

McZeal Robotics - www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com



The Future at the Service of Your Clients



FEATURES



Pepper and NAO are attractive humanoid robots designed to interact with visitors in any public place.

Linking physical and online channels, Pepper and NAO offer a new experience with real added value in a physical location.

Proactive

Thanks to their numerous sensors, Pepper and NAO detect and see people in their environment. They attract their attention and invite them to interact with them.

Attractive

Their design, size and humanoid behaviour, make Pepper and NAO easily accepted by everyone. They are not designed to replace anyone. They are meant to assist in simple and repetitive tasks, allowing employees to focus on more added-value missions.



Interactive

Created to communicate as naturally and intuitively as possible, Pepper and NAO use both their voice and body language to interact with people. Pepper's touch screen increases his capacity to interact and enables him to provide more information, particularly in graphic format. Also, Pepper is able to understand and speak in numerous languages.



Emotional Engaging

Apart from the empathetic link with audience created by their humanoid design, body language and tone of voice, Pepper and NAO engage people in a unique and emotional way which transform the user journey and leverage it to a new level.

Connected

Although Pepper is able to function without being connected to the internet, his performance is improved when he is connected to the Cloud via his Wi-Fi connection. This allows him to access his advanced voice recognition and emotional analysis services. It is also via the Cloud that Pepper provides you with the data he collects.



Customisable

An entirely programmable platform, Pepper offers infinite usage possibilities to enrich the customer's experience. Pepper's community of partners provides all the skills and know-how necessary to create, develop and adapt new content and uses, enabling Pepper to effectively meet your business goals.

TECHNICAL FEATURES

**Touch screen
to facilitate
interactions**

AUTONOMY

12 hours and autodocking
capacity

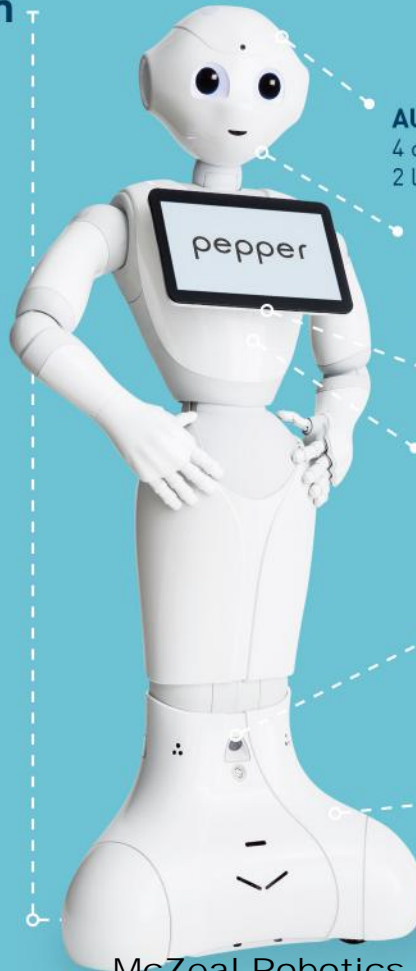
FLOWING MOVEMENTS

20 degrees of freedom

SPEECH RECOGNITION

More than 15 languages

120cm



pepper

AUDIO

4 omnidirectional microphones
2 loudspeakers

FACE DETECTION

Two 5 megapixels cameras
One 3D camera

CONNECTIVITY

Bluetooth - Ethernet - Wi-Fi

POWER

Processor ATOM
E3845

NAVIGATION

An inertial unit, infrared sensors, bumpers
2 sonars sensors for omnidirectional
navigating capability

3 omnidirectional wheels

28kg

McZeal Robotics - www.mczealrobotics.com

1-832-930-3777

sales@alrobots.com or almczeal@gmail.com

NAO⁶

POWER

Processor ATOM
Quad core 1.91 GHz
4 GB DDR3 RAM
32 GB SSD

TECHNICAL FEATURES

FACE DETECTION

Two 5 megapixels cameras

AUDIO

4 omnidirectional microphones
2 loudspeakers

EXPLORATION

2 sonars to detect obstacles

CONNECTIVITY

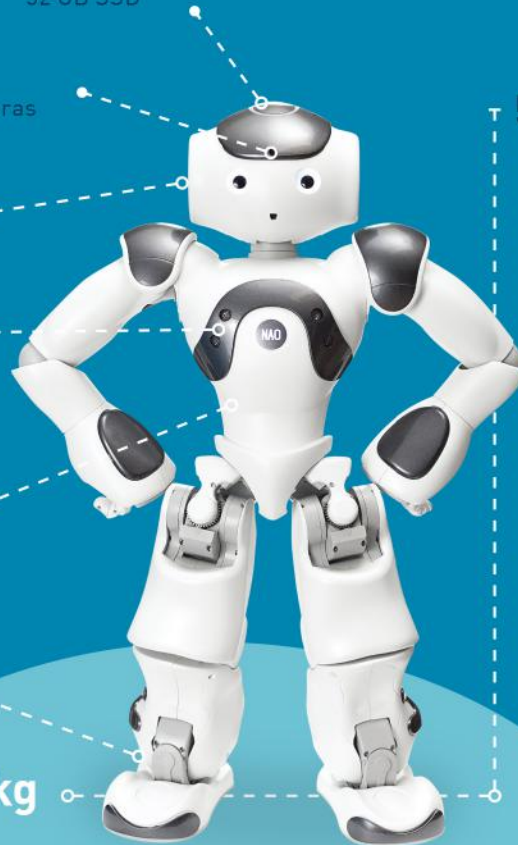
Bluetooth - Ethernet - Wi-Fi

ADAPTATIVE WALK

8x Force Sensitive Resistors

58cm

5,6kg



**Powerful motors
and robust fingers
for prehensile hands**

FALL & RECOVERY MANAGER

Detects falls, triggers
the protection and able
to stand up alone

FLOWING MOVEMENTS

20 degrees of freedom

SPEECH RECOGNITION

More than 20 languages

SOLUTIONS

Pepper and NAO are already deployed in more than 2 000 public places, assisting in various missions in retail, finance, tourism or even healthcare. They help to welcome, give information and interact with visitors in shops, banks, hotels, museums, airports, train stations, hospitals, nursing homes, offices or institutions.

ATTRACT

Stand-out to drive traffic

Pepper and NAO's attractive design arouses curiosity and inspire confidence and benevolence. They detect and attract or even approach visitors. Through voice and body language, they engage in dialogue easily. Animated relays of the communication campaigns: Pepper and NAO make it possible to link the online digital strategy to that in physical space.

WELCOME AND ASSIST

Ensure a memorable first impression and increase loyalty

Pepper and NAO offer a professional and constant welcome. They manage queues and entertain visitors to reduce perceived waiting time. They guide and answer common questions. They can also identify a customer to provide suitable content. Pepper and NAO understand the reasons for the visitor's arrival and inform their fellow humans. They are able to speak and understand about twenty languages. Entrusting robots with repetitive tasks makes it possible to allocate resources to missions with higher added value.

INFORM AND ENGAGE

Make your customers feel unique

Pepper and NAO are able to adapt to all customers. They can identify customers and recommend products and services tailored to their profile or purchase history. Connected, our robots have access to relevant information for visitors at all times. Pepper and NAO relentlessly present your products and services, and adapt their speech to their interlocutor (age, gender...)

SHARPEN CUSTOMER INSIGHTS

Gather meaningful customer knowledge with our robots

Pepper and NAO act as points of digital interaction between your company and the end user. They capture visitors' reactions and feed internal data teams (product perception, after-sales service, satisfaction questionnaire...). Once processed, the data helps build a more effective business strategy. Finally, Pepper and NAO complete the journey and deliver the adjusted messages to customers.



REDEFINE SERVICES

A new customer experience with personalized services

Pepper and NAO offer a wide variety of services. Thanks to their sensors, cameras and microphones, our robots interpret their environment and understand the requests of their interlocutor.

Connected to the Internet, to your CRM or ERP, Pepper and NAO extract information they need to provide a personalized service (Bookings, click & collect, registration...).

Interfaceable with other devices (payment terminals, printers, screens, tablets), our robots fulfill several roles and adapt to your service strategy.



FLEXIBLE SUPPORT SERVICES

SoftBank Robotics and its Partners have developed a Service and Guarantee package to support the critical nature of the missions entrusted to Pepper and NAO. The modular service options enable you to select the elements that are best adapted to the nature of your business. These options include training, configuration and installation of solutions with Pepper and NAO, as well as maintenance (repair or replacement of your robot).



A FLEET MANAGEMENT PLATFORM

Our solutions include a remote management platform for your fleet of robots.

The creation of groups of robots to which you can apply different application profiles enables you to remotely manage your fleet.

Our monitoring tools provide you with invaluable data regarding the usage and condition of your fleet of robots. This remote management optimises the use of robots on the ground, reduces service costs and rationalises reporting, all of which contributes positively to maximising your return on investment.

OUR OFFER



AN ECOSYSTEM OF CERTIFIED PARTNERS

In order to assist you in the deployment of solutions adapted to your needs, we have set up the first ecosystem of companies capable of providing you with advice, development and personalised solutions. Fully trained, our Certified Partners have developed a range of robotics know-how applicable to your different professional fields. Working closely with SoftBank Robotics, these experts will accompany you throughout the entire course of your projects involving our robots Pepper and NAO.

McZeal Robotics - www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com

TEACHING SOLUTIONS FOR A NEW WORLD

Education & Research

McZeal Robotics -
www.mczealrobotics.com
1-832-930-3777
sales@alrobots.com or
almczeal@gmail.com



 SoftBank
Robotics



MAKE THE NEW GENERATIONS READY FOR THE CHALLENGES OF TOMORROW

Attractive programmable humanoid robots, NAO and Pepper help you create unique, interactive classroom experiences.

NAO and Pepper are high performance robotic platforms designed for a wide range of multimodal expressive gestures and behaviors, making them ideal for educators and researchers. These two robots are evolving in the world of Education as new tools to assist teachers or as learning platforms for programming from primary school to higher education.

Teaching solutions for tomorrow's careers, NAO and Pepper are adapted to each level of education.

• For Primary Education

Thanks to their cute design, NAO and Pepper are great assistants to capture attention and learn while having fun.

• For Primary, Secondary and Higher Education

NAO and Pepper are great tools to learn programming and encourage a multidisciplinary approach to study projects.

Numerous national and international high school robotics competitions have selected NAO and Pepper as standard platforms. These projects are based on programming but also the design of a robot, mechanics, automation...

• For Special Education

ASK (*Autism Solution for Kids*) with NAO and Pepper evolves with different turnkey solutions for educators and therapists. Both robots are used in approach with young children with autism, as they have unlimited patience to help children communicate. Nice applications developed by our certified Partners combine an easy-to-use interface with activities programmed on the robot according to your specific needs.

In line with today's educational content and challenges

- Ideal platforms to introduce STEM related subjects such as Maths, Physics, Computer Science and Programming
- Cross-curricular applications that connect theory with practice
- Fully adaptable to current school programs.

Powerful platforms to engage students and teachers

- Hands-on, project-based learning to encourage teamwork
- Interactive lessons to drive greater participation
- Comprehensive and versatile educational solutions.

• For Educators

Studying robotics-related fields with NAO and Pepper has already proven its relevance to educators with clear benefits for students.

Using a robotic platform like NAO or Pepper:

- Enhances creative problem-solving techniques
- Promotes active learning
- Encourages a multidisciplinary approach.

• For Researchers

HRI, perception, cognition, navigation and localization are some of the fields that can be explored with NAO and Pepper.

NAO and Pepper have been selected to be the standard platforms for the RoboCup Soccer and RoboCup@Home (<http://www.robocup.org/>)

Dozens of teams from all around the world use NAO's and Pepper's set of skills to compete at the RoboCup event.

McZeal Robotics -
www.mczealrobotics.com
1-832-930-3777
sales@alrobots.com or
almczeal@gmail.com

NAO⁶

NAO and Pepper are programmable humanoid platforms

4 omnidirectional microphones
2 loudspeakers

Processor ATOM
Quad core 1.91 GHz
4 GB DDR3 RAM
32 GB SSD

Two 5 megapixels
cameras

58cm

Bluetooth - WiFi - Ethernet

More than
20 languages

2 sonars
to detect
obstacles

25 degrees
of freedom

FALL & RECOVERY MANAGER

Detects falls, triggers
the protection and able
to stand up alone

8x Force Sensitive
Resistors

Powerful motors
and robust fingers
for prehensile
hands

5,6kg

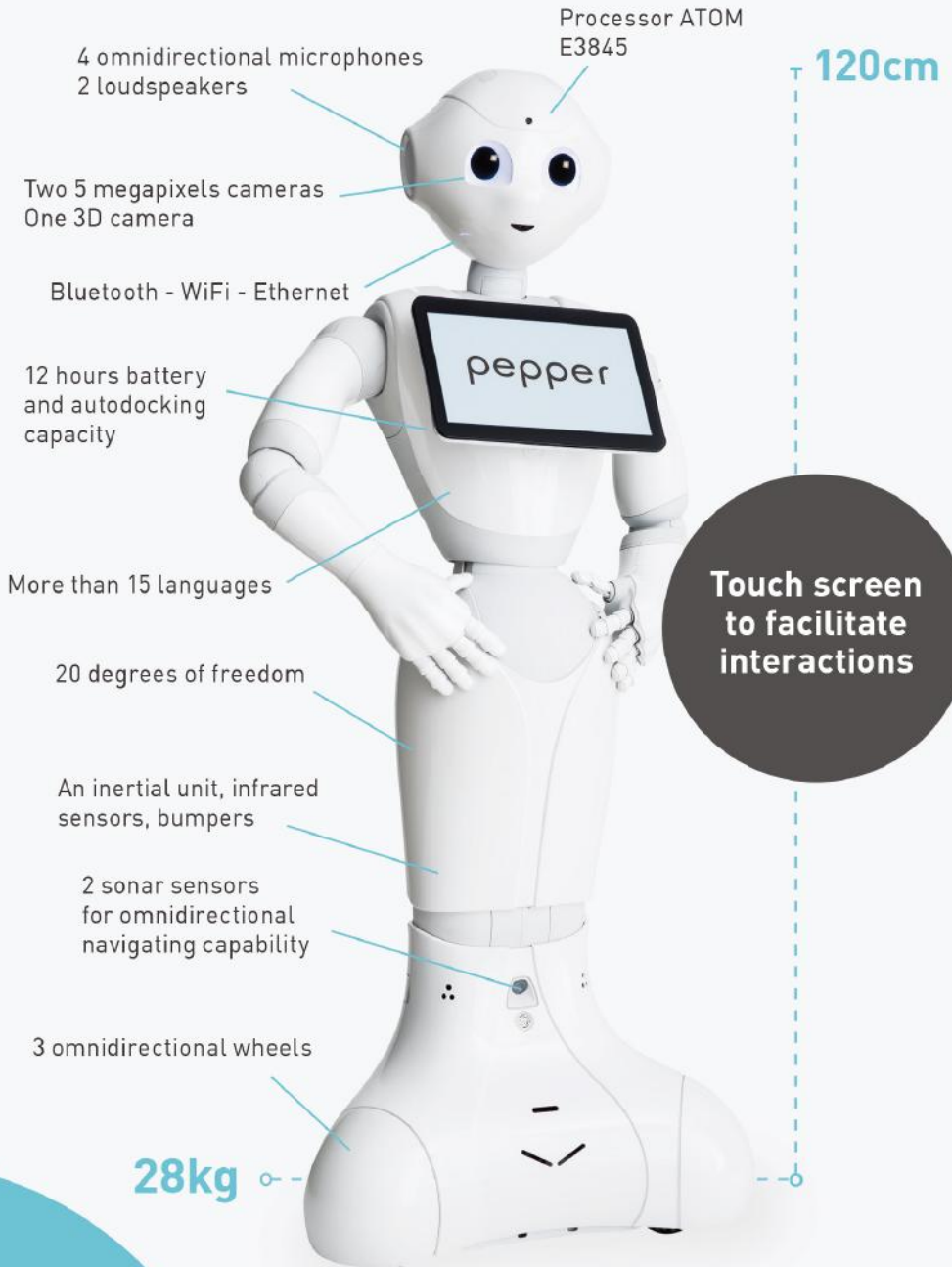
McZeal Robotics - www.mczealrobotics.com

1-832-930-3777

sales@alrobots.com or almczeal@gmail.com

NAO and Pepper are programmable humanoid platforms

pepper



McZeal Robotics - www.mczealrobotics.com

1-832-930-3777

sales@alrobots.com or almczeal@gmail.com

SOFTWARE & RESOURCES

NAO and Pepper come with all the foundational software required for educators and researchers.



C

CHOREGRAPHE

Discover coding with Choregraphe, our intuitive and graphical programming software, using simple drag & drop and algorithmic reasoning.

- Develop and package complete applications
- Create animations in interactive mode, without the need to pilot the robot's motors one by one
- Design verbal interaction with QiChat, our human-robot dialogue design language
- Train on a virtual robot
- Enrich the proposed library with your own code.

Several tutorials are available on Choregraphe for a quick and effective understanding of the tool.



McZeal Robotics -
www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com



C++
Python
Java

Android*
*only available
for Pepper



MONITOR

Demonstrate and explain mechatronics by monitoring the robot's activity thanks to our Monitor application.

NAOqi OS

NAO and Pepper run on NAOqi OS, a Unix based proprietary OS. The NAOqi Framework provides a programming base to develop applications on the robots. It corresponds to common robotics needs including: parallelism, resources, synchronization... Several SDKs are provided to control and develop with NAO and Pepper.

We offer API with:

- Low level methods enabling sensor reading and precise piloting of any motor
- High level methods giving access to a list of services like automatic detection of humans, obstacles avoidance or vocal synthesis.

OTHER STANDARD LANGUAGES

Some of our certified Partners also develop visual programming interfaces based on Blockly or Scratch to program NAO and Pepper easily.

SUPPORT

SoftBank Robotics offers a range of trainings adapted to your needs and your skills to help you and guide you in creating your own experiences with NAO and Pepper. Your projects can also be enriched with the help of our certified Partners (developers and distributors) specialized in the education sector.

McZeal Robotics -
www.mczealrobotics.com
1-832-930-3777
sales@alrobots.com or
almczeal@gmail.com



pepper

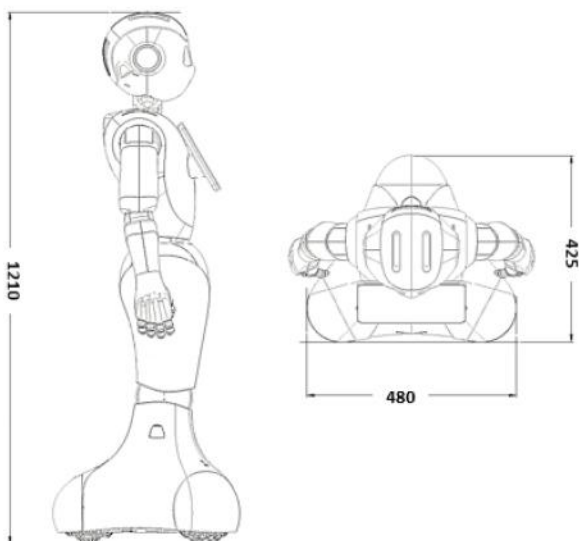
Datasheet 1.8a



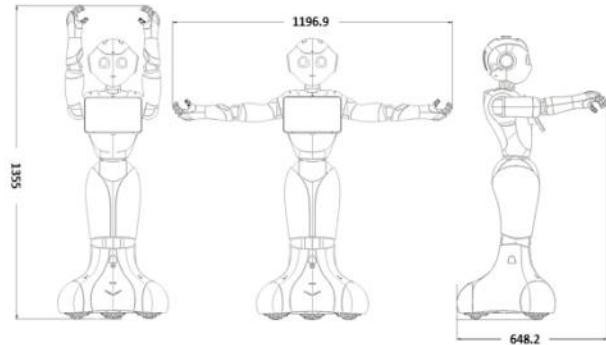
PHYSICAL CHARACTERISTICS

CONSTRUCTION

Dimension (HxWxL)	1208.5 x 477.2 x 424 mm	
Packaging (HxWxL)	1400 x 580 x 580 mm	
Weight	29.10 kg	
Weight with packaging	41.9 kg	
Working temperature range	5°C to 35°C (41°F to 95°F)	
Working humidity range	20% < 80% uncondensed	
Storage temperature range	-10°C to 60°C (14°F to 140°F)	
Storage humidity range	10% < 90%, uncondensed	
IP protection class	IPX0	
Autonomy	Self-discharge	4 months
	Standby mode	19 hours
	Intensive use	12 hours



CONSTRUCTION



BRAIN SYSTEM

MOTHERBOARD

Processor	ATOM E3845
CPU	Quad core
Clock speed	1.91 GHz
RAM	4 GB DDR3
Flash memory	32 GB eMMC (of which 24 GB available for users)
GPU	Intel HD graphics up to 792 MHz

HUMAN INTERACTION

TABLET

Model	LG CNS Tablet	
Dimensions	246 x 175 x 14.5 mm	
Buttons	Home, Back, Recent	
USB	USB 2.0 OTG Wire to board wafer type (Wi-Fi I/F)	
In-Speaker	20 Hz ~ 20,000 Hz 0.5 W (Normal) / 0.8 W (MAX)	
Microphone	Omnidirectional	
Camera	2 megapixel	
Display (LCD)	Size	10.1"
	Resolution	1280 * 800
	Panel type	TFT
	Touch type	Capacitive

McZeal Robotics -
www.mczealrobotics.com
 1-832-930-3777
sales@alrobots.com or
almczeal@gmail.com

TABLET

SD Socket	Micro SD	
Battery	None	
CPU	CPU: 1.3 GHz quad-core ARM Cortex-A7 MT8127/ Cache 512 KB L2 1.6G pixel/sec@416MHz	
DDR3 SD RAM	1 GB (512 MB * 2)	
Flash memory	32 GB (eMMC)	
Wi-Fi	802.11 a/b/g/n	
Bluetooth version	4.0 (LE)	
Media	File format	AVI, WMV, ASF, MP4, MKV, MPG, DAT, TS, TP, TRP, 3GP
	Video codec	DivX, XviD, H.264, W MV 9/8/7, MPEG1
	Audio codec	MPEG1 Layer 1/2/3, WMA, OGG Vorbis, PCM, FLAC
	Video resolution	Max 1920 * 1080
HTML5 video	File format	MP4
	Video codec	H.264
	Audio codec	AAC
	Video resolution	Max 1280 * 720

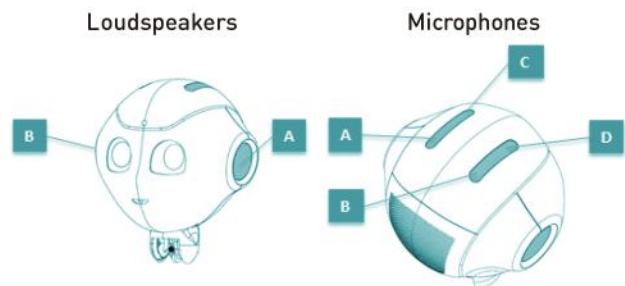
Note: Practical videos output is limited by network connection. Frame rate depends on CPU usage. Values are calculated with the CPU fully dedicated to image gathering.

AUDIO

Loudspeakers	Location	1 in each ear
	Nominal diameter	25 mm
	Impedance	8 Ω
	Sensitivity	78 dB 1w/1m @ 1kHz
	Frequency response (-10 dB)	70 Hz / 7.2 kHz
	Output power (nominal)	5 W
	Input power (peak)	20 W

AUDIO

Microphones	Location	4 on the head
	Sensitivity	300 mV/Pa +/- 3dB at 1 kHz
	Frequency range	100 Hz - 10 kHz (-10 dB relative to 1 kHz)



2D CAMERAS

Location	1 in the mouth and 1 in the forehead	
Model	OV5640	
Type	SOC Image Sensor	
Imaging array	Resolution	5 Mp
	Optical format	¼ inch
	Active Pixel (HxV)	2592 x 1944
Sensitivity	Pixel size	1.4 μm * 1.4 μm
	Dynamic range	68 db @8x gain
	Signal/ Noise ratio	6 dB (maximum)
	Responsibility	600 mV/Lux-sec
Output	Camera output	640 * 480 @ 30 fps
	Data Format	YUV422 color space
	Shutter type	Rolling shutter / frame exposure
View	Field of view	68.2° DFOV (57.2° HFOV, 44.3° VFOV)
	Focus range	30 cm ~ infinity
	Focus type	Fixed focus

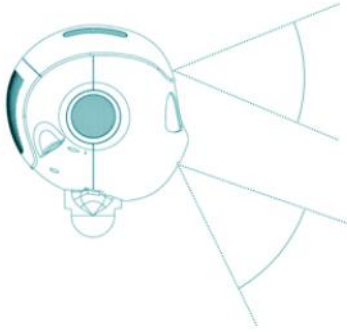
McZeal Robotics -
www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com

pepper

version 1.8a

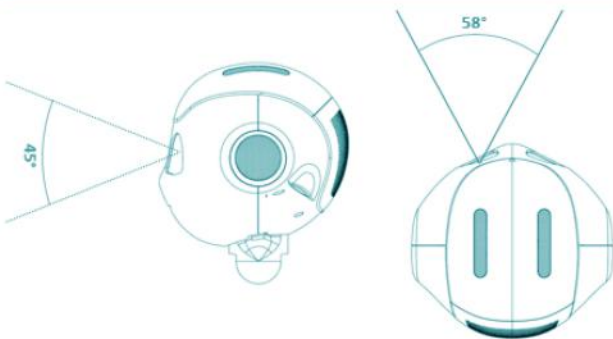
P.4

2D CAMERAS



3D CAMERA

Location	1 in the eyes	
Model	ASUS XTION	
Type	SOC Image Sensor	
Imaging array	Optical format	1/4 inch
	Active Pixels (HxV)	320 x 240
Output	Camera Output	320 * 240 @ 20 fps
	Data Format	(YUV422 color space)
	Shutter type	Electronic Rolling shutter (ERS)
View	Field of view	70.0° DFOV (58.0° HFOV, 45.0° VFOV)
	Focus range	40 cm ~ 8 m

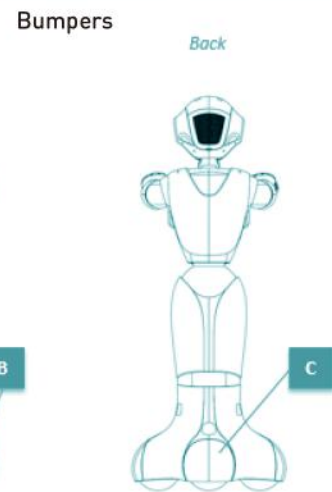
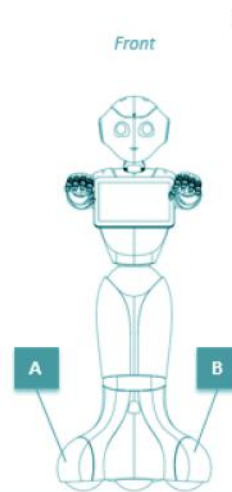
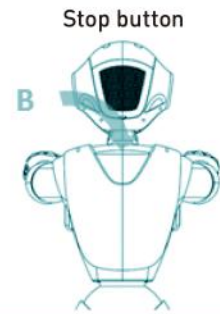
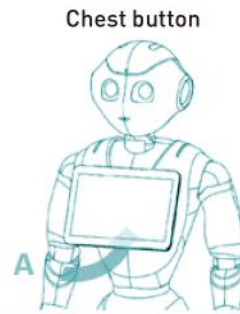


BUTTONS

Chest button	Number	1
	Location	On the Chest under the Tablet

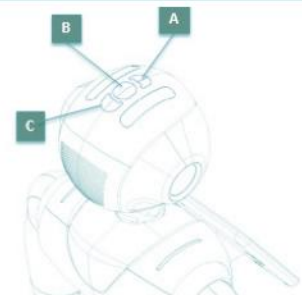
BUTTONS

Stop button	Number	1
	Location	On the nape of the neck
Wheel bumper	Number	3
	Location	2 in the front and 1 at the back on the Base



TOUCH SENSITIVITY

Head	Number	3
	Location	On the top of the Head
Hand	Number	2
	Location	On the back of both hands



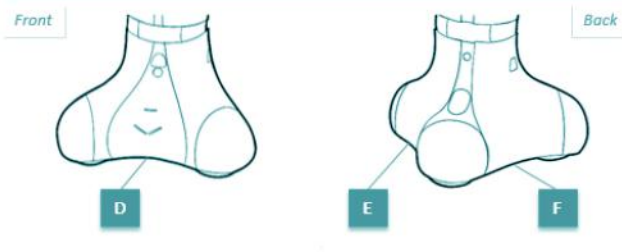
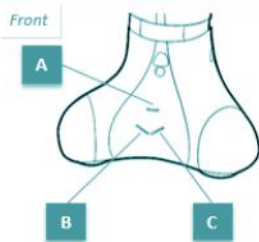
LEDS

Eye LEDs	Quantity	2 x 8
	Color	RGB FullColor
Ear LEDs	Quantity	2 x 10
	Color	16 shades of blue
Shoulder LEDs	Quantity	2 x 2
	Color	RGB FullColor

ENVIRONMENT SENSORS

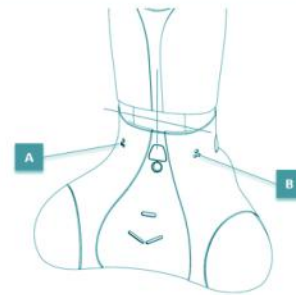
LASERS

Number and location	1 on each side of the base (3) 3 in the front of the base
Class	1M
Wavelength	808 nm
Mode of Operation	Pulsed
Framerate	6.25 Hz per laser
Global shutter camera	Auto-exposure control
Emission	15 dots projected at 60°E
Detection range	20 cm to 2.8 m at 3 cm above the ground



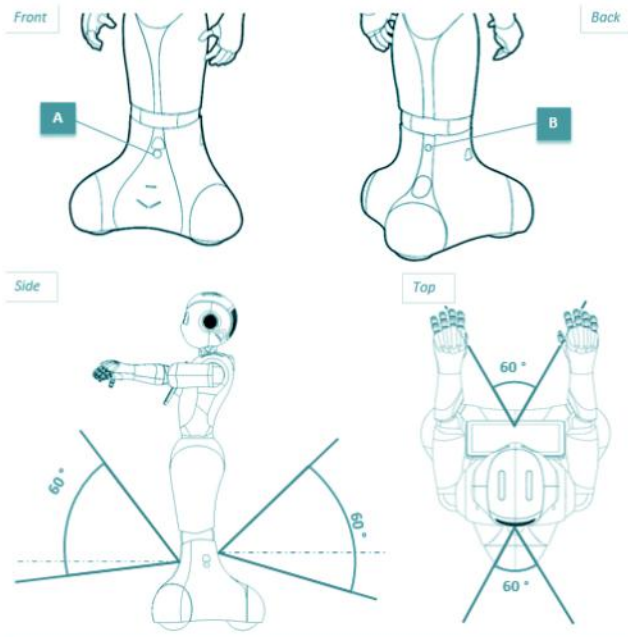
IR SENSORS

Number	2
Position	1 on both sides
Wavelength	808 nm
Range	0 to 50 cm at 27 cm above the ground
Angle	2°



SONARS

Position	1 in front and 1 at the back on the base
Frequency	42 kHz
Sensitivity	-86 dB
Resolution	0.03 m
Detection range	0* - 5m depending on object type * Closer than 0.3m will range as 0,3m
Effective cone	60° depending on the object type



pepper

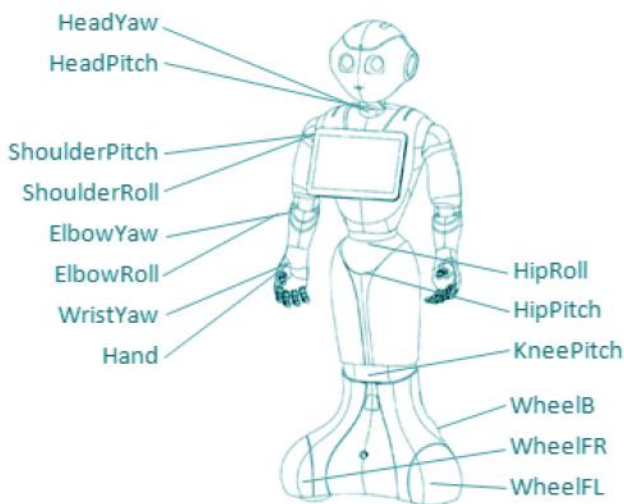
INERTIAL UNIT

Number	1
Composition	3-axis gyrometer with an angular speed of $\sim 500^\circ/\text{s}$ 3-axis accelerometer with an acceleration of $\sim 2\text{ g}$

MOTION

MOTORS

Location	Degrees of freedom	Movement
Head	2	HeadYaw
		HeadPitch
Arms	4	ShoulderPitch
		ShoulderRoll
		ElbowYaw
		ElbowRoll
Hands	2	WristYaw
		Hand
Leg	3	HipRoll
		HipPitch
		KneePitch
Base	3	WheelFL
		WheelFR
		WheelB



ROTATION SENSORS

MRE (Magnetic Rotary Encoder)	Number	30
	Sensor type	Hall effect sensor
	Precision	0.1°

MOTORS POWER

Motion speed	Up to 2 km/h
Climbing	Up to 1,5 cm
Max. slope	5°

CONNECTIVITY

Wi-Fi	802.11 a/b/g/n 64/128 bit: WEP, WPA/WPA2
Ethernet	1xRJ45 10/100/1000 base T
Bluetooth®	4.0

ENERGY

BATTERY

Type	Lithium-Ion	
Voltage	Nominal voltage	26.46 V
	Battery robot protection	22.5 V-24.2 V (depending on temperature)
Battery under voltage protection	17.5 V	
Battery voltage lockout	11.9 V	
Max. charge	29.4 V	

BATTERY

Current	Max. charge	8 A
	Use in active mode	Max. 3.5 mA (battery electronic)
	Use in stand-by mode	Max. 850 μ A (battery electronic)
	Use in power down mode (V < 2.5 V per cell)	Max. 50 μ A (battery electronic)
Typ. capacity	30 Ah 795 Ah	
Charging method	Constant Current / Constant Voltage	
Cycle life	Min.	300 \geq 20.65 Ah (70% of the capacity at 25°C)
	Expected	1000 \geq 70% of the capacity at 25°C
Operating temperature	Charging	0 to + 50°C
	Discharging	0 to +50°C
	Thermal protection	The battery interrupts charge/discharge when the temperature limits are reached.
Esd (en 61000-4-2 / 12.2009)	Air discharge	8 kV
	Contact discharge	4 kV
Weight	4.72 kg	

BATTERY CHARGER

Working temperature range	-5°C to 40°C (23°F to 104°F)	
Working humidity range	10% < 80% uncondensed	
Storage temperature range	-20°C to 70°C (-4°F to 158°F)	
Storage humidity range	5% < 95% uncondensed	
Charger life	3 years or 1000 cycles and 30 K hour minimum	

BATTERY CHARGER

Input Voltage range	100 ~ 240 V AC	
Charger input frequency if AC	47/63 Hz	
Output voltage	29.2 V DC	
Output max current	8 A	
Charging duration when robot is OFF	2 h	50% of charge
	3 h 30 min	80% of charge
	8 h	100% of charge
Full charge indication	LED pass to solid green at 99.4% in 6 h 30 min	
Casing dimension (HxWxD)	45 x 204 x 104 mm	
Weight	1.36 kg	
Weight (with packaging)	1.66 kg	
Packaging (HxWxD)	60 x 355 x 270 mm	
Cable length	AC	1.85 m
	DC	1.75 m
Casing material	Plastic	
Connector material	AD	PVC, PP, Brass, PA66
	DC	ABS-PC TiO2, Silicone 60 shore A, Paint UV coating

MATERIALS

Body (white parts) and Chest Button	ABS-PC + Paint/UV coating	
Body (grey parts)	PA + GF resin	
Soft parts	ABS-PC + TPV +Paint/UV coating, TPV + Paint/UV coating	
Base	ABS-PC, ABS-PC + Paint/UV coating	

pepper

version 1.8a

P.8

Base	PC
camera lens	
Wheels	PA + GF resin, PA + GF resin + TPU
Speaker / Microphone mesh	Steel + paint
LED lamp (shoulder)	PMMA
Eyes	PC + Ir ink, PC + Paint/UV coating
Ears	PC + Paint/UV coating
Mouth	ABS
Fingers	ABS-PC + Paint/UV coating, Silicone, PA + GF resin
Waist rubber	TPSiV
Charging port	ABS-PC
Charging terminal	Brass
Metal Pin	Steel alloy + Silicone
Plastic Pin	ABS-PC

McZeal Robotics -
www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com



McZeal Robotics -
www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com

NAO⁶



McZeal Robotics -
www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com



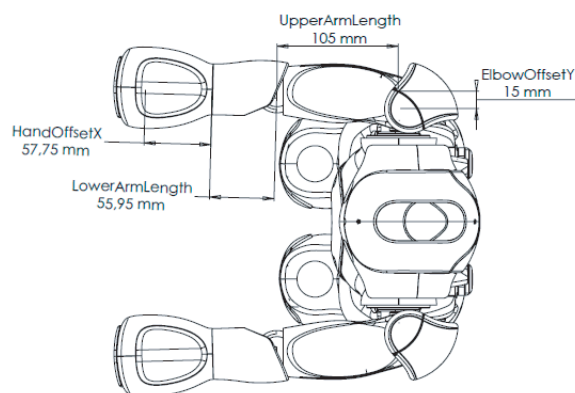
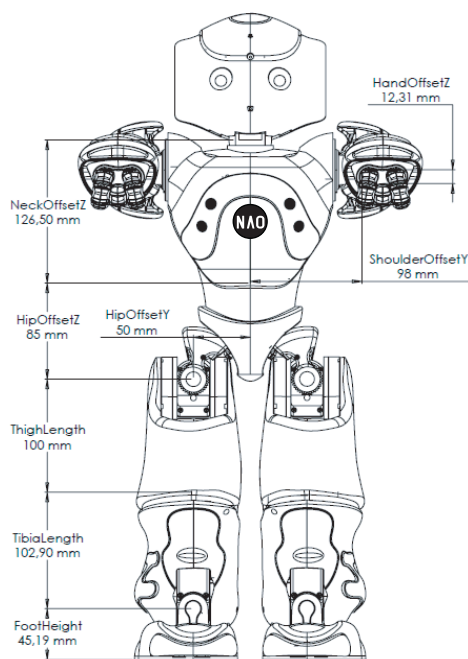
NAO⁶

MODEL: H25600

PHYSICAL CHARACTERISTICS

GENERAL

Size (HxDxW)	574x311x275 mm / 22.6x12.2x10.8 in
Weight	5.48 kg / 12.08 lb



BRAIN SYSTEM

MOTHER BOARD

CPU	CPU processor	ATOM E3845
	Cache memory	2 MB
	Clock speed	1.91 GHz
RAM	4GB DDR3	
Flash memory	32GB eMMC	

SOFTWARE

Open Nao	Embedded GNU/Linux Distribution based on Gentoo
Architecture	x86
Programming	Embedded: C++ / Python Remote: Java

HUMAN INTERACTION

LANGUAGES

Text to speech & Automatic speech Recognition	Czech, Danish, Dutch, English, Finnish, French, German, Italian, Japanese, Greek, Polish, European Portuguese, Brazilian Portuguese, Spanish, Swedish, Russian, Turkish, Arabic, Brazilian, Standard Mandarin, Taiwanese Mandarin, Norwegian.
---	---

AUDIO

Loud Speakers	Left & Right	
	Diameter	40 mm
	Impedance	4 Ω
	Audio power	87 dB +/- 3 dB
	Freq range	up to ~20 kHz
	Input	2 W
Microphones	x4 omnidirectional on the head	
	Sensitivity	-12dBV/PA @1KHZ
	Frequency range	100HZ to 10KHZ



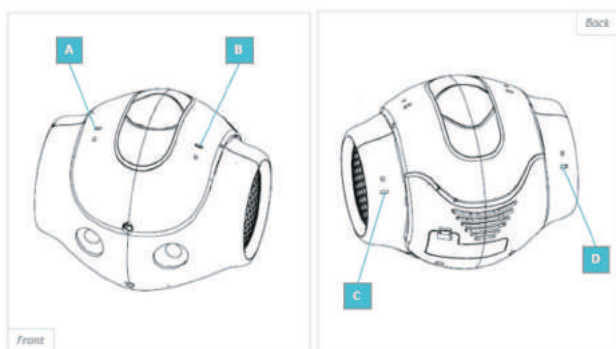
McZeal Robotics -
 www.mczealrobotics.com 1-832-930-3777
 sales@alrobots.com or almczeal@gmail.com

NAO⁶

McZeal Robotics - www.mczealrobotics.com 1-832-930-3777
sales@mczealrobots.com

LEDS

Placement	Quantity	Description
Tactile Head	12	16 White levels
Eyes	2x8	RGB FullColor
Ears	2x10	16 Blue levels
Chest button	1	RGB FullColor
Feet	2x1	RGB FullColor



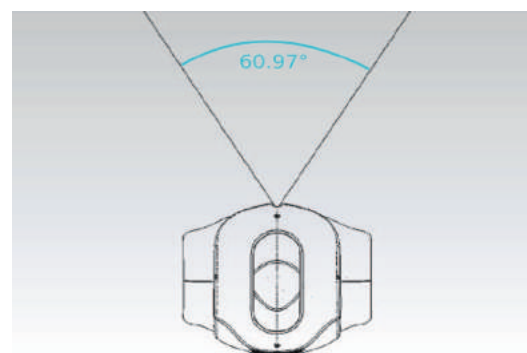
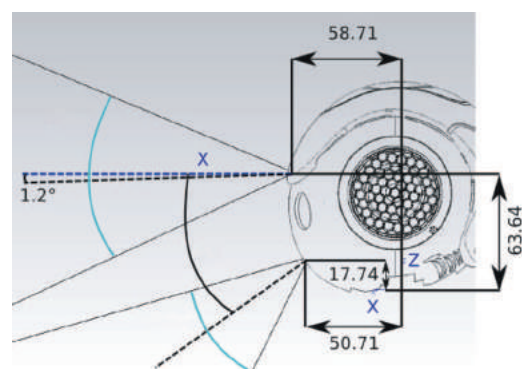
2D CAMERAS

Cameras	2 front of head	
Sensor model	OV5640	
Sensor type	SoC - CMOS Image Sensor	
Imaging array	Resolution	5 MP
	Size	1/4 in
	Active Pixels (HxV)	2592 x 1944
Sensitivity	Pixel size	1.4 x 1.4 μm
	Dynamic range	68 dB @8x gain
	Signal/Noise ratio (max)	36 dB
	Responsivity	600 mV/lux-sec
Output	Camera output	640 x 480 @30 fps
	Data Format	YUY & RGB
	Shutter type	Rolling Shutter/ frame exposure
View	Field of view	67.4° DFOV (56.3° HFOV, 43.7° VFOV)
	Focus range	10 cm ~ ∞ ≈ 4 in - ∞
	Focus type	Auto focus

FRAMERATES

	Top Camera	Bottom Camera
Resolution		
320x240 px	@15, 30 fps	@15, 30 fps
640x480 px	@15, 30 fps	@15, 30 fps
1280x960 px	@15, 30 fps	@10, 15 fps
1920x1080 px	@15, 30 fps	-
2560x1920 px	@15 fps	-

Note: The rate of the video stream will depend on the network and the video resolution chosen. All frame rates depend on the CPU usage. Values are measured with a CPU fully dedicated to image gathering.



McZeal Robotics -
 www.mczealrobotics.com 1-832-930-3777
 sales@alrobots.com or almczeal@gmail.com

 **SoftBank**
Robotics

NAO⁶

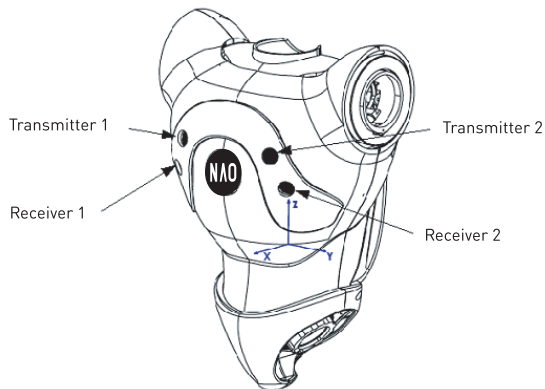
ENVIRONMENT SENSORS

INERTIAL UNIT

Gyrometer	1	
Axis		3
Precision		5%
Angular speed		500°/s approx.
IMU	1	
Axis		3
Precision		10%
Nominal acceleration		2g approx.

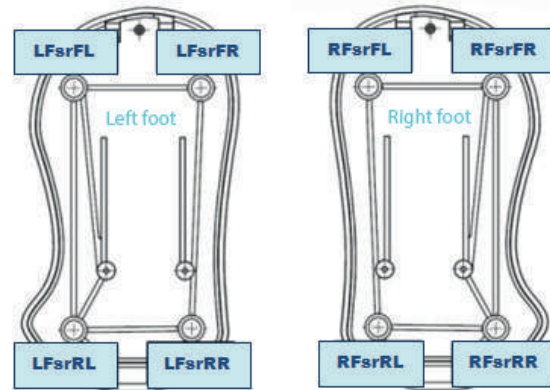
SONAR

Transmitters	2 on front
Receivers	2 on front
Frequency	40 kHz
Resolution	1 cm @50 cm
Detection Range	0.20 m to 0.80 m
Effective Cone	60°



FORCE SENSITIVE RESISTORS (FSR)

Range	0 to 25 N
Location	4 in each foot
Sensitivity	40 g approx.



BUTTONS & SENSORS

Chest Button	✓
Foot Bumper	✓
Tactile Head	✓
Tactile Hand	✓

ENERGY

ROBOT BATTERY

Battery	Type	Lithium-Ion
	Nominal voltage/capacity	21.6 V / 2.9 Ah
	Max charge voltage	25.2 V
	Recommended charge current	1.8 A
	Max charge / discharge current	2.1 A / 2.0 A
	Energy	62.5 Wh
	Charging duration	90 min
	Run time	60 min (Active use)
		90 min (Normal use)

BATTERY CHARGER

Input	100 to 240 VAC - 50/60 Hz - Max 1.2 A
Output	25.2 VDC - 2 A



McZeal Robotics -
 www.mczealrobotics.com 1-832-930-3777
 sales@alrobots.com or almczeal@gmail.com

NAO⁶

MOTION

DEGREES OF FREEDOM

Head	2
Arm (in each)	5
Pelvis	1
Leg (in each)	5
Hand (in each)	1

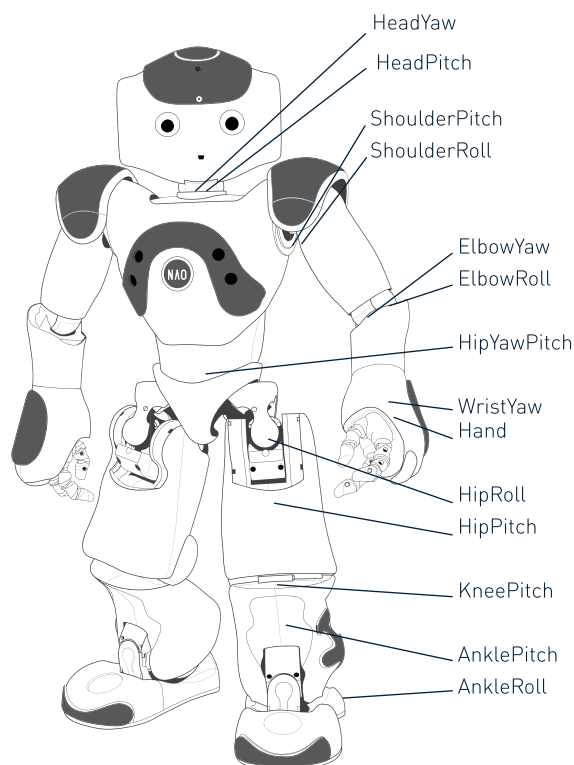
MOTOR SPECIFICATIONS

Motor type Brush DC Coreless

POSITION OF MOTORS

		Gear Ratio	Motor type
Head joints	HeadYaw	150.27	3
	HeadPitch	173.22	3
Arm joints	ShoulderPitch	150.27	4
	ShoulderRoll	173.22	3
	ElbowYaw	150.27	3
	ElbowRoll	173.22	3
Hand joints	WristYaw	50.61	2
	Hand/ Fingers	36.24	2
Leg joints	HipYawPitch	201.3	1
	HipRoll	201.3	1
	HipPitch	130.85	5
	KneePitch	130.85	5
	AnklePitch	130.85	5
	AnkleRoll	201.3	1

For details of type and gear ratio, see below.



MOTOR TYPE

	Motor type 1	Motor type 2	Motor type 3	Motor type 4	Motor type 5
Make	22NT82213P	17N88208E	16GT83210E	DCX 16S	22NT Z20
No load speed (rpm)	8700 ±10%	8400 ±12%	10700 ±10%	11400 ±10%	8700 ±10%
Stall torque (mNm)	65 ±8%	9.4 ±8%	14.3 ±8%	22.4 ±10%	65 ±10%
Continuous torque (mNm)	17.8 max	4.9 max	6.2 max	2.6 max	17.8 max

McZeal Robotics -
 www.mczealrobotics.com 1-832-930-3777
 sales@alrobots.com or almczeal@gmail.com





NAO⁶

JOINT MOVEMENT ENCODERS

MRE (Magnetic Rotary Encoder)	36
	Using hall effect sensor technology
	Precision: 12 bits / 0.1°

CONNECTIVITY

CONNECTION

Ethernet	1×RJ45 - 10/100/1000 BASE T
WIFI	IEEE 802.11a/b/g/n
WPAN IEEE 802.15.1 (Bluetooth)	4.0 (LE)

+86-021-61358998
apac-sales@softbankrobotics.com

McZeal Robotics -
www.mczealrobotics.com 1-832-930-3777
sales@alrobots.com or almczeal@gmail.com

 SoftBank
Robotics