telemax™ EVO Hybrid

TELEROB
An AVS Company

PRODUCT DESCRIPTION

EOD ROBOT
telemax EVO HYBRID

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TELEMAX EVO SERIES

The very latest generation of remote-controlled manipulators is characterized by unrivaled manipulation, climbing and all-terrain capabilities. Featuring different drive systems and manipulators, all members of the telemax EVO series specialize in different fields, yet can still be used universally. All of these vehicles boast the revolutionary precision manipulator with Tool Center Point Control, tool magazines with automatic tool exchange and countless preprogrammed motion sequences. The large selection of interchangeable accessories for all members of the telemax EVO series enables adaptation to the most diverse applications and specific tasks.

	HYBRID	PLUS
MANIPULATOR, REACH	++	++
MANIPULATOR, REACH UPWARDS	++	++
MANIPULATOR, LIFTING CAPACITY	++	+++
COMPACT DIMENSIONS	+++	+
LOW WEIGHT	++	+
TOTAL PAYLOAD CAPACITY	++	+++
MOBILITY, STAIRS	+++	++
OVERCOMING OF OBSTACLES	+++	++
DRIVING SPEED	++	+
DRIVING BEHAVIOR ON TERRAIN	++	++
BATTERY LIFE	++	+++
USE OF HEAVY-DUTY TOOLS	++	+++
SUITABILITY FOR CBRN SCENARIOS	+++	++

EOD ROBOT
telemax EVO HYBRID

1 GENERAL

The EOD robot telemax is a high sophisticated, small and versatile EOD robot designed to be operated by bomb disposal engineers. It is best suited for operation in confined spaces like airplanes, underground trains and coaches.

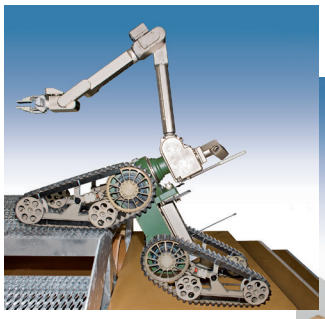
What sets the EOD robot telemax EVO apart from its predecessor telemax, is a multitude of new functions and technical further developments. The telemax EVO boasts a modern, future-proof operating concept with multi-touch screen and an ergonomic design. Its intuitive operation is based on the applications we're all familiar with from the world of tablets and smartphones.

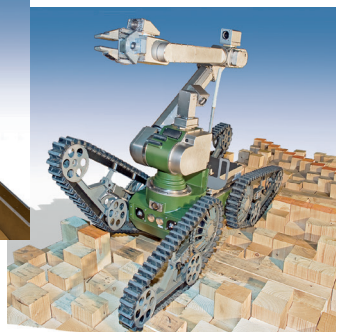
Wireless operation over IP Mesh guarantees stable radio transmission and outstanding network coverage, particularly in urban environments. The additionally installed repeaters can be used to increase the range by 1,000 m (LOS) each if necessary.

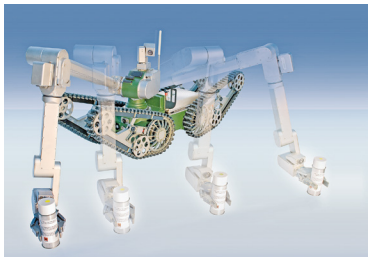
The HD Pan/Tilt/Zoom camera with LED lighting produces razor-sharp images, ensuring a perfect overview during use. A GPS module and a 2-way audio module are integrated in the system as standard.

Highlights:

- Programmable manipulator with tool center point (TCP) control
- Excellent mobility due to four-track running gear
- 6-axis manipulator with rotating turret
- Modern, sustainable operating concept with multi-touch screen and ergonomic design
- PTZ camera in HD quality
- Choice between standard speed version and high speed version
- Outstanding reach owing to the height-adjustable chassis
- Tool changing system with two tool magazines
- Plug&Play sensor technology
- Fully integrated 2-way audio module
- Simultaneous display of four video feeds (quad view)
- Multi-robot operation
- Two different battery types available:
  NiMh battery and Li-ion battery (Li-ion battery system in conformity with IATA, UN 38.3)
- Interfaces for the following firing systems:
  AQUASET, ABL 3000L, DemiMod, NEEDLE, PROPARMS 12.5 RC, PROPARMS 20 RC MKIII, PROPARMS 29 RC, RE 70 M3 Plus, Vulcan, RE 50, Viper, RE 12g Mini, BENELLI M4 Super 90, PAN and LANCE
- T-mini controller for easy loading and unloading of the robot







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1.1 CHASSIS AND RUNNING GEAR

The EOD robot telemax EVO HYBRID is equipped with a 4-track running gear featuring individually adjustable flippers. Each flipper has its own drive system, which is one of the reasons why the 4-track drive system features superior mobility compared to all other types of chassis configurations. For example, it can easily cope with inclines of 45° or 100%. Obstacles measuring up to half a meter (19.6 in) in height can be overcome, as can 600 mm (23.6 in) wide gaps in the surface. Separately suspended and spring-mounted, each flipper can be operated individually, in pairs, or all at once. At the touch of a button, an intelligent control system presets the running gear configuration to match the given situation. In addition, the operator can choose between a normal and a fast drive mode depending on the task at hand*. This makes the operator's task much easier, especially when the vehicle has to negotiate a narrow stairwell or high steps. Safety brakes secure the chassis from rolling away when the robot comes to a halt on gradients and sloping terrain.

Sensors permanently inform the operator about the inclination of the EOD robot. By using the auto level function, the EOD robot can be automatically stabilized at any time with the touch of a button.

In standard configuration, the top speed of the telemax EVO HYBRID is 4 km/h (2.4 mph). The high speed version runs along at a brisk 10 km/h (6.2 mph) (with wheels). The wheels can be mounted to the drive axes easily and quickly without the need for tools.

* Both standard speed version and high speed version feature the two different drive modes.

1.2 MANIPULATOR

In order to appreciate the remarkable advantages of a telemax, it is important to take a quick look at how conventional EOD robots work. When using one of these, approaching a suspicious object with the manipulator involves a separate moving of multiple individual axes, each of which must be selected by pressing a button and operated separately.

By contrast, the telemax is little short of revolutionary. It is the world's first EOD robot that features TCP control. TCP refers to an imaginary "tool center point" or – stated more simply – the gripper or disrupter: This imaginary point in space is moved by simultaneously using a thumb and index finger joystick. The intelligent control system automatically computes the axes necessary for attaining the desired target point.

What does this mean for the bomb disposal engineer? He saves precious time – and the more complicated the route to the suspicious object, the more time he saves. TCP control also enables high precision manipulation by moving the tool accurately to the desired position.

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Moreover, the vehicle's integrated robot control system offers other major advantages: it is fully programmable. This way, routine manipulator movements or running gear positions can be programmed as "automatic motion sequences", stored and called up by the operator whenever required by pressing a button.

1.3 CONTROL SYSTEM

The EOD robot telemax EVO HYBRID can be controlled by radio link (RF), via a 3m cable (9.8 ft cable) or via an optional fiber optic cable.

When operating in wireless mode, communication between the EOD robot and the control station takes place via IP Mesh radio that transmits encrypted signals in both directions. With a clear line of sight it is possible to attain ranges of up to 1,000 m (3,280 ft). Moreover, thanks to powerful transmitters, operations inside buildings do not pose a problem.

An optional fiber optic cable control system is available for certain operational situations. It is used when electromagnetic radiation must be absolutely avoided. When the fiber optic cable is connected, the wireless control components automatically switch off; this is a plug-and-play function.

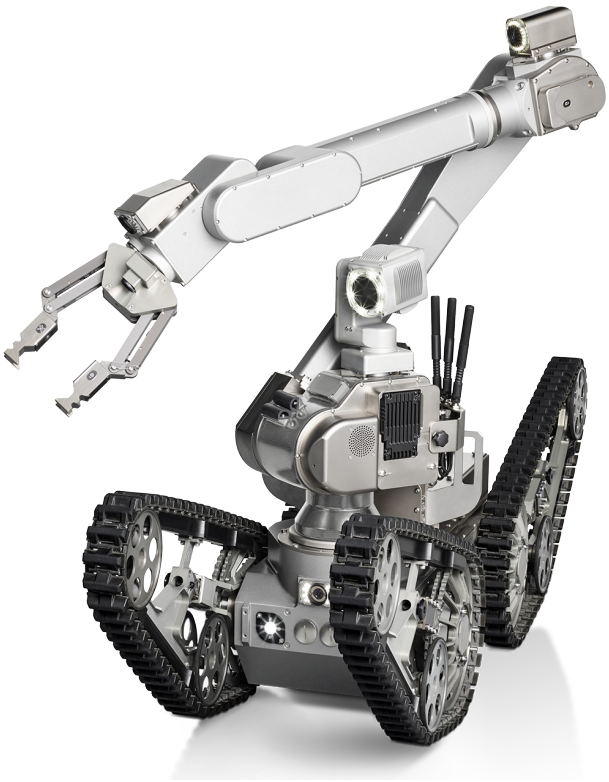
During radio and cable operation alike, a built-in computer takes over monitoring and control functions, relieving the pressure on the operator when conducting standardized sequences and control functions. An outstanding feature of the control system is the programmability of recurrent movement sequences, known as "automatic motion sequences". These automatic moves are selected by pressing a button, causing the system to shift into the desired end position. Programming is very easy, and can be performed by the user at any time.

The EOD robot telemax EVO HYBRID has a built-in collision protection, meaning that all the axes of the manipulator, the chassis and the flippers are protected against colliding with one another*.

1.4 LOADING

The telemax EVO HYBRID's batteries are charged using a charger, which is connected to the EOD robot using a corresponding cable.

* This only involves protection against collision with itself and does not prevent a collision between the vehicle and its surrounding environment.



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1.5 CAMERAS AND INTERFACES

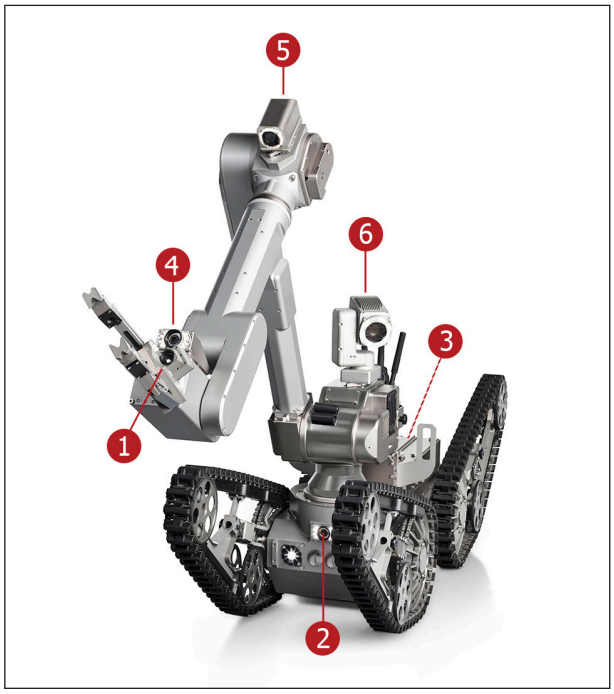

Figure: Cameras

1.5.1 CAMERAS

The standard configuration of the EOD robot telemax EVO HYBRID includes three high-quality color cameras:

› Gripper camera (1)
› Front camera (2)
› Rear camera (3)

In addition to the three standard cameras, further plug-on modules can be mounted to standard interfaces at the manipulator within seconds. The following plug-on modules are available:

› HD PTZ camera day/night with connection TEI
› Fix-focus camera (4)
› Zoom camera (5)
› PTZ camera (6)
› P/T thermal imaging camera
› P/T night vision camera
› 360° Camera

telemax EVO HYBRID features a quad view technology which makes it possible to display images from different cameras at the same time. This makes driving in confined spaces much easier, and also substantially simplifies manipulator operations.

1.5.2 INTERFACES

The EOD robot telemax EVO HYBRID features seven interfaces: Five interfaces are integrated in the manipulator, two are realized in the chassis. A large variety of accessories (see chapter 6) can be attached to these interfaces. The interfaces also enable to integrate customer-specific devices.

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1.6 OTHER IMPORTANT CHARACTERISTICS

1.6.1 BUILT-IN-TEST

When the main switch is activated the system always conducts an inertial self-test. Essential internal communication functions are automatically checked, as is the status of the system. The vehicle is not cleared for operation until all safety-related checks have been successfully completed. This prevents the deployment of any system which is not fully functional.

1.6.2 SAFETY CLUTCHES

Built-in safety clutches prevent overload and potential damage of the mechanical assemblies and possible damage of the respective motor gearbox units. When a safety clutch is triggered, e.g. after inadvertent collision with an obstacle, the manipulator's position is automatically recalculated and the system is immediately ready for operation again.

1.6.3 POWER SUPPLY

For extended operating times, Telerob supplies lithium ion batteries in addition to the conventional nickel-metal hydride batteries. The lithium ion batteries meet IATA transport regulations (UN 38.3).

The telemax EVO HYBRID can be equipped with up to two batteries. Using more than one battery increases the length of operation.

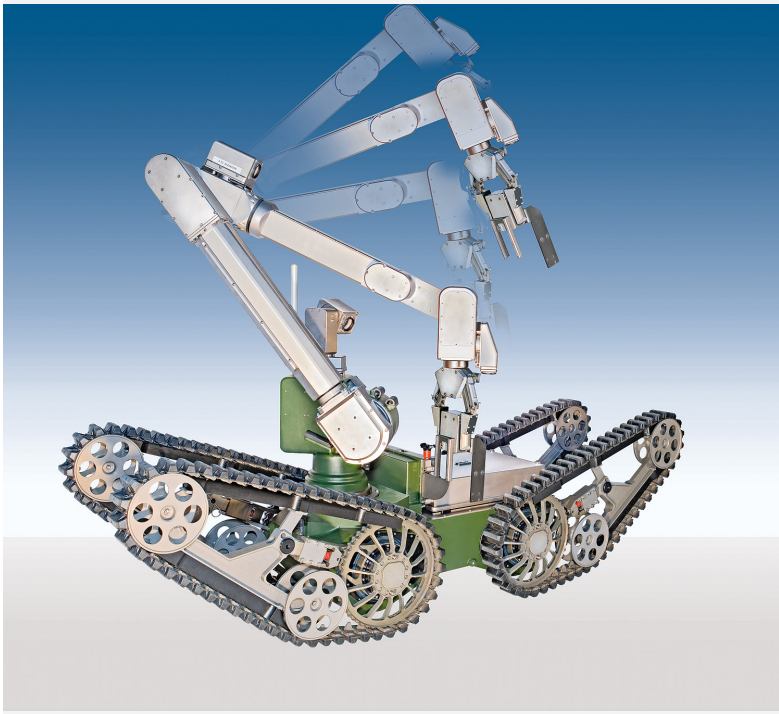

Figure: Tool magazine

1.6.4 AUTOMATIC TOOL CHANGE

The telemax EVO is the only vehicle in its class to have two tool magazines integrated in the chassis. This means that up to two additional tools or disrupters can be carried on an operation, eliminating the need to return to base to pick up new equipment. Once again, the operator saves valuable time, permitting him to concentrate on the actual task at hand. At the touch of a button, the manipulator automatically withdraws an extra tool from the magazine.

TELEMAX EVO SERIES

2 CHARACTERISTICS OF EOD ROBOT TELEMAX / TELEMAX EVO

	telemax	telemax EVO
RADIO SYSTEM	Digital and analog RoboLAN IP Mesh	IP Mesh radio (control data, video data and audio data, higher data rate, various options, e.g. use of repeaters)
MODULAR RADIO MODULE	✕	✓
MULTI-TOUCH SCREEN	✕	✓
CONTROL	Communication unit and control panel	Robo Command
PTZ CAMERA IN HD QUALITY	✕	✓
OPTICAL ZOOM RANGE PTZ CAMERA	18x	30x
VIDEO RECORDER	External	Integrated video recording
VIDEO DISPLAY	Picture-in-picture	Quad view
2-WAY-AUDIO SYSTEM	Optional	Integrated
LIGHTING	LED	White light LEDs and infrared LEDs
SUN SHIELD	External	Integrated in controller
MULTI-ROBOT OPERATION	✕	✓

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3 TECHNICAL DATA
3.1 CHASSIS AND RUNNING GEAR

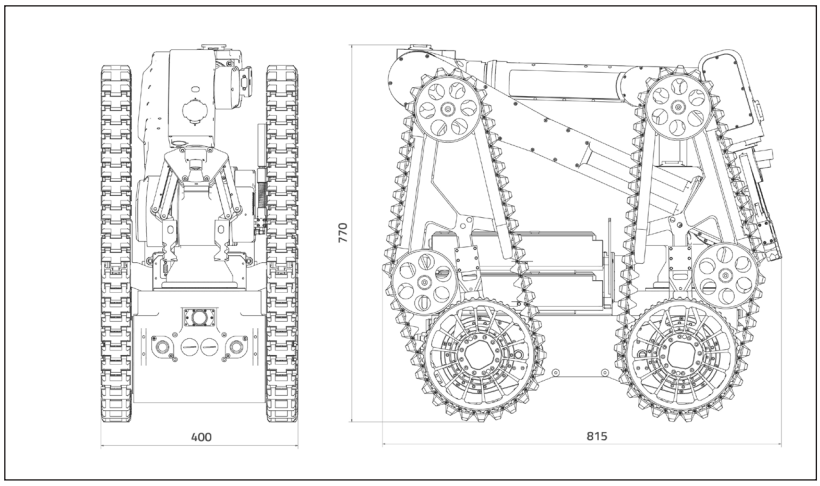

Figure: Packing position

LENGTH	815 mm (32 in) (system in packing position)
WIDTH	400 mm (16 in)
HEIGHT	770 mm (30 in) (system in packing position w/o options)
WEIGHT	78 kg (172 lb)(w/o battery, w/o accessories)
SPEED	Standard speed version: max. 4 km/h (2.4 mph) High speed version: max. 10 km/h (6.2 mph)
DRIVE	Four-track system with track units (flippers) that can be controlled individually, 4 wheels can optionally be attached
TURNING CIRCLE	900 mm (35 in) (theoretical) (depending on surface)
MOBILITY (STAIRS & SLOPES)	45° (depending on surface)
MOBILITY (OBSTACLE HEIGHT)	500 mm (20 in)
MOBILITY (GAP WIDTH)	600 mm (24 in)
FORDING DEPTH	266-660 mm (10-26 in) (depending on flipper position)
UNIVERSAL INTERFACE	1
FIRING CHANNEL	1
PAYLOAD	31 kg (68 lb) (totally)

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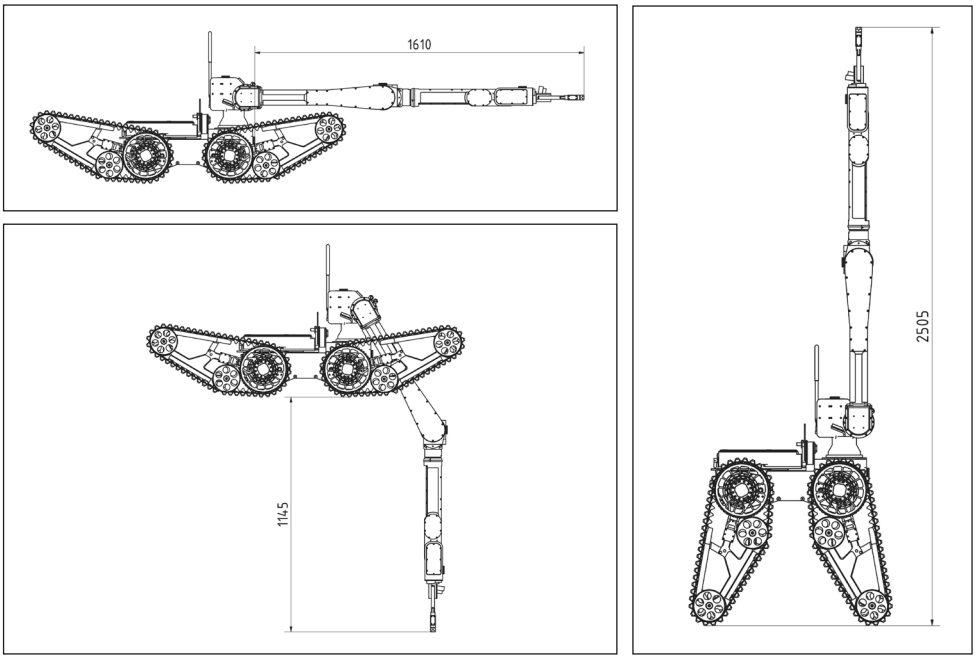
FLIPPER SWIVELING RANGE	-85° to +80°
POWER SUPPLY	NiMh battery: 24 V, 15 Ah; 10 kg (22 lb) Li-ion battery: 26 V, 40 Ah; 8.6 kg (19 lb)
TIME OF OPERATION	NiMh battery (mixed operation): approx. 2 h with 1 battery; approx. 4 h with 2 batteries Li-ion battery (mixed operation): approx. 5 h with 1 battery; approx. 10 h with 2 batteries

Technical data ±0,5% tolerance

3.2 MANIPULATOR

3.2.1 REACH



Figures: Reach

UPWARD REACH	2505 mm (99 in)
FORWARD REACH	1610 mm (63 in)
DOWNWARD REACH	1145 mm (45 in)

Technical data ±0,5% tolerance

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3.2.2 RANGE OF MOVEMENT

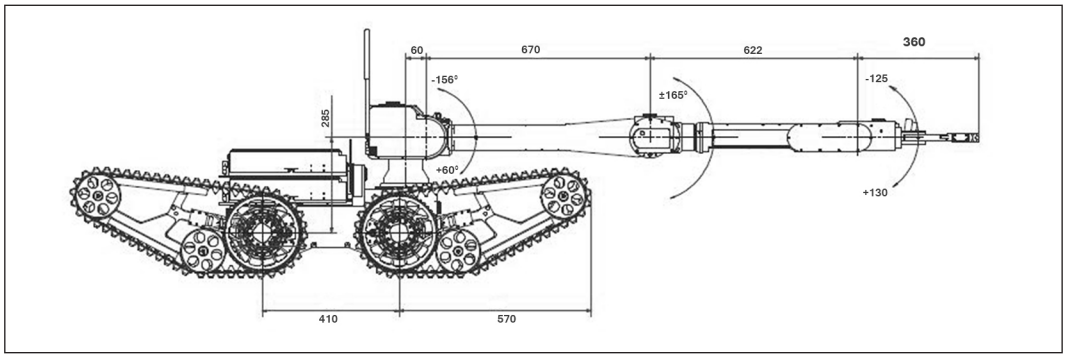

Figure: Range of movement of manipulator

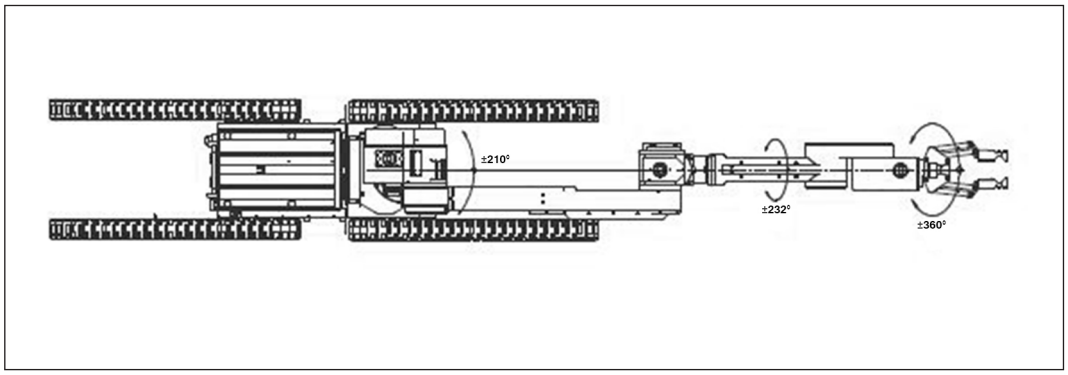

Figure: Range of movement of turret

AXES	6 rotating axes and gripper
TURRET TURN	± 210°
UPPER ARM TILT	+60° to -156°
LOWER ARM TILT	± 165°
LOWER ARM TURN	± 232°
WRIST TILT	- 125° to +130° (w/o plug-on modules)
WRIST TURN	Infinite
GRIPPER OPENING WIDTH	200 mm (8 in)
GRIPPER PAYLOAD	7.5 kg (16 lb)

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GRIPPER FORCE	Max. 300 N
UNIVERSAL INTERFACE	3
INTERFACE	1 (gripper – firing channel, accessories) 1 (elbow – firing channel)
PRE-PROGRAMMABLE POSITIONS	Yes
SAFETY CLUTCH	In each rotating axis
TCP MOVEMENT	Max. 0.16 m/s

Technical data ±0,5% tolerance

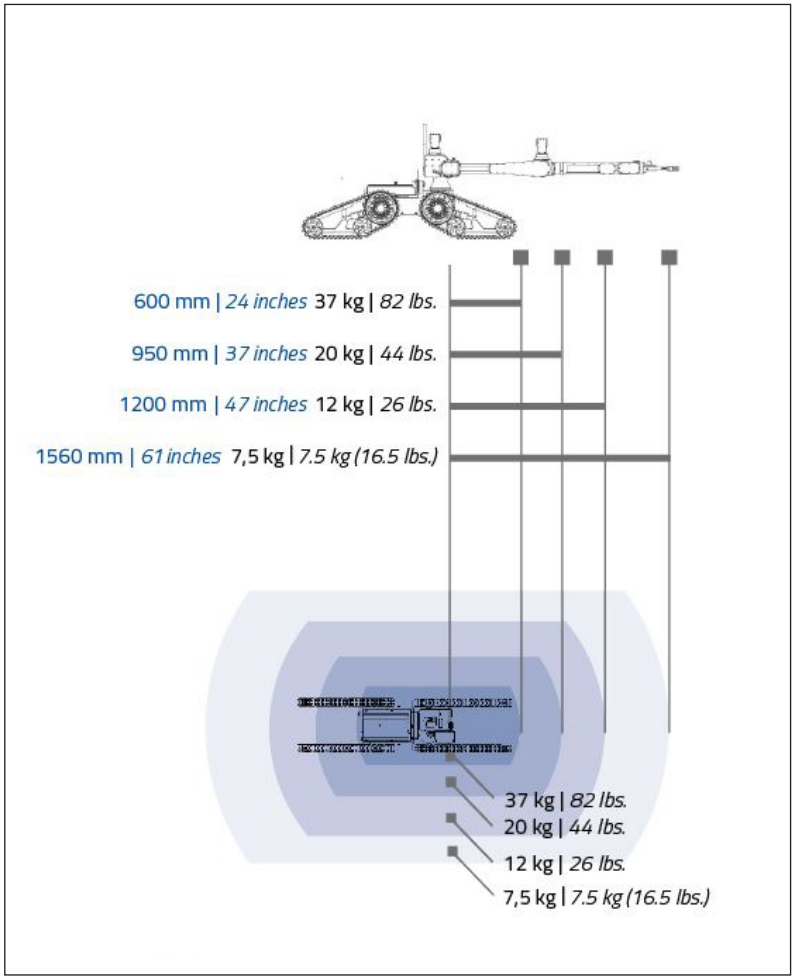

Figure: Load diagram

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3.3 CAMERAS

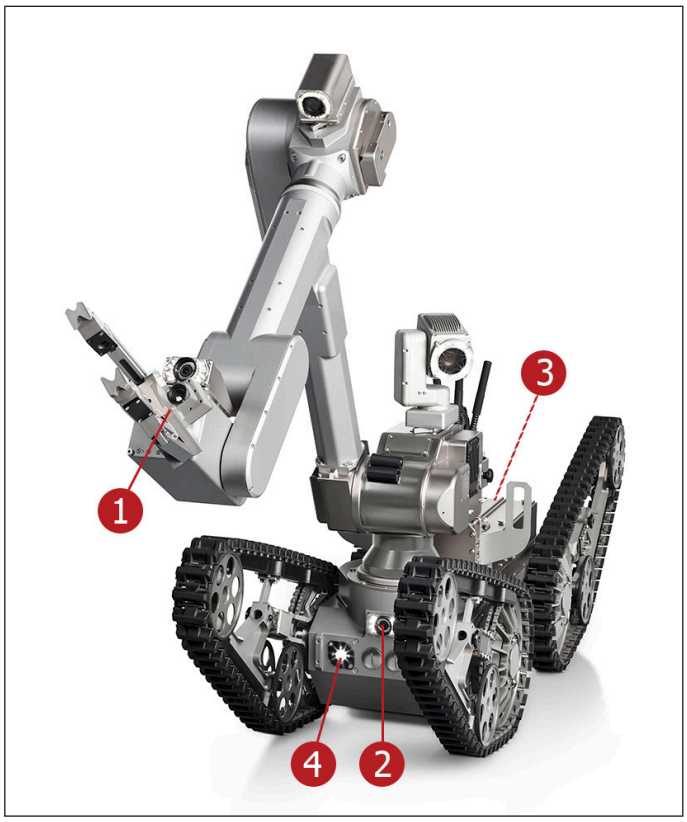

Figure: Cameras

NUMBER OF CAMERAS	Up to eight cameras possible: 3 cameras (standard scope of delivery) 5 optional cameras

3.3.1 STANDARD CAMERAS

GRIPPER CAMERA (1)	Color, fixed focus, LED lighting (continuously switchable)
FRONT CAMERA (2)	Color, fixed focus, LED lighting (continuously switchable)
REAR CAMERA (3)	Color, fixed focus, LED lighting (continuously switchable)
HIGH BEAM (4)	2 (high bright power LED, 3 watts each)

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3.3.2 OPTIONAL CAMERAS

HD PTZ CAMERA DAY/NIGHT WITH CONNECTION TEI	Color automatic focusing, zoom, day/night, 0.01 lx (F1.6, AGC on, 1/30s), 30 x optical zoom, Full HD (1920 × 1080), wide angle 63.7°, tele 2,3°, pan/tilt head, 6 white light LEDs, 6 infrared LEDs (LEDs infinitely variable)
FIX-FOCUS CAMERA	Color, fixed focus, LED lighting (continuously switchable)
ZOOM CAMERA	Color, zoom, LED lighting (continuously switchable)
PTZ CAMERA	Color, zoom, LED lighting (continuously switchable)
P/T THERMAL IMAGING CAMERA	320 (H) x 256 (V), thermal sensitivity (NETD) < 50 mK at f/1.0[1]
P/T NIGHT VISION CAMERA	Color, zoom, 10 day & night zoom lens, LED lighting (continuously switchable)
360° CAMERA	Color, 30 x zoom, LED lighting (continuously switchable)

3.4 UNIVERSAL CHARGER

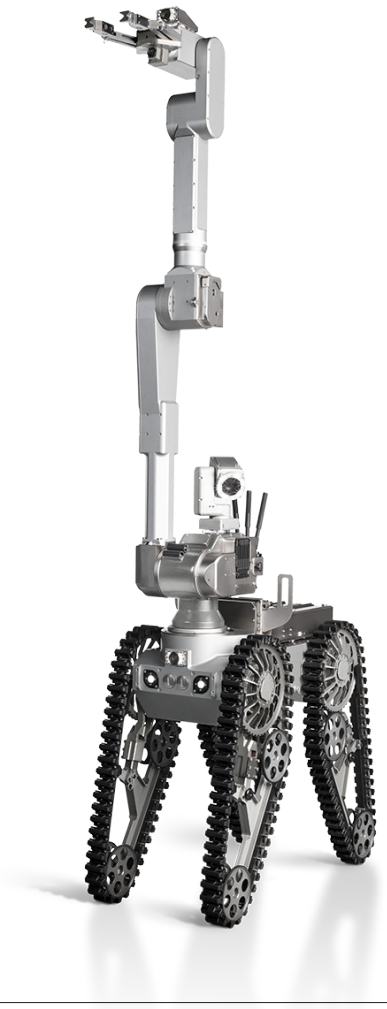
LENGTH	442 mm (17.4 in)
WIDTH	240 mm (9.4 in)
HEIGHT	280 mm (11 in)
WEIGHT	18 kg (39.6 lb)
INPUT	100 - 240 VAC

Technical data ±0,5% tolerance

3.5 CHARGER LIGHT

LENGTH	350 mm (13.8 in)
WIDTH	200 mm (7.8 in)
HEIGHT	90 mm (3.5 in)
WEIGHT W/O BATTERIES	3.7 kg (8.1 lb)
INPUT	85 - 264 VAC

Technical data ±0,5% tolerance



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3.6 ADDITIONAL DATA

BTN NUMBER	8479 5000
END USER CERTIFICATE	Required

3.6.1 ELECTRICAL/ELECTRONICS

ELECTROMAGNETIC COMPATIBILITY (EMC)	EN 301 489-1 EN 61000-6-2 EN 61000-6-3

3.6.2 RADIO LINK

The network is self-configuring, i.e. the best connection is always selected automatically, e.g. via repeaters. The frequency range can be restricted on the software side if required.

NETNODE IP MESH RADIO	FREQUENCY BAND	1,14 ... 1,5 GHz 2,0 ... 2,5 GHz 4,4 ... 5,0 GHz
	BANDWIDTH	6 MHz
	TRANSMITTING POWER	1 W
MPU5 IP MESH RADIO	FREQUENCY BAND	1,35 ... 1,39 GHz 2,2 ... 2,5 GHz 4,43 ... 5,0 GHz
	BANDWIDTH	10 MHz
	TRANSMITTING POWER	3 × 2 W (depending on radio module)

3.6.3 AMBIENT OPERATING CONDITIONS

TEMPERATURE RANGE	-20°C to +60°C
IP RATING	IP 67: chassis IP 65: manipulator
NOISE EMISSIONS	<70 dB(A)
CLEANING	Cleaning and decontamination with running water

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4 SCOPE OF DELIVERY STANDARD VEHICLE

4.1 EOD ROBOT

- Chassis with running gears
- 6-axis manipulator with rotating turret
- Programmable manipulator with tool center point (TCP) control
- Manipulator and flipper axes protected by safety clutches
- Built-in collision protection
- Integrated 2-way audio module
- Automatic tool changing system
- Pre-programmed automatic motion sequences for the flippers
- Pre-programmable automatic motion sequences for the manipulator (flipper movement can be included)
- Three color cameras with integrated lighting
- Five interfaces at the manipulator, 2 at the chassis
- Standard speed version: max. 4 km/h (2.4 mph) High speed version: max. 10 km/h (6.2 mph)
- Color: Grey aluminium (RAL 9007), other colors on request

4.2 ADDITIONAL

- Set of tools onboard
- Ten track links with bolts and changing tool
- Ring binder with manual, illustrated parts catalog and test certificate

5 COMPULSORY COMPONENTS

5.1 ROBO COMMAND

- Communication unit with telescopic mast, power supply and battery
- Controller
- Radio equipment IP Mesh
- Power supply unit with cable
- 3m cable (9.8 feet cable)
- Headset

5.2 RADIO AND VIDEO TRANSMISSON

An operational system needs at least one of the following components:

- NETNode IP Mesh radio
- MPU5 IP Mesh radio
- Fiber optic cable drum

5.3 POWER SUPPLY

An operational system needs at least one battery for the telemax EVO and one charger. The following components are available:

- NiMh battery; 24 V, 17 Ah
- Li-ion battery; 26 V, 40 Ah
- Universal charger with intelligent power management
- Case for universal charger
- Charger light

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6 OPTIONAL ACCESSORIES

The following optional accessories are available for the EOD robot telemax EVO HYBRID. The product description of the individual items is available separately upon request. We would be pleased to assist you with customized solutions or in integrating other systems.

If desired we also deliver the firing systems with the respective holders. Please note, in doing so, special regulations have to be met which might affect the delivery time.

6.1 FIRING SYSTEMS GRIPPER

- Holder AQUASET
- Holder ABL 3000L
- Holder NEEDLE
- Holder PROPARMS 12.5 RC
- Holder PROPARMS 20 RC MKIII
- Holder RE 12g Mini
- Holder Recoilless firing systems
- Holder DemiMod

6.2 FIRING SYSTEMS LOWER ARM

- BENELLI M4 Super 90
- Holder PROPARMS 20 RC MKIII
- Holder PROPARMS 29 RC
- Holder Recoilless firing systems
- Holder PAN
- Holder LANCE
- Laser aiming system

6.3 CAMERAS

- HD PTZ camera day/night with connection TEI
- Fixed-focus camera
- Zoom camera
- PTZ camera
- P/T thermal imaging camera
- P/T night vision camera
- Inspection camera
- 360° Camera

6.4 CBRNE ACCESSORIES

- Sensor platform with connection TEI
- Sample-taking platform (incl. sample-taking tools)
- Holder RadEye
- Holder SVG 2
- Holder XR 5000
- Holder FirstDefender RMX
- Holder ChemProX
- Holder Pendar X10
- Holder for detectors

6.5 X-RAY ACCESSORIES

- Holder for x-ray systems
- X-ray system VCSecurity
- X-ray system NOVO
- Fixing kit for x-ray system
- Support | holder for x-ray systems
- Holder XR150
- X-ray source XR150

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6.6 ADDITIONAL ACCESSORIES GRIPPER

- Holder MULTIBLOCK with mechanical tools
  - Key holder
  - Tearing hook
  - Window breaker
  - Belt cutter
  - Spring hook
  - Dig hook
- Wire cutter | steel blade
- Wire cutter | ceramic blade

6.7 ADDITIONAL ACCESSORIES CHASSIS

- Fiber optic cable drum
- Fiber optic cable drum | motor driven rewind
- Trigger source
- Sansolo Rapid Coil
- Repeater NETNode
- Repeater MPU5
- Repeater platform
- HD PTZ camera for repeater

6.8 ACCESSORIES CONNECTION UCI / UI

- Laser rangefinder
- UCI extension TEI

6.9 ADDITIONAL ACCESSORIES

- T-mini controller
- Wheels
- Flipper
- Basket
- Transport container
- Electronic spare parts package
- Mechanical spare parts package

Subject to technical change without notice.