Appendix B

Requirements Specification and Supplier’s offer

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# General

## Background and scope

The Danish Defence Acquisition and Logistics Organization (DALO) wish to conclude a framework agreement regarding acquisition of Dog Mounted Sensor, Communication and Light Systems (DMSCLS). The Agreement concerns delivery of DMSCLS and includes furthermore spare parts, education and service and support.

## Concept

DALO wish to purchase a DMSCLS, which can easily be mounted on a Military Working Dog (MWD), provide picture/video feed from a dog mounted sensor and enable discrete voice commands to the dog.

The DMSCLS will be used in both domestic and international operations/missions. All system components (sensors, light, comms., transmitters, battery, cables etc.) that can be mounted on the MWD shall be fully integrated with and/or in the harness worn by the MWD. The design/configuration of the system components and/or harness shall not in any way limit/prohibit the MWDs ability to execute the operator’s commands. The design/configuration of the system components and/or harness shall enable the MWD connected to/with an operator to fast rope and/or air drop if required. The DMSCLS shall be able to interface to 3rd party products to enable transmission of picture/video feed.

The DMSCLS is expected to operate both day and night in a variety of weather and climatic conditions ranging from freezing snowy conditions, through temperate wet and foggy conditions to hot conditions. This especially means that the sensor(s), comms., batteries and cables placed on the MWD should be able to cope with these environments. Not only temperature and weather conditions should be considered. As the DMSCLS will be used in both domestic and international operations/missions the system’s ability to cope with vibrations, shock, pressure changes from firing weapons and electromagnetic fields surrounding the dog is also important.

The DMSCLS shall be able to work on all kind and size of dogs.

## Use Case

The use of the DMSCLS is described below in a likely operational scenario:

As preparation for a mission/operation the operator/dog handler mounts a sensor, comms., and light system on a harness specially fitted for the particular MWD. The equipment is locked in a transport mode. The operator uses the Human-Machine Interface (HMI) to record up to four voice commands that the operator can used to command the MWD on the battle ground – if required. The operator and MWD are transported to the battle field in a helicopter. The operator attaches the MWD to his vest and uses a fast robe to exit the helicopter.

When in a safe location, the operator ensures that the equipment is no longer in transport mode, raises the sensor on the back of the MDW, verifies that video/picture feed is received on the HMI from the dog mounted sensor, that voice commands and the light system can be activate using the HMI.

The operator and MWD moves from the safe location to the battle field where the MWD is send into a compound through a door to look for explosive and enemy fighters. When inside the compound the operator commands the MWD using the 4 pre-recorded voice commands that the MWD hears through a discrete speaker near its ears. During the search the MWD has to enter a dark building. When entering the dark building the operator turns on the light on the MWD in order for the MWD to navigate and the operator to get a video/picture feed from the dog-mounted sensor. The MWD is commanded to lie quietly in a corner in order for the operator to discretely observe a hallway to get situation awareness. The operator remotely turns off the light and uses the DMSCLS low light capability to observe in the dark hallway. The operator connects the DMSCLS to a 3rd party system to distribute the picture/video feed to allied troops on the battle ground. After a period of time the operator remotely turns on the light and commands the MWD to exit the building and compound using the pre-recorded voice commands.

# System description

The DMSCLS consists of 4 predefined sub-systems, where DALO expect that DMSCLS sub-system consists of a number of standard hardware components, which includes but is not limited to:

* Sensor sub-system:
	+ Human-Machine Interface (HMI/video): Wireless receiver of video/picture signal and screen.
	+ The daylight capacity: low light capability sensor and transmitter to be mounted on the Harness.
	+ Low Light thermal capacity: Near InfraRed (NIR) sensor and transmitter mounted on the Harness
	+ Thermal imaging capacity: Long Wave IR sensor and transmitter mounted on the Harness.
* Light sub-system:
	+ Human-Machine Interface (HMI/ light): Wireless control of light emitting equipment mounted on the harness and MWD.
	+ The components mounted on the harness’ control of onboard light.
* Comms. sub-system:
	+ Human-Machine Interface (HMI/comms.): Wireless transmitter of voice commands.
	+ The components mounted on the harness to deliver voice commands from the operator to the dog.
* Harness sub-system:
	+ The vest mounted on the MWD.

## DMSCLS

The Supplier shall offer:

* A DMSCLS as described under section 2 and which shall comply with the requirements as specified in Section 5.

## Documentation

The Supplier shall offer the following documentation:

* User manual comprising operation and handling of the system.
* Users maintenance: Maintenance Level I (ML-I) of the DMSCLS incl. how to deal with rain, snow and ice.
* Procedure for testing system is operational/in working condition.
	+ Installation manual comprising of information concerning e.g. recommended position and mounting of all the system components and harness on the MWD.
* Spare part catalogue which shall include main components and relevant spare parts.
* Interface Control Document (ICD) describing mechanical, electrical and software interface that is supported by the DMSCLS.
* Radio frequency profile – for integration purposes. If the DMSCLS somehow is emitting frequencies able to influence radio transceivers a radio frequency profile shall be provided.

## Education

The Supplier shall offer a course which shall include:

Training for master instructors/train the trainer and maintenance personnel:

This course shall provide thorough understanding of the DMSCLS, and shall provide information concerning:

* Basic operational principles of the DMSCLS.
* How the individual components work and how they communicate with each other.
* How to install the system.
* How to replace individual components.
* How to start and test the system.
* How to perform user maintenance (ML-I) on the DMSCLS.
* How to find and handle/repair defects/problems.
* How to operate the system and use the HMIs.
* How the documentation is structured and how to read the spare parts list.

Other information:

* The course is for max. 5 students at a location in Denmark.
* The Danish defence will provide class rooms, terrain, workshop etc. for the training.
* The Supplier shall provide necessary special tools and/or test equipment etc. for the training.
* The course shall be held in English or Danish, and documentation used during the course shall be in English or Danish as well.
* The course shall comprise a mix of theory and practical exercises.

Note price stated in Appendix B.1 “Suppliers prices” is for a complete training course, not a price per student.

## Service and support

If DALO wish support for repair of defect components the Supplier shall offer hourly rates for the following type of support:

* Technician (Maintenance at Workshop level and/or repair of defect components)

# Maintenance

The Buyer handles all maintenance related activities. In case the Buyer has a need for service and/or support related to repair and/or maintenance of the delivered products, the products will at the cost of the Buyer be transported to Supplier's location for repair/maintenance. Pricing will be in accordance with the Technician price per hour stated by the Supplier in Appendix B.1 “Suppliers prices”

# Definitions and abbreviations

In this chapter we describe definitions and abbreviations used in this requirement specification.

## Definitions

DMSCLS Dog Mounted Sensor, Communication and Light System System mounted on a MWD using a harness. A system that is able to provide picture/video feed from a dog mounted sensor and enable discrete voice commands to the dog.

ML-I Maintenance level I – Maintenance at User level.

ML-II Maintenance level II – Maintenance at Workshop level.

The System DMSCLS as described above

Human-Machine Interface The operators remote control, feed-back and display module

## Abbreviations

DALO Danish Defence Acquisition and Logistics Organization

HMI Human-Machine Interface

STANAG NATO Standardization Agreement

LWIR Long Wave Infra Red

Classification

The following categories are valid for the ’Classification’ column. Each requirement is classified as ‘Mandatory Requirement’ or ‘Requirement’. Mandatory Requirements are marked with ‘**M**’. Requirements are marked with ‘R’.

| ClassificationID | Description |
| --- | --- |
| **M** | A mandatory requirement shall be fulfilled by the tenderer. If a mandatory requirement is not fulfilled, the offer will be excluded from further evaluation  |
| R | Requirement. These requirements will be evaluated or tested by Danish Defence  |

Documentation

The following categories are valid for the ’Documentation’ column. It specifies how the tenderer should document how the proposed equipment/service fulfills the requirement. It is possible to specify more than one documentation requirement.

| DocumentationID | Description |
| --- | --- |
| Y/N | Tenderer must answer with Y (yes) or N (no) if the requirement is fulfilled. If necessary with comments. Please observe that if it is a Mandatory Requirement answering ‘No’ results in an unconditional offer  |
|  D | The offer must include a description ***or*** attached valid documentation. |

# Requirements

| **Id. No.** | **Requirement description** | Classification | **DALO comment** | Documentation | Requirement compliance | **Evaluation** | **Tenderer’s description** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | **Water**The System shall comply with STANAG 4370, AECTP300, method 307, procedure 1-Immersion or equivalent.  | M | Documentation or description shall be provided for each system component at 1 meters depth for 30 minutes. | Y/ND |  |  |  |
| 2 | **Battery**All batteries required by the System should be same type and model. | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 8%** |  |
| 3 | **Battery**The batteries for the Human-Machine Interface (HMI/video) and the Camera shall be the same type and model. | M |  | Y/N |  |  |  |
| 4 | **Battery**All batteries used to power the System shall be rechargeable batteries. | M  |  | Y/N |  |  |  |
| 5 | **Battery**It shall be possible to replace all batteries used to power the System without the use of special tools. | M |  | Y/N |  |  |  |
| 6 | **Charger**The battery charger for all rechargeable batteries shall support 220-240VAC 50 Hz and 110VAC 60 Hz.  | M | Shall support 110-240 VAC, 50-60 Hz | Y/N |  |  |  |
| 7 | **Charger**The battery charger should be able to draw power from either BA5590 and/or BA5390. | R | Describe which batteries you support. | Y/ND |  | Yes: 5 PNo: 1 P**Weighting: 1,125%** |  |
| 8 | **Charger**The battery charger should be able to draw power from 12-24VDC power source in a vehicle. | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 1,125%** |  |
| 9 | **Operational time**The System shall (fully charged and at 20 degrees Celsius) have an operational time of no less than 30 minutes. | M |  | Y/N |  |  |  |
| 10 | **Line Of Sight (LOS) range**The System shall have a LOS range between the equipment mounted on the dog (Video sensors, Light and Comms. system) and HMI (video), HMI (light) and HMI (Comms.) of no less than 250 meters. | M | The Supplier shall document or describe the maximum LOS range between each of the identified components from the equipment mounted on the dog and the corresponding HMI. | Y/ND |  |  |  |
| 11 | **Frequency**The System shall be operable within the Communications Frequency limits described for Denmark in: www.efis.dkwww.efis.dk. | M | The Supplier shall in addition to Y/N describe or document the frequencies and output power of the System. | Y/ND |  |  |  |
| 12 | **Operation of multiple systems** It shall be possible to operate 4 Systems simultaneously within 10 meters from each other without interference occurs between System subsystems and components. | M | The Supplier shall in addition to Y/N specify the number of Systems that can operate simultaneously within 10 meters from each other without interference that degrades DMSCLS functionality | Y/ND  |  |  |  |
| 13 | **Encryption**The wireless connection between the Camera sensor and HMI/video should be encrypted, without loss of performance and/or functionality. | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 5%** |  |
| 14 | **Harness configuration**The Supplier shall offer Harness in a small, medium, and large configuration. | M |  | Y/N |  |  |  |
| 15 | **Harness**It shall be possible to adjust the Harness configuration specific to the individual dog. | M |  | Y/N |  |  |  |
|  16 | **Rails/bracket**The rails/bracket used to mount the Camera sensor shall be fully integrated on/in the Harness.  | M | The integration shall ensure that the components mounted on the harness will not be entangled with the environment.  | Y/N |  |  |  |
| 17 | **Rails/bracket**The rails/bracket to mount the Camera sensor on the Harness shall be located on the back of the dog. | M |  | Y/N |  |  |  |
| 18 | **Rails/bracket**It shall be possible to mount/un-mount the rails/bracket from the Harness without the use of special tools. | M |  | Y/N |  |  |  |
| 19 | **Handle**The Harness shall include a handle located on the back of the dog in the longitudinal direction.  | M | The operator uses the handle to lift/carry the dog. | Y/N |  |  |  |
| 20 | **Load bearing loops**The harness shall include two load bearing loops for fast roping: one in the front (head end of the dog) and one in the end (tail end of the dog) where as a minimum a 12mm fast rope can be fastening. | M |  | Y/N |  |  |  |
| 21 | **Load bearing loops**The two load bearing loops shall be made of a material that makes fast roping silent. | M | The load bearing loops shall not be made of metal. | Y/N |  |  |  |
| 22 | **Coexistence**The two load bearing loops, mounting equipment, the Camera sensor, transmitters, the comms. and light equipment shall be located on the Harness in such a way that it can coexist without any reduction in functionality. | M | The Supplier shall provide pictures of the System mounted on a dog that displays/includes all the system components offered. | Y/ND |  |  |  |
| 23 | **Camera arm**The Camera sensor shall be located on an arm that can be manually deployed from the Rails/bracket located on the Harness and locked in an outright (vertical) position. | M |  | Y/N |  |  |  |
| 24 | **Camera arm**The Camera sensor arm shall be flexible and be able to tilt 180 degrees in the longitudinal direction in case the Camera and/or arm hits an obstacle.  | M | This is the mode used during operation. | Y/N |  |  |  |
| 25 | **Camera arm**When not in use it shall be possible to lock the Camera arm including the Camera sensor to the Rails/bracket located on the Harness. | M | This is the mode used during transportation. | Y/N |  |  |  |
| 26 | **Camera arm & Camera**The Camera arm and Camera sensor shall be mounted on the Rails/bracket located on the Harness using a Quick Release mechanism.  | M | Release and mounting of Camera arm and Camera shall be possible without the use of tools. | Y/N |  |  |  |
| 27 | **Weight**The Camera arm and Camera sensor shall have a total mass of no more than 1.0 kg. | M | Batteries to be included. | Y/N |  |  |  |
| 28 | **Sensor**The DMSCLS shall be equipped with a low light sensor capacity. | M | Low light capability: to see in very low light (0,0003 lux)  | Y/N |  |  |  |
| 29 | **Sensor**The DMSCLS shall be equipped with Low Light thermal capacity: Near InfraRed (NIR) sensor  | M | Capability: to see in total darkness  | Y/N |  |  |  |
| 30 | **NIR light**The DMSCLS shall have a NIR light source that is integrated into the harness. | M | No emission of visible light (380-800 nm) | Y/N |  |  |  |
| 31 | **Sensor**The daylight Camera sensor should be a color sensor. | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 5%** |  |
| 32 | **Sensor**The daylight Camera sensor should have a minimum resolution of 600 horizontal lines.  | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 5%** |  |
| 33 | **Sensor**The DMSCLS should have a sensor with thermal sensitivity working in the spectrum suitable for body temperature. | R | Understood as LWIR | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 2,25%** |  |
| 34 | **Human-Machine Interface (HMI/video)**The Human-Machine Interface (HMI/video) should have a battery indicator showing the Battery level on the Camera sensor equipment. | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 8%** |  |
| 35 | **Human-Machine Interface (HMI/video)**The screen on the Human-Machine Interface (HMI/video) shall be minimum 4” (inch). | M |  | Y/N |  |  |  |
| 36 | **Human-Machine Interface (HMI/video)**The screen on the Human-Machine Interface (HMI/video) should be a color screen and provide a minimum resolution of 600 horizontal lines. | R |  | Y/N |  | Yes to both: 5 PNo: 1 P**Weighting: 5%** |  |
| 37 | **Human-Machine Interface (HMI/video)**The Human-Machine Interface (HMI/video) shall include a brightness/dim adjustment option. | M |  | Y/N |  |  |  |
| 38 | **Human-Machine Interface (HMI/video)**The Human-Machine Interface (HMI/video) should be able to forward the audio recorded via a microphone mounted on the MWD to the Operator headset using a Standard connector: 3.5 mm jack. | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 5%** |  |
| 39 | **Video interface**The System shall be able to connect to external radio and/or recording systems supporting one or more of the following analog and/or digital options:Interface requirements:(analog):- Physical interface: VGA or Composite or phono or RCA video port- Data protocol: NTSC/PAL(digital)- Physical interface: RS-232 or RS-485 or RS-422 or HDMI or Serial/Ethernet capability (RJ45)- Data protocol: H.264 (MPEG-4 part 10) or DDL/IP(alternative digital)- USB RNDIS Host and Device | M |  | Y/N |  |  |  |
| 40 | **Microphone**The System should include a microphone that can be mounted on the Harness that can transmit audio to the Human-Machine Interface (HMI/video) | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 8%** |  |
| 41 | **Audio interface / PPT box**The System should be able to distribute the audio from a microphone through the Human-Machine Interface (HMI/video) to an Invisio X50/V60 PTT BOX, to forward the audio to the Operator headset using a Standard connector: 3.5 mm jack.(PTT BOX Part number: Invisio V60-521220) | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 8%** |  |
| 42 | **Recording**The System should be able to record video onto a replaceable storage media connected directly to the Human-Machine Interface (HMI/video). | R | Connected directly is defined by: either an internal storage in the Human-Machine Interface (HMI/video) or external connected storage. | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 8%** |  |
| 43 | **Storage** The operator should be able to replace the storage media without the use of tools.  | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 2,25%** |  |
| 44 | **Storage** The storage media should be a SD-card or USB memory stick.  | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 5%** |  |
| 45 | **Video/audio-format** Recordings done by the system should be in a video/audio-format that can be played on an Android tablet.  | R | Examples could be: MP3 and/or MPEG4. | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 8%** |  |
| 46 | **Gloves** All the System’s functions and adjustments shall be accessible for the Operator equipped with 2 mm thick gloves where no heat can be transferred to the HMI.  | M |  | Y/N |  |  |  |
| 47 | **Comms. and Light system**The Comms. and Light system shall be mounted on the Harness using a Quick Release mechanism.  | M | Release and mounting of the Comms. and Light system shall be possible without the use of tools. | Y/N |  |  |  |
| 48 | **Remote control of flash light**The Light system shall be equipped with a normal light capability that can be remotely turned on/off from the Human-Machine Interface (HMI/ light). | M | Normal light capability is defined as the wavelength spectrum of 380-940 nm. The light source shall be located on the dog in such a way that the dog can use it to navigate in dark environments. The light shall not blind the MWD or sensors. | Y/N |  |  |  |
| 49 | **Remote control**The DMSCLS shall be able to remotely turn on/off the IR light from the Human-Machine Interface. | M |  | Y/N |  |  |  |
| 50 | **Voice commands**It shall be possible to record as a minimum 4 voice commands in the Comms. system using the Human-Machine Interface (HMI/comms.). | M | The voice commands are used by the Operator to give commands to the dog during operation. | Y/N |  |  |  |
| 51 | **Voice commands**It shall be possible to activate up to 4 different voice commands in the Comms. system located on the dog remotely from the Human-Machine Interface (HMI/comms.).  | M |  | Y/N |  |  |  |
| 52 | **Blinding strobe light**The DMSCLS should be equipped with a blinding strobe light capability that can be remotely turned on/off from the Human-Machine Interface. | R | Shall not affect dog’s ability to see or sensors ability to function properly. | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 8%** |  |
| 53 | **Climate** The System should be functional without modification in the climate zones: A1, A2, A3 and C0. (Definition of climate zones: STANAG 4370 and AECTP-200).  | R | The Supplier shall in addition to Y/N specify which of the stated climate zones that are supported. | Y/ND |  | 1 P per. Climate Zone supported. 5 P if all zones are supported**Weighting: 5%** |  |
| 54 | **Documentation** All documentation shall be delivered in either Danish or English.  | M |  | Y/N |  |  |  |
| 55 | **Documentation**All documentation shall be provided in a digital format in PDF. | M |  | Y/N |  |  |  |
| 56 | **Documentation** The Supplier shall deliver User manual, comprising: - Operation and handling of system - User maintenance documentation for ML-I (User level) of the system. | M |  | Y/N |  |  |  |
| 57 | **Documentation** The Supplier shall deliver technical drawings and pictures of the offered components.  | M |  | Y/N |  |  |  |
| 58 | **Documentation** The Supplier shall deliver a spare parts catalogue including illustrations for each of the spare parts.  | M |  | Y/N |  |  |  |
| 59 | **Training/courses** The Supplier shall deliver a training course for master instructors/train the trainer and maintenance personnel for up to 5 persons with duration of no more than 2 days at a location in Denmark. | M |  | Y/N |  |  |  |
| 60 | **Service and support**The supplier should be able to deliver phone and mail support within normal business hours for special point of contacts, free of charge.  | R |  | Y/N |  | Yes: 5 PNo: 1 P**Weighting: 2,25%** |  |
| 61 | **Software updates**The Supplier shall make any software and firmware updates available when released, free of charge. | M |  | Y/N |  |  |  |
| 62 | **Service and support**The Supplier shall offer a fixed hourly rate on a Technician performing ML-II and/or repair of defect components. | M |  | Y/N |  |  |  |

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