────── DI >────── | *Sensor Type*  ─ Standard |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Alarm only contact** | AMCS |  |
|  | *Status*  Alarm ─ | ─────── DI >────── | *Sensor Type*  ─ Standard [Unit type: Alarm] |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Failure (defect) only contact** | AMCS |  |
|  | *Status*  Failure ─ | ─────── DI >────── | *Sensor Type*  ─ Standard [Unit type: Alarm] |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **On/Off status with failure contact** | AMCS |  |
|  | *Status*  On ─  Failure ─ | ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Standard  ─ Failure |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **On/Off status with failure and running contact** | AMCS |  |
|  | *Status*  On ─  Failure ─  Running ─ | ─────── DI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Standard  ─ Failure  ─ Running |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Breaker without feedback** | AMCS |  |
|  | *Control*  Switch ─ | ──────< DO ─────── | *Sensor Type*  ─ Standard |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Breaker with feedback** | AMCS |  |
|  | *Control*  Switch ─  *Status*  On ─ | ──────< DO ───────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Standard  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Impulse relay with feedback** | AMCS |  |
|  | *Control*  Impulse switch ─  *Status*  On ─ | ──────< DO ───────  ─────── DI >────── | *Sensor Type*  ─ Impulse  ─ Standard  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Fan with feedback and running output** | AMCS |  |
|  | *Control*  Switch ─  *Status*  On ─  Running ─ | ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Standard  ─ Running  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Two speed Fan with single feedback and running output** | AMCS |  |
|  | *Control*  Set to low speed ─  Set to high speed ─  *Status*  On ─  Running ─ | ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Low Speed  ─ High Speed  ─ Standard  ─ Running |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Two speed Fan with low/high feedback, running and failure output** | AMCS |  |
|  | *Control*  Set to low speed ─  Set to high speed ─  *Status*  Low speed ─  High speed ─  Running ─  Failure ─ | ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Low Speed  ─ High Speed  ─ Low Speed  ─ High Speed  ─ Running  ─ Failure |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Valve** | AMCS |  |
|  | *Status*  Open ─  Closed ─ | ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Open  ─ Closed  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Valve with single continuous control** | AMCS |  |
|  | *Control*  Open/Close ─  *Status*  Open ─  Closed ─ | ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Open  ─ Closed  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Valve with dual continuous control** | AMCS |  |
|  | *Control*  Open ─  Close ─  *Status*  Open ─  Closed ─ | ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Request {NC}  ─ Open  ─ Closed  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Valve with momentary control** | AMCS |  |
|  | *Control*  Open ─  Close ─  *Status*  Open ─  Closed ─ | ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Set  ─ Reset  ─ Open  ─ Closed  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Valve with momentary control** | AMCS |  |
|  | *Control*  Open ─  Close ─  *Status*  Open ─  Closed ─ | ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Set  ─ Reset  ─ Open  ─ Closed  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **WT Door system** | AMCS |  |
|  | *Status*  Open ─  Closed ─  Failure ─ | ─────── DI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Open  ─ Closed  ─ Failure  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Pump with feedback and running output** | AMCS |  |
|  | *Control*  Switch ─  *Status*  On ─  Running ─ | ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Standard  ─ Running  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Pump with local control indication** | AMCS |  |
|  | *Control*  Switch ─  *Status*  On ─  Local ─ | ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Standard  ─ Remote {NC}  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Pump with local/remote control/indication** | AMCS |  |
|  | *Control*  Switch ─  Set to remote control ─  *Status*  On ─  Remote ─ | ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Remote  ─ Standard  ─ Remote  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Pump with auto/manual and remote/local control** | AMCS |  |
|  | *Control*  Switch ─  Set to remote control ─  Set to automatic control ─  *Status*  On ─ | ──────< DO ───────  ──────< DO ───────  ──────< DO ───────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Remote  ─ Auto  ─ Standard  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Pump with auto/manual and remote/local control/indication** | AMCS |  |
|  | *Control*  Switch ─  Set to remote control ─  Set to automatic control ─  *Status*  On ─  Remote ─  Auto ─ | ──────< DO ───────  ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Remote  ─ Auto  ─ Standard  ─ Remote  ─ Auto  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Pump with auto/manual, main/standby and remote/local control/indication** | AMCS |  |
|  | *Control*  Switch ─  Set to remote control ─  Set to automatic control ─  Main ─  *Status*  On ─  Remote ─  Auto ─  Main ─ | ──────< DO ───────  ──────< DO ───────  ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Remote  ─ Auto  ─ Standby {NC}  ─ Standard  ─ Remote  ─ Auto  ─ Standby {NC}  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Pump with auto/manual control/indication and external hardwired panel** | AMCS |  |
|  | *Control*  Switch ─  Set to automatic control ─  *Status*  On ─  Auto ─  Failure ─  *Control (Panel)*  Pump on indication light ─  Pump off indication light ─  Pump failure indication light ─  *Status (Panel)*  Start pump ─  Stop pump ─ | ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >──────  ─────── DI >──────  ──────< DO ───────  ──────< DO ───────  ──────< DO ───────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Request  ─ Remote  ─ Standard  ─ Auto  ─ Failure  ─ On Lamp  ─ Off Lamp  ─ Failure  ─ Set  ─ Reset  *(Internal timeout monitoring)* |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Tank level** | AMCS |  |
|  | *Status*  Level ─ | ─────── AI >────── | *Sensor Type*  ─ Standard |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Tank level high and/or too high alarm** | AMCS |  |
|  | *Status*  High alarm ─  Too high alarm ─ | ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ High  ─ Too High |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Tank level with high/too high alarm** | AMCS |  |
|  | *Status*  Level ─  High alarm ─  Too high alarm ─ | ─────── AI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Standard  ─ High  ─ Too High |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Tank level with low/too low alarm** | AMCS |  |
|  | *Status*  Level ─  Low alarm ─  Too low alarm ─ | ─────── AI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Standard  ─ Low  ─ Too Low |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Temperature** | AMCS |  |
|  | *Status*  Temperature ─ | ─────── AI >────── | *Sensor Type*  ─ Standard |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Temperature high and/or too high alarm** | AMCS |  |
|  | *Status*  High alarm ─  Too high alarm ─ | ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ High  ─ Too High |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Temperature with high/too high alarm** | AMCS |  |
|  | *Status*  Temperature ─  High alarm ─  Too high alarm ─ | ─────── AI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Standard  ─ High  ─ Too High |  |
|  |  |  |  |  |

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| --- | --- | --- | --- | --- |
|  | Object | **Temperature with setpoint (HVAC)** | AMCS |  |
|  | *Control*  Setpoint ─  *Status*  Current setpoint ─  Current temperature ─ | ──────< AO ───────  ─────── AI >──────  ─────── AI >────── | *Sensor Type*  ─ Request1  ─ Standard1  ─ Standard2  *1Temperature Setpoint field tag*  *2Temperature field tag* |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Temperature with external alarm levels and indication** | AMCS |  |
|  | *Status*  Temperature ─  Too low alarm temperature ─  Low alarm temperature ─  High alarm temperature ─  Too high alarm temperature ─  Too low alarm ─  Low alarm ─  High alarm ─  Too high alarm ─ | ─────── AI >──────  ─────── AI >──────  ─────── AI >──────  ─────── AI >──────  ─────── AI >──────  ─────── DI >──────  ─────── DI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Standard  ─ Too Low Level  ─ Low Level  ─ High Level  ─ Too High Level  ─ Too Low  ─ Low  ─ High  ─ Too High |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Pressure** | AMCS |  |
|  | *Status*  Pressure ─ | ─────── AI >────── | *Sensor Type*  ─ Standard |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Pressure low and/or too low alarm** | AMCS |  |
|  | *Status*  Low alarm ─  Too low alarm ─ | ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Low  ─ Too Low |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Object | **Pressure with low/too low, high/too high alarm** | AMCS |  |
|  | *Status*  Pressure ─  Too low alarm ─  Low alarm ─  High alarm ─  Too high alarm ─ | ─────── AI >──────  ─────── DI >──────  ─────── DI >──────  ─────── DI >──────  ─────── DI >────── | *Sensor Type*  ─ Standard  ─ Too Low  ─ Low  ─ High  ─ Too High |  |
|  |  |  |  |  |

# Appendix F “Fat checklist”

**Factory Acceptation Test**

**NavVision AMS**

**Alarm Monitoring System**

**--------------------------**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Project: | |  | | |
| Project number: | |  | | |
| Main title: | | Imtech NavVision AMCS Engineers GuidelineFactory Acceptation Test | | |
| Sub title: | | Alarm Monitoring System | | |
| Special remark: | |  | | |
| Issue: | | 1.0 | | |
| Date: | |  | | |
|  | |  | | |
| Registration code: | |  | | |
|  | |  | |  |
|  | |  | | |
|  | |  | | |
|  | |  | | |
| Approved: | |  | | |
| Certified: | |  | | |
|  | |  | | |
|  |  |  |  | |
|  |  |  |  | |
| Official |  | Date of release: |  | |
| distributed |  |  |  | |
| copy stamp: |  | Copy no.: |  | |
|  |  |  |  | |
|  |  |  |  | |

**Abbreviations**

FAT Factory Acceptance Test

HAT Harbour Acceptance Test

FT Free Technics BV

AMS Alarm Monitoring System

SAT Sea Acceptance Test

ECR Engine Control Room

SBR SwitchBoard Room

MSB Main Switch Board

WH Wheelhouse

PS Port Side

SB Starboard

Eng Engineer

DAP Duty Alarm Panel

ER Engine room

**Updates**

The table below lists the updates and changes pertaining to the successive document versions.

|  |  |  |  |
| --- | --- | --- | --- |
| Issue: | Date: | Change: | Reason: |
| 1.0 |  | Initial version | First project issue |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Test Procedures FAT**

**Verify scope of supply**

|  |  |
| --- | --- |
| **Precondition: all** | **Test Date:**  **Tested by:** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Scope of supply** | | **Needed** | **Present** |
| Alarm PC Systems | Alarm Main Server PC (SBR)  PanelPC  Keyboard incl. trackball |  |  |
| Alarm Failsafe Server PC (WH)  Wireless Keyboard USB / Trackball |  |  |
| Alarm Failsafe Server PC (WH)  Wireless Keyboard USB / Trackball |  |  |
| Alarm Failsafe Server PC (Fly Bridge)  Wireless Keyboard USB / Trackball |  |  |
| Duty Alarm Panels | DAP (Generic) |  |  |
| DAP (Chief Engineer Cabin) |  |  |
| DAP (Crew Mess room) |  |  |
| PLC | PLC 1 (Gen Room SB) |  |  |
| PLC 2 (Gen Room PS) |  |  |
| PLC 3 (Wheelhouse) |  |  |
|  | PLC (Generic) |  |  |
| Network | Network Switches Phoenix Contact |  |  |
| Serial Servers Moxa |  |  |
| ICP Das |  |  |
|  | Watch Entrance Unit (Gen Room PS/SB) |  |  |
| Timer Reset Buttons (Engine Room) |  |  |
| Alarm and Journal Printer |  |  |
| Additional Hardware | Axis Video Server |  |  |
|  | IP-Camera’s |  |  |
|  | BNWAS Panel (Captain’s Cabin) |  |  |
|  | RS232 to RS485 opto-isolators |  |  |

**Alarm handling: Basic Alarm Functionality**

**Precondition**

|  |  |
| --- | --- |
| **Precondition: system running with no unacknowledged alarms** | **Test Date:**  **Tested by:** |

| **Description** | **Required Steps** | Expected result | Remarks |
| --- | --- | --- | --- |
| Generate alarm | Remove test-wire | Relevant alarm is indicated in top right corner of every screen |  |
|  |  | Alarm output is enabled |  |
| Check alarm list for consistency | On all systems: open the alarm page | The alarm page shows all relevant alarm as blinking and on top of the list |  |
| Acknowledge alarm on Bridge PC’s  (Fail Safe Server 1,2 or 3) | Double click on the alarm line | Acknowledging is not possible |  |
| Acknowledge alarm on  Duty Alarm Panels Crew Mess and Eng Cabin | Double click on the alarm line | Acknowledging is not possible |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER | Double click on the alarm line | Alarm is acknowledged and sound stops, alarm is still visible in list |  |
| Rectify alarm | Restore removed test-wire | Alarm is automatically removed from list |  |

**Alarm handling: Testing of Redundancy**

**Precondition**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Precondition: system running with no unacknowledged alarms** | | | **Test Date:**  **Tested by:** | |
| **Description** | **Required Steps** | | Expected result | | Remarks |
| Generate alarm | Remove test-wire | | Relevant alarm is indicated in top right corner of every screen | |  |
|  |  | | Alarm output enabled | |  |
| Check alarm list for consistency | On all systems: open the alarm page | | The alarm page shows all relevant alarm as blinking and on top of the list | |  |
| Simulate a failure of the ER PC (Main Server) | Shutdown ER PC | | New alarm generated showing the loss of connectivity | |  |
|  |  | | Control of Main Server (ER PC) is transferred to the Fail Safe Servers, system keeps running. | |  |
| Acknowledge “Bridge Take Over ER” alarm on the Fail Safe Servers | Double click on the alarm line | | Alarm is acknowledged | |  |
| Acknowledge test-wire alarm on the Fail Safe Servers | Double click on the alarm line | | Alarm is acknowledged and sound stops, alarm is still active in list | |  |
| Rectify alarm | Restore removed test-wire | | Alarm is automatically removed from list | |  |
| Simulate server repair | Boot up Main Server (ER PC) | | Control of Fail Safe Servers is transferred back to Main Server (ER PC) | |  |
|  |  | | “Bridge Take Over ER” alarm disappears from alarmlist | |  |
| Generate alarm | Remove test-wire | | Relevant alarm is indicated in top right corner of every screen  Alarm output enabled | |  |
| Acknowledge alarm on Fail Safe Servers | Double click on the alarm line | | Acknowledging is not possible | |  |
| Acknowledge alarm on  Duty Alarm Panels Crew Mess and Eng Cabin | Double click on the alarm line | | Acknowledging is not possible | |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER | Double click on the alarm line | | Alarm is acknowledged and sound stops, alarm is still visible in list | |  |
| Rectify alarm | Restore removed test-wire | | Alarm is automatically removed from list | |  |

**Alarm handling: General Alarm**

**Precondition**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Precondition: system running with no unacknowledged alarms** | | | **Test Date:**  **Tested by:** | |
| **Description** | **Required Steps** | | Expected result | | Remarks |
| Generate alarm | Remove test-wire | | Relevant alarm is indicated in top right corner of every screen  Alarm output enabled | |  |
| Check alarm list for consistency | On all systems: open the alarm page | | The alarm page shows all relevant alarm as blinking and on top of the list | |  |
| Create General Alarm | Do not accept the alarm for 5 minutes | | After 5 minutes General Alarm generated. | |  |
| Acknowledge test-wire alarm on Fail Safe Servers | Double click on the alarm line | | Acknowledging is not possible | |  |
| Acknowledge alarm on  Duty Alarm Panels Crew Mess and Eng Cabin | Double click on the alarm line | | Acknowledging is not possible | |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER | Double click on the alarm line | | Alarm is acknowledged and sound stops, alarm is still active in list | |  |
| Rectify alarm | Restore removed test-wire | | Alarm is automatically removed from list | |  |

**Alarm handling: Network Alarms**

**Precondition**

|  |  |
| --- | --- |
| **Precondition: system running with no unacknowledged alarms** | **Test Date:**  **Tested by:** |

| **Description** | **Required Steps** | Expected result | Remarks |
| --- | --- | --- | --- |
| Generate network alarm | Remove network wire | All alarms are shown; newest alarm is on top of the alarm list |  |
| Check alarm list for consistency | On all systems: open the alarm page | The alarm page shows all relevant alarm as blinking and on top of the list |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER (or if possible on Fail Safe Servers) | Double click on the alarm line | Alarm is acknowledged and sound stops, alarm is still active in list |  |
| Rectify alarm | Restore removed network wire | Alarm is automatically removed from list |  |

**Alarm handling: Attended and Unattended: Attended**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Precondition: system running with no unacknowledged alarms** | | | **Test Date:**  **Tested by:** | |
| **Description** | **Required Steps** | | Expected result | | Remarks |
| Select duty and Engine Room attended | Select “Chief Eng.” on duty and push attended button on the Engine Room Watch Entrance Unit | | Duty selection shows “Chief Eng.” and “attended”(all AMS screens)  On the Engine Room Watch Entrance Unit the attended button is on (blue) | |  |
| Generate alarm | Remove network cable | | Network alarm displayed on all AMS screens, sound in Engine Room and Crew Mess room | |  |
| Silence locally | Push silence button Duty Alarm Panel Crew Mess Room | | Only Crew Mess silences and Engine Room continue to sound.  Alarm visual indication does not change | |  |
| Silence locally | Push silence button Watch Entrance Unit SB. **or**  Push silence button Watch Entrance Unit PS. | | Alarm visual indication does not change | |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER | Double click on the alarm line | | Alarm is acknowledged and sound stops, alarm is still active in list | |  |
| Rectify alarm | Restore removed network wire | | Alarm is automatically removed from list | |  |

**Alarm handling: Attended and Unattended: Unattended**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Precondition: system running with no unacknowledged alarms** | | | **Test Date:**  **Tested by:** | |
| **Description** | **Required Steps** | | Expected result | | Remarks |
| Select duty and Engine Room unattended | Select “Chief Eng.” on duty and push attended button on the Engine Room Watch Entrance Unit | | Duty selection shows “Chief Eng.” and “unattended”(all AMS screens)  On the Engine Room Watch Entrance Unit the attended button is off (blue) | |  |
| Generate alarm | Remove network cable | | Network alarm displayed on all AMS screens, sound in Engine Room, Chief Eng. Cabin and Crew Mess room | |  |
| Silence locally | Push silence button Duty Alarm Panel Crew Mess Room | | Only Crew Mess silences, Chief Eng. Cabin and Engine Room continue to sound.  Alarm visual indication does not change | |  |
| Silence locally | Push silence button Duty Alarm Panel Chief Eng. Cabin | | Crew Mess and Chief Eng. Cabin silences and Engine Room continue to sound.  Alarm visual indication does not change | |  |
| Silence locally | Push silence button Watch Entrance Unit SB. **or**  Push silence button Watch Entrance Unit PS. | | Alarm visual indication does not change  (If you press one of these button’s, the AMS System automatically switches to Attended) | |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER | Double click on the alarm line | | Alarm is acknowledged and sound stops, alarm is still active in list | |  |
| Rectify alarm | Restore removed network wire | | Alarm is automatically removed from list | |  |

**Alarm handling: Engine Room Attended Timer (Deadman)**

|  |  |
| --- | --- |
| **Precondition: system running with no unacknowledged alarms** | **Test Date:**  **Tested by:** |

| **Description** | **Required Steps** | Expected result | Remarks |
| --- | --- | --- | --- |
| Select duty and Engine Room attended | Select “Chief Eng.” on duty and push attended button on the Engine Room Watch Entrance Unit | Duty selection shows “Chief Eng.” and “attended”(all AMS screens)  On the Engine Room Watch Entrance Unit the attended button is on (blue) |  |
| Start Deadman timer | Click on timer icon in the Engine Room | On screen keyboard appears in the Engine Room. A password is required to activate timer |  |
| Enter password | Enter “12345” | Engine Room timer in the Engine Room and Crew Mess room (Duty Alarm Panel) starts counting down |  |
| Timer reset | While timer runs it can be reset by any icon click action in the Engine room, or the green timer reset buttons | Timer resets and starts over |  |
| Engine Room unattended | Go to unattended mode | Timer stops and resets |  |
| Engine Room attended | Go to attended mode | Timer starts |  |
| Select duty and Engine Room attended | Select “Chief Eng.” on duty and push attended button on the Engine Room Watch Entrance Unit | Duty selection shows “Chief Eng.” and “attended”(all AMS screens)  On the Engine Room Watch Entrance Unit the attended button is on (blue) |  |
| Start Deadman timer | Click on timer icon in the Engine Room | On screen keyboard appears in the Engine Room. A password is required to activate timer |  |
| Enter password | Enter “12345” | Timer starts running |  |
| Timer reset | While timer runs it can be reset by any icon click action in the Engine Room, or the green timer reset buttons | Timer starts over |  |
| Run for 25 min | Wait 25 min | Alarm displayed on all AMS screens, sound in Engine Room, Chief Eng. Cabin and Crew Mess room |  |
| Wait extra 5 min | General alarm will sound | Al AMS stations will sound and cannot be silenced, only in Engine Room the alarm can be accepted |  |
| Accept alarm | Accept alarm | All AMS go silent and timer restarts |  |

**Alarm handling: Testing of Power Redundancy**

**Precondition**

|  |  |
| --- | --- |
| **Precondition: system running with no unacknowledged alarms** | **Test Date:**  **Tested by:** |

| **Description** | **Required Steps** | Expected result | Remarks |
| --- | --- | --- | --- |
| Simulate a Power supply Failure | Remove the main Power supply socket from one of the cabinets. | Relevant alarm is indicated in top right corner of every screen |  |
|  |  | Alarm output enabled |  |
| Check alarm list for consistency | On all systems: open the alarm page | The alarm page shows all relevant alarm as blinking and on top of the list |  |
|  |  | System still running on backup Power supply |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER | Double click on the alarm line | Alarm is acknowledged and sound stops, alarm is still visible in list |  |
| Rectify alarm | Restore removed Power Supply | Alarm is automatically removed from list |  |
| Simulate a Backup Power supply Failure | Remove the main Backup Power supply socket from one of the cabinets. | Relevant alarm is indicated in top right corner of every screen |  |
|  |  | Alarm output enabled |  |
| Check alarm list for consistency | On all systems: open the alarm page | The alarm page shows all relevant alarm as blinking and on top of the list |  |
|  |  | System still running on Main Power supply |  |
| Acknowledge alarm on ER PC  (Main Server) or on the Duty Alarm Panel in the PS ER | Double click on the alarm line | Alarm is acknowledged and sound stops, alarm is still visible in list |  |
| Rectify alarm | Restore removed Power Supply | Alarm is automatically removed from list |  |
| Simulate a Total Power Supply Failure | Remove the Main Power supply socket from one of the cabinets. | System still running on Backup Power supply  Alarm output enabled |  |
|  | Remove the Backup Power supply socket from one of the cabinets.  (Same Cabinet as Main Power Supply) | System is now running on batteries |  |
| Check alarm list for consistency | On all systems: open the alarm page | The alarm page shows all relevant alarm as blinking and on top of the list |  |
| Rectify alarm | Restore Power Supply Main / Backup | Alarm is automatically removed from list |  |

**Alarm handling: BNWAS**

|  |  |
| --- | --- |
| **Precondition: system running with no unacknowledged alarms** | **Test Date:**  **Tested by:** |

| **Description** | **Required Steps** | Expected result | Remarks |
| --- | --- | --- | --- |
| Activate BNWAS system | Activated BNWAS by using the screen password button (12345) | Timer starts running |  |
| Test first stage | Wait for first stage (normally 12 minutes) | Alarm is only visual available |  |
| Test next stage | Wait for 15 seconds | Alarm sounds on bridge |  |
| Test next stage | Wait for 15 seconds | Alarm sounds in Captains Cabin |  |
| Test next stage | Wait for 30 seconds | Alarm sounds in Crew Mess |  |
| Test next stage | Wait for 60 seconds | Alarm sounds everywhere |  |
| General Alarm | Wait for 3 minutes | General Alarm Generated |  |

Appendix

|  |
| --- |
| **REMARKS** |

**APPROVAL REPORT**

**Program Identification**

|  |  |
| --- | --- |
| Program name |  |
| **Customer Name** |  |

**Distribution of Approval Report**

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of copies** | **Recipient** | | **With attachment(s) y/n?** |
| Company | **Function / role** |
| 1x | Imtech Marine / Free Technics | Program Manager |  |
| 1x | Customer | Project Manager |  |
| 1x | Lloyd’s Register Nederland | Surveyor |  |

Approval

|  |  |
| --- | --- |
| **For and on behalf of Imtech:** | **For and on behalf of customer:** |
| Signature: | Signature: |
| Name: | Name: |
| Title: | Title: |

Witness

|  |  |
| --- | --- |
| **For and on behalf of :** | **For and on behalf of :** |
| Signature: | Signature: |
| Name: | Name: |
| Title: | Title: |