

## Fact Sheet

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| Price                                      | \$45 K  |
| Availability                               | Worldwide   |
| <b>HARDWARE CONFIGURATION</b>              |   |
| Number of parts                            | ~120 parts (Excluding fasteners)  |
| Power requirements                         |   |
| Average power                              | 36 W (25 in standby)  |
| Peak power                                 | 155W  |
| Cable connections for any external devices |   |
| From Base                                  | USB interface (Gamepad)<br>Ethernet 1 Gbps (Web App + API)<br>HDMI 1.4a<br>Wi-Fi (Web App + API) IEEE 802.11a/b/g/n<br>Bluetooth 4.0 + LE<br>Digital I/O  |
| From Interface module                      | RS-485 (compatible with Robotiq Adaptive Grippers)<br>100 Mbps Ethernet<br>UART (3.3V)<br>I2C (3.3V)<br>GPIO (3.3V, qty 4)<br>24V @ 0.5A<br>3.3V @ 0.1A for signaling   |
| <b>SENSORS</b>                             |   |
| Robot Arm Base sensors                     | Voltage<br>Current<br>Temperature<br>Arm present detection<br>6-axis accelerometer / gyroscope  |
| Robot Arm Actuator sensors                 | Motor phases current sensors (one per phase)<br>Motor phases temperature sensors (one per phase)<br>CPU temperature sensor<br>Input voltage sensor<br>Hall effect sensors for BLDC motor drive<br>Absolute rotary position encoder<br>Incremental rotary position encoder<br>Torque sensors |
| Robot Arm Interface module sensors         | Voltage monitoring (future enhancement)<br>Temperature sensor (CPU, accelerometer and dedicated)<br>6-axis accelerometer / gyroscope  |
| Robot Arm Camera sensors                   | 2D RGB camera (Omnivision OV5640)<br>3D stereo depth sensor (Intel® RealSense™ Depth Module D410)   |
| Gripper (optional from Robotiq)            | Temperature<br>Current  |

# Fact Sheet

## LOW-LEVEL INTERFACE

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### API language(s)

C++, Python

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### Interface frequency (read and write)

1KHz

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### Command level

Position, velocity, torque , current (in joint space only). Cartesian control available in high level mode only

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### Robot state: data available via interface

For each joint: position, velocity, torque , motor current, voltage , temperature (motor and microcontroller)

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### Model (Mass, Damping, Gravity, Jacobian) available at interface frequency

Not available. However the mass and geometry are found in URDF

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### Gripper commands

For each gripper motor : position, velocity

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### Gripper feedback: data available via interface

For each gripper motor : position, velocity

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### Gripper access: can the gripper be accessed at interface frequency (read and write)

Yes

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### External connections

WiFi, Wired Ethernet

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### Interface module protocols

I2C, UART, Ethernet, GPO

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### Minimum requirements of external PC to run the interface

Ubuntu v16.04 (64 bits) on any computer with a i7 processor  
8 Go RAM and the real time patch installed

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