headquarters, Castelletto S. Ticino NO

technical office, Genova

Company Profile

Robox S.p.A, a company started in 1975, designs and manufactures electronic controllers, programming languages, development environments for robotics and motion control systems.

Its broad range of products can be adapted to any application, from the simplest ones (1 or 2 controlled axes), to the most sophisticated ones (dozens of controlled axes) thanks to the availability of architectures which can be "modular", "compact"or even integrated in brushless drives.

Robox controllers communicate with the outside world through the main industrial communication protocols and fieldbuses (EtherCAT, Sercos, OPCUA, ActiveX, TCP, UDP, TFTP, CANopen, Profibus-DP, DeviceNet, DF1, Profinet slave, Ethernet/IP, Modbus/TCP).

Innovation and quality have been the main goals of Robox since the very beginning.

Innovation has always been pursued keeping in mind the global reliability (present and future) of the product.

Quality has always been ensured by appropriate design choices and an accurate selection of materials. Robox has been certified UNI EN ISO 9001 since 1997.

Robox is a highly specialized research laboratory authorized by the Italian Ministry of Research and Education.

Goals achieved:
- **1976** first micro-processor based controller for industrial robots (Intel 8080)
- **1984** first programming language for the ''robot control" (Robox RHLL)
- **1986** first compact Motion controller RPM (Intel 80186)
- **1987** first programming language for the ''Motion control" (Robox R)
- **1993** first integrated development environment for Windows (Robox RDE)
- **1997** first modular Motion controller RBXM (Intel 80486)
- **1999** Profibus DP, DeviceNet for Robox Motion controllers
- **2000** Master CANopen for Robox Motion controllers
- **2000** Positioning board for MOOG DACS Drive
- **2001** TCP/IP, UDP/IP protocol for Robox Motion controllers
- **2001** CANopen slave interface for SIEMENS SIMODRIVE
- **2002** RDE3 evolution of the Robox development environment
- **2003** CPU based on Freescale Power PC G2 for RBXM
- **2004** RTE operating system
- **2005** CANopen slave interface for SIEMENS SINAMICS S120
- **2006** Motion control board for PARKER Hannifin
- **2007** EtherCAT slave interface for PARKER Hannifin
- **2007** µRMC based on Freescale Power PC G2
- **2008** SPIMD20 for STMicroelectronics
- **2008** EtherCAT master for Robox Motion controllers
- **2009** EtherCAT slave interface for PHASE
- **2009** µRMC^2 based on Freescale Power PC G2
- **2009** SERCOS 2 interface
- **2010** CPU based on the Freescale Power PC P2020 for RBXM
- **2011** µRMC^3 based on Freescale Power PC P2020
- **2011** RID20 Robox Integrated Drive
- **2012** Profinet slave, Ethernet/IP, Modbus/TCP
- **2013** µRIO, ROS (Robot Operating System)
- **2014** RFBCED Ether Cat Net graphic configurator
- **2015** RP-1 based on Freescale Power Pc (400Mhz)
- **2015** RID20-I
- **2016** RPL (Robot programming language)
- **2017** Integration of SafetyBridge Axioline modules
- **2017** RP-2 based on ARM Cortex A9 (800Mhz)
- **2018** EtherCAT slave interface for SIEMENS SINAMICS S120
- **2018** EC2A 6 axes intelligent drive
- **2018** RIG8 Teach pendant unit
- **2018** RP-0 based on ARM Cortex A9 (600MHz)
- **2019** Safety Board for Robotics
- **2020** EC2B 6 axes intelligent drive
- **2021** RID20-E Robox Evolution Integrated Drive
- **2021** R++ object oriented structured text language
- **2021** Axioline Stepper Module (Smart Element)
- **2021** Natural Guidance for AGV
- **2022** MEMS-based guidance for AGV
- **2022** OPC UA protocol for RP-2
- **2023** G-code language
- **2023** EtherCAT slave interface for RP-2
- **2024** µRP-2 based on ARM Cortex A9 (800MHz)
- **2024** EEBE board for advanced safety functions
- **2025** SI- µPAC based on AMR Cortex A9 (600 MHz) for Nidec drives
- **2025** RTEMS multicore operating system

The main application fields for Robox Motion controllers are:

- Beverage
- Packaging
- Palletizing/depalletizing devices
- Glass industry machines
- Food industry machines
- Wood industry machines
- Hygiene industry
- Tissue industry
- Paper industry machines
- Plastic industry machines
- Textiles industry machines
- Marble industry machines
- Automated guided vehicles (AGVs)
- Feeding devices
- Painting robots
- Measurement machines
- Machines for fibre optic handling
- Printing machines
- Winding machines
- Robots
- Spot welding robots
- Arc welding robots
- Assembly robots
- Plasma cutting robots
- Laser cutting robots
- Water jet cutting robots
- Glue application robots
- Pick & place robots
- Automatic warehouses
- Machine tools

  etc.

MARBLE INDUSTRY MACHINES

TEXTILES INDUSTRY MACHINES

PLASTIC INDUSTRY MACHINES

PAPER INDUSTRY MACHINES

ROBOTS

WOOD INDUSTRY MACHINES

BEVERAGE

AGV

PACKAGING

PALLETIZING / DEPALLETIZING DEVICES

FOOD INDUSTRY MACHINES

RP-2 - Expandable Motion Controller
Master EtherCAT - Master CANopen - Master Axioline F

ROBOX HMI Teach gun   Programming suite RDE   Third party PLC or HMI

Remote service

RP-2 ROBOX MOTION CONTROLLER

Communication towards the Lower level:
- OPC UA
- Modbus/TCP
- UDP/IP
- TCP/IP

Deterministic Communication towards the Lower level:
- EtherCAT
- CANopen

Communication towards the upper level:
- PROFINET
- DeviceNet - EtherNet/IP
- Modbus/TCP
- TCP/IP
- UDP/IP
- ActiveX - .NET
- OPC Server
- Wi-Fi

ROBOX Motor Drive and Integrated Drive   **ROBOX Remote I/O**   Third party servo drive, remote I/O or generic devices

---

- ARM Cortex A9 Dual Core (800MHz)
- Up to 32 interpolated axes, driven through EtherCAT and/or CANopen fieldbus
- Suitable for installation on DIN guide (35mm) in accordance with EN60715 rule
- External measures (l, h, p): 100 x 123 x 96 (mm) 0.5Kg
- Micro SD flash memory / 1GB DRAM / 512KB retentive RAM (for retentive parameters and alarm history storage)
- Real time clock calendar
- Watch dog relay
- 128X64 OLED display for diagnostics and monitoring of the CPU status equipped with five degrees range joystick
- UL certification

Communication

- 2 10/100 Mbits/s Ethernet channels dedicated to master fieldbus (EtherCAT CoE, SoE, EoE) for axes control and/or remote I/O
- 2 10/100 Mbits/s Ethernet channels dedicated to slave fieldbus EtherCAT and PROFINET
- 2 10/100 Mbits/s Ethernet channels with internal switch for general purposes (TCP/IP, UDP, TFTP, Modbus/TCP, Ethernet/IP, Robox BCC/31/TCP, OPCUA) * 4 for AS1018.003
- 1 10/100 Mbits/s Ethernet channel with Wan function
- 1 Wi-Fi channel for general purposes
- 1 Canbus channel (Master DS301, DS401 and DS402 protocols for axes control and/or remote I/O, Device Net, Robox Cnet)
- 1 USB type B - UART serial channel for general purposes (Robox BCC/31, DF1)
- 1 RS232 serial channel for general purposes (Robox BCC/31, DF1)
- 1 Wan channel for factory level access
- OPC Server, ActiveX, rLibJava, rLibQt, RlibNet and rLibC available for communication in Windows environment
- Axioline master bus for Axioline F modules
- Diagnostic web server

Expansion boards

Axioline peripherals
See section "Expansion modules/Remote I/O"

RTE Firmware (Real Time Extended)

It is installed in the removable MicroSD card
and allows the correct execution of the different tasks
The available tasks are the following:
- On event (capture)..priority 1
- Programmed frequency (motion).......................priority 2
- Programmed frequency (auxiliary functions).....priority 3,4,5,6
- Background...priority 7
- OB hooked...priority 2
- OB hooked...priority 5

The user develops the application software using RDE (Robox Development Environment)
See section "Programming suite RDE"

Product codes

Motion Controller
- RP-2 - AS1018.002
- RP-2 - (Bus slave) AS1018.012
- RP-2 - AS1018.003

Compact flash
- MicroSD (<=3axes) RP - AS3025.306
- MicroSD (<=4axes) RP - AS3025.308
- MicroSD (<=5axes) RP - AS3025.309
- MicroSD (<=8axes) RP - AS3025.305
- MicroSD (<=10axes) RP - AS3025.310
- MicroSD (<=12axes) RP - AS3025.307
- MicroSD (<=16axes) RP - AS3025.304
- MicroSD (<=32axes) RP - AS3025.303
- MicroSD (AGV) RP - AS3025.313

RP-1 - Expandable Motion Controller
Master EtherCAT - Master CANopen - Master Axioline F

ROBOX HMI Teach gun　　　Programming suite RDE　　　Third party PLC or HMI

Remote service

Communication towards the Lower level:

● Modbus/TCP
● UDP/IP
● TCP/IP

Deterministic Communication towards the Lower level:

● EtherCAT
● CANopen

Communication towards the upper level:

● PROFIBUS
● DeviceNet - EtherNet/IP
● Modbus/TCP
● TCP/IP
● UDP/IP
● ActiveX - .NET
● OPC Server

RP-1 ROBOX MOTION CONTROLLER

ROBOX Motor Drive and Integrated Drive　　　**ROBOX Remote I/O**　　　Third party servo drive, remote I/O or generic devices

---

- Freescale Power PC MPC5200 (400MHz)
- Up to 32 interpolated axes, driven through CANopen or EtherCAT fieldbus
- Suitable for installation on DIN guide (35mm) in accordance with EN60715 rule
- External measures (l,h,p): 100 x 123 x 96 (mm) 0,5 kg
- Compact flash memory Card / 64 MB DRAM / 128 Kb retentive RAM *(for retentive parameters and alarm history storage)*
- 8 digital, PNP, 24VDC opto-coupled inputs (3 with capture functions)
- 8 digital, PNP, 24VDC opto-coupled outputs (max 0.5A per channel)
- 1 incremental encoder input (RS422 line driver 5VDC) with dedicated homing input
- Real time clock calendar
- Watch dog relay
- Display for monitoring the Cpu status
- UL certification

Communication

- 2 10/100 Mbits/s Ethernet channels (EtherCAT, CoE, SoE, EoE for axes control and/or remote I/O, TCP/IP, UDP, TFTP, Modbus/TCP, Ethernet/IP, Robox BCC/31/TCP)
- 2 Canbus channels (Master DS301, DS401 and DS402 protocols for axes control and/or remote I/O, Device Net, Robox Cnet)
- 1 Profibus channel (DP slave)
- 1 RS232 serial channel for general purposes (Robox BCC/31, DF1)
- 1 RS422/485 serial channel for general purposes (Robox BCC/31, DF1)
- OPC Server, ActiveX, rLibJaya, rLibQt, RlibNet and rLibC available for communication in Windows environment
- Axioline master bus for Axioline F modules
- Diagnostic web server

Expansion boards

Axioline peripherals
See section "Expansion modules/Remote I/O"

RTE Firmware (Real Time Extended)

It is installed in the removable Compact Flash
and allows the correct execution of the different tasks
The available tasks are the following:
- On event (capture)...priority 1
- Programmed frequency (motion).....................priority 2
- Programmed frequency (auxiliary functions).....priority 3,4,5,6
- Background...priority 7
- OB hooked...priority 2
- OB hooked...priority 5
The user develops the application software using RDE
(Robox Development Environment)
See section Programming suite RDE

Product codes

Motion Controller
- RP-1 - AS1017.004

Compact flash
- CompactFlash (<=3axes) RP-1- AS3023.306
- CompactFlash (<=4axes) RP-1- AS3023.308
- CompactFlash (<=5axes) RP-1- AS3023.309
- CompactFlash (<=8axes) RP-1- AS3023.305
- CompactFlash (<=10axes) RP-1- AS3023.310
- CompactFlash (<=12axes) RP-1- AS3023.307
- CompactFlash (<=16axes) RP-1- AS3023.304
- CompactFlash (<=32axes) RP-1- AS3023.303
- CompactFlash (AGV) RP-1- AS3023.313

RP-0 - Expandable Motion Controller
Master EtherCAT - Master CANopen - Master Axioline F

ROBOX HMI Teach gun

Programming suite RDE

Third party PLC or HMI

Remote service

Communication towards the Lower level:

● Modbus/TCP
● UDP/IP
● TCP/IP

Deterministic Communication towards the Lower level:

● EtherCAT
● CANopen

Communication towards the upper level:

● DeviceNet - EtherNet/IP
● Modbus/TCP
● TCP/IP
● UDP/IP
● ActiveX - .NET
● OPC Server

RP-0 ROBOX MOTION CONTROLLER

ROBOX Motor Drive and Integrated Drive

ROBOX Remote I/O

Third party servo drive, remote I/O or generic devices

- ARM Cortex A9 (600MHz)
- Up to 5 interpolated axes, driven through EtherCAT and/or CANopen fieldbus
- Suitable for installation on DIN guide (35mm) in accordance with EN60715 rule
- External measures (l, h, p): 100 x 123 x 96 (mm) 0.5Kg
- Micro SD flash memory / 1GB DRAM / 512KB
- retentive RAM (for retentive parameters and alarm history storage)
- Real time clock calendar
- Watch dog relay
- 128X64 OLED display for diagnostics and monitoring of the CPU status equipped with five degrees range joystick
- UL certification

Communication

- 2 10/100 Mbits/s Ethernet channels (EtherCAT, CoE, SoE, EoE for axes control and/or remote I/O, TCP/IP, UDP, TFTP, Modbus/TCP, Ethernet/IP, Robox BCC/31/TCP)
- 1 Canbus channel (Master DS301, DS401 and DS402 protocols for axes control and/or remote I/O, Device Net, Robox Cnet)
- 1 USB type B - UART serial channel for general purposes (Robox BCC/31, DF1)
- OPC Server, ActiveX, rLibJava, rLibQt, RlibNet and rLibC available for communication in Windows environment
- Axioline master bus for Axioline F modules
- Diagnostic web server

Expansion boards

See section "Expansion modules/Remote I/O"

RTE Firmware (Real Time Extended)

It is installed in the removable MicroSD card
and allows the correct execution of the different tasks
The available tasks are the following:
- On event (capture)..priority 1
- Programmed frequency (motion)......................priority 2
- Programmed frequency (auxiliary functions).....priority 3,4,5,6
- Background...priority 7
- OB hooked..priority 2
- OB hooked..priority 5
The user develops the application software using RDE
(Robox Development Environment)
See section "Programming suite RDE"

Product codes

Motion Controller
- RP-0 - AS1018.000

Compact flash
- MicroSD (<=3axes) RP - AS3025.306
- MicroSD (<=4axes) RP - AS3025.308
- MicroSD (<=5axes) RP - AS3025.309

Expansion modules
Remote I/O
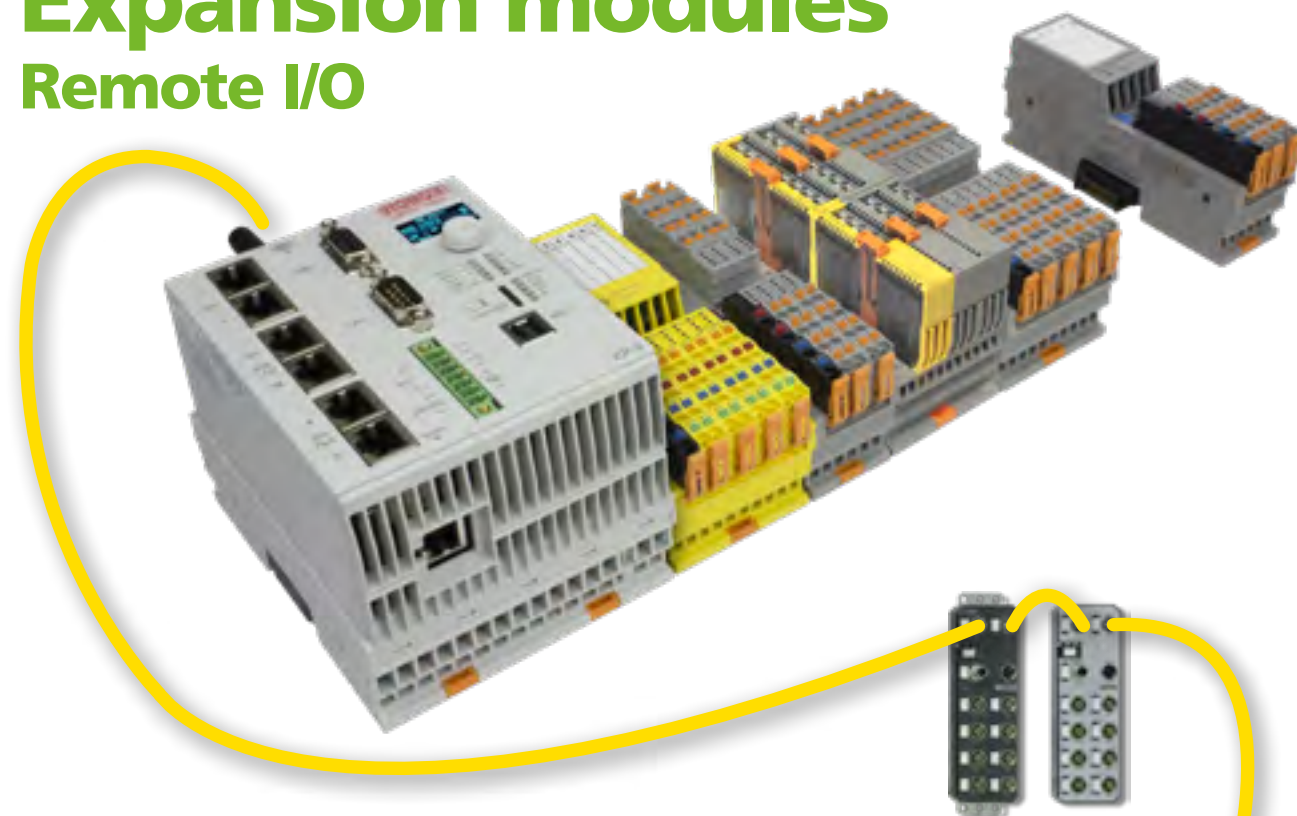
Remote I/O
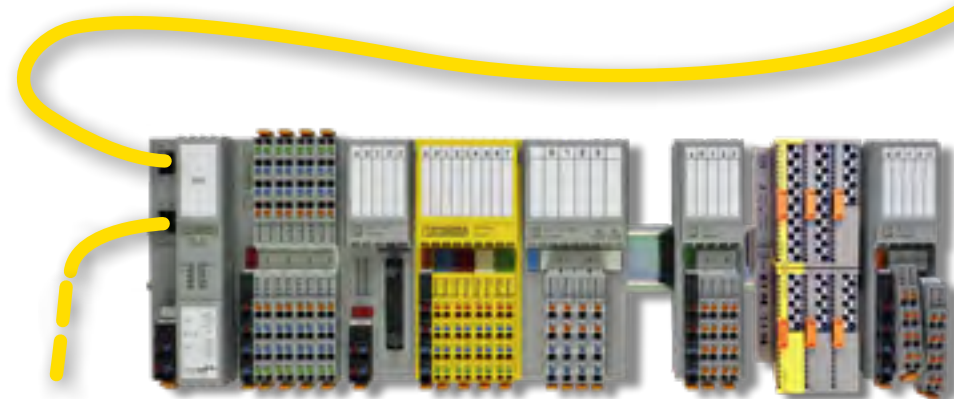
AXC-BS
Bus connector for direct connection
to RP-1, RP-2, RP-0

AXL-F-BP-SE6
Axioline F Backplane, 6 slots for Axioline Smart Elements, transmission speed in the local bus

AXL-F-BK-EC
Axioline F bus coupler for EtherCAT®

AXL-F-BP-SE4
Axioline F Backplane, 4 slots for Axioline Smart Elements, transmission speed in the local bus

IP 67 modules

AXL-E-EC-DIO16-M12-6P
Axioline E- EtherCAT® device in a plastic housing with 8 inputs, 24 V DC, 8 outputs, 24 V DC, 500 mA, M12 fast connection technology

AXL-E-EC-DI8-DO8-M12-6P
Axioline E-EtherCAT™ device in a plastic housing with 16 configurable inputs or outputs, 24 V DC, M12 fast connection technology

AXL-E-EC-IOL8-DI4-M12-6P
Axioline E-EtherCAT® device in a plastic housing with 8 IO-Link ports and 4 digital inputs, 24 V DC, M12 fast connection technology

Digital input/output modules

AXL-F-DI16/1-1H
Axioline F digital input module, 16 inputs, 24 V DC, 1-wire connection method

AXL-F-DI16/1-HS-1H
Axioline F digital input module, 16 inputs, high speed, 24 V DC, 1-wire connection technology

AXL-F-DI32/1-1F
Axioline F digital input module, 32 inputs, 24 V DC, single-wire connection method

AXL-F-DI32/1-2H
Axioline F digital input module, 32 inputs, 24 V DC, single-wire connection method

AXL-F-DO4/3-AC-1F
Axioline F digital output module, 4 outputs, 230 V AC, connection technology: 3-conductor, transmission speed in the local bus: 100 Mbps, degree of protection: IP20, including bus base module and Axioline F connectors

AXL-F-DO8/2-2A-1H
Axioline digital output terminal, 8 outputs, 24 V DC, 2 A, 2-wire connection method

AXL-F-DO16/1-1H
Axioline F digital output module, 16 outputs, 24 V DC, 500 mA, 1-wire connection method

AXL-F-DO32/1-1F
Axioline F digital output module, 32 outputs, 24 V DC, 500 mA, single-wire connection method

AXL-F-DO32/1-2H
Axioline F digital output module, 32 outputs, 24 V DC, single-wire connection method

AXL-F-DI8/1-DO8/1-1H
Axioline F digital input and output module, 8 inputs, 24 V DC, 8 outputs, 24 V DC, 500 mA, single-conductor connection technology

AXL-F-DI16/1-DO16/1-2H
Axioline F digital input and output module, 16 inputs, 24 V DC, 16 outputs, 24 V DC, 500 mA, 1-wire connection technology

Analog input/output modules

AXL-F-AI4-I-1H
Axioline F analog input module, 4 inputs: 0 - 20 mA, 4 - 20 mA, ±20 mA, 2, 3, and 4-conductor connection technology, integrated sensor supply

AXL-F-AI4-U-1H
Axioline F analog input module, 4 inputs: 0 - 5 V, ±5 V, 0 - 10 V, ±10 V, 2, 3, and 4-conductor connection technology, integrated sensor supply

AXL-F-AI8-1F
Axioline F analog input module, 8 inputs: 0 - 10 V, ±10 V, 0 - 20 mA, 4 - 20 mA, ±20 mA, 2-wire connection method

AXL-F-AO4-1H
Axioline F analog output module, 4 outputs: 0 - 10 V, ±10 V, 0 - 5 V, ±5 V, 0 - 20 mA, 4 - 20 mA, 2-wire connection technology

AXL-F-AO8-1F
Axioline F analog output module, 8 outputs: 0 - 10 V, ±10 V, 0 - 5 V, ±5 V, 0 - 20 mA, 4 - 20 mA, ±20 mA, 2-wire connection technology

AXL-F-AI2-AO2-1H
Axioline F analog input and output module, 2 inputs, 2 outputs, 0 - 10 V, ±10 V, 0 - 5 V, ±5 V, 0 - 20 mA, 4 - 20 mA, ±20 mA, 2-conductor connection technology

Temperature modules

AXL-F-RTD4-1H
Axioline F temperature module, 4 inputs for connecting resistance temperature detectors

AXL-F-RTD8-1F
Axioline F temperature module, 8 inputs for connecting temperature shunts

AXL-F-UTH4-1H
Axioline F temperature module, 4 inputs for connection of thermocouple sensors

AXL-F-UTH8-1F
Axioline temperature module, 8 inputs for connection of thermocouple sensors

Special function modules

AXL-F-CNT2-INC2-1F
Axioline F special function module, 2 counter inputs, 2 incremental encoder inputs

AXL-F-PWR-1H
Axioline F power module for the communications power UBus, max. 4 A

AXL-F-PM-EF-1F
Axioline F power measurement module, input voltage: up to 400 V AC (phase/neutral) or 690 V AC (phase/phase), input current: up to 5 A AC

AXL-F-RS-UNI-1H
Axioline F communication module for serial data transmission, 1 interface can be parameterized as RS.485/RS-422 or RS.232

AXL-F-PWM2-1H
Axioline F, function module, pulse width modulation, transmission speed in local bus 100 Mbps, IP20 degree of protection, including bus base module and Axioline F male connectors

AXL-F-SSI1-AO1-1H
Axioline F function module, 1 SSI interface for absolute encoder, 1 analog output: 0 - 10 V, ±10 V, 0 - 5 V, 0 - 20 mA, 4 - 20 mA, ±20 mA, 2-conductor connection technology

AXL-F-SGI2-1H
Axioline F, strain gauge capture module, Transmission speed in the local bus: 100 Mbps, degree of protection: IP20, including bus base module and Axioline F connectors

Safety modules

AXL-F-SSDI8/4-1F
Safety-related digital input module, IP20 protection, for the SafetyBridge system. The module has 4 safe digital inputs for two-channel assignment or 8 safe digital inputs for single-channel assignment.

AXL-F-SSDO8/3-1F
Safety-related digital output module, IP20 protection, for the SafetyBridge system. The module has four safe digital outputs with two-channel occupancy or 8 safe digital outputs with single-channel occupancy

AXL-F-LPSDO8/3-1F
Safety-related digital output module, IP20 protection, for the SafetyBridge system. The module has four safe digital outputs with two-channel occupancy or 8 safe digital outputs with single-channel occupancy

AXL-SE-SC-A
Axioline Smart Elements slot cover, diagnostic function

Digital input/output modules

AXL-SE-DI16/1
Axioline Smart Elements digital input module, 16 inputs, 24 V DC, connection technology

AXL-SE-DO16/1
Axioline Smart Elements digital output module, 16 inputs, 24 V DC, connection technology

Analog input/output modules

AXL-SE-AI4-I-4-20
Axioline Smart Elements analog input module, 4 inputs, 4 mA ... 20 mA, connection technology

AXL-SE-AI4-U-0-10
Axioline Smart Elements analog input module, 4 inputs, 0 V ... 10 V, connection technology

AXL-SE-AO4-I-4-20
Axioline Smart Elements analog output module, 4 inputs, 4 mA ... 20 mA, connection technology

AXL-SE-AO4-U-0-10
Axioline Smart Elements Analog output module, 4 inputs, 0 V ... 10 V, connection technology

Temperature modules

AXL-SE-RTD4-PT100
Axioline Smart Elements temperature recording module, 4 analog RTD inputs,connection technology

AXL-SE-UTH4-EF
Axioline Smart Elements, Temperature recording module, Analog inputs: 4 (Inputs for thermocouples or linear voltage), connection technology: 2-conductor (shielded, twisted pair), External cold junction (can also be used as an additional Pt 100 sensor input): 1, connection technology: 4-conductor, degree of protection: IP20

Special function modules

AXL-SE-CNT1
Axioline Smart Elements function module, Counter input: 1, Control input: 1, Counting direction input: 1, Digital output: 1, 24 V DC, 100 mA

AXL-SE-INC1-SYM
Axioline Smart Elements Position detection module, 1 incremental encoder input, symmetrical encoders, in accordance with EIA-422, Digital inputs: 2, 24 V DC

AXL-SE-IOL4
Axioline Smart Elements, IO-Link master, IO-Link ports Class A: 4, connection method: Push-in connection, connection technology: 3-conductor

AXL-SE-RS485
Axioline Smart Elements communication module, interface: RS-485

AS8001.001 (RO-AXL SE STP2)
Axioline Smart Element dual channel stepper motor controller

Safety modules

AXL-SE-SSDI8/3
Axioline Smart Elements digital input module, IP20 protection, SafetyBridge system. Safe digital inputs: 8 (1-channel assignment), 4 (2-channel assignment), 24 V DC, connection technology: 3-conductor

AXL-SE-SSDO4/2-2A
Axioline Smart Elements digital output module, IP20 protection SafetyBridge system, Safe digital outputs: 4 (1-channel assignment), 2 (2-channel assignment), 24 V DC, 2 A, connection technology: 2-conductor


Programmable Safety PLC

SAFE ROBOTICS
High safety standards must be observed when humans and robots work together in the same area. Any risk of injury to humans must be completely eliminated. The development of new safety components for safe human-robot interaction is one of our main areas of research.

SAFE AGVS
To ensure processes in the production area and in logistics, it is often necessary to monitor not only the speeds and position but also the environment of automated guided vehicles (AGV).

SSCU-1   SSCU-1/AX   ROBOX by BBH

Open programmable and configurable FSoE Master unit for operation on EtherCAT networks

- Data interface for up to 6 scanner units
- 4 Encoder interfaces (only for SSCU-1/AX)
- 16 Safe digital inputs
- 10 Safe digital outputs
- 2 Relay outputs
- 2 Configurable pulse outputs or safe digital outputs
- Safety controller suitable up to PL e (EN ISO 13849-1) or SIL3 (IEC 61508)
- Optional: SARC functionality (Safe Arithmetic Calculation)
- cULus approval
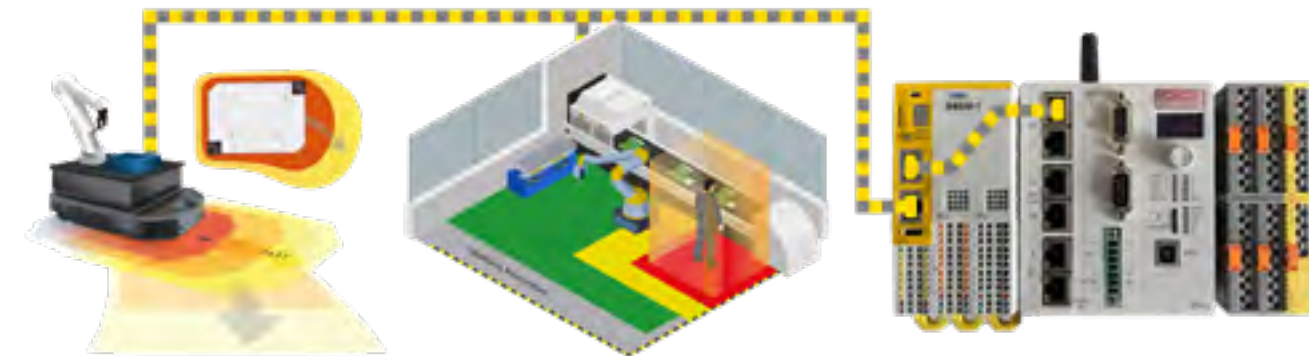
Thanks to FSoE technology, and Safe Advanced Aritmetics (SARC), the Safety PLC line can perform safe encoder reading and monitor safe position, velocity and behaviour of complex dynamic robotics systems.
This solution can also interact dynamically with the area configuration of safety scanners and monitor the area surrounding robots and moving vehicles in a safety certified way.
The system is fully customizable to perfectly fit the requirements of each specific system.

Programmable Safety PLC

HMI

> RPC family

> RHMI family

> RIG8

RPC - AS6012.XXX

RPC are a family of industrial PCs, based on a fanless INTEL processor suitable for producing sophisticated operator interfaces aimed to facilitate the use of the machine controlled by the end user. By using the RDT software, interaction is possible, through the BBC3 Protocol on support TCP / IP, with the motion controller connected both with variable exchange as well as with upload / download of files. The terminal is furthermore equipped with an integrated remote service software which renders its Internet access, particularly simple and quick.

Product specification:
- Display LCD TFT from 10 inches up to 15 inches
- CPU Intel Atom dual core 1,86 GHz
- 2 GB DDR3 dynamic ram
- SSD drive 32GB 2,5" SATA MLC
- CFast 2GB SATA 2 SLC
- 2 expansion slot MiniPCI
- 1 USB frontal port - 4 USB ports
- 1 serial port RS232
- 1 PS/2
- 2 Ethernet interface 10/100/1000 Mbps
- Power supply 24VDC

Programming:
- RTM run-time software to execute RDT projects
- REMOTE SERVICE software via VPN
- User friendly configurator

RHMI - AS6011.XXX

RHMI are a family of operator terminals, based on a fanless ARM processor suitable for producing simple but complete operator interfaces aimed to facilitate the use of the machine controlled by the end user. By using the RDT software, interaction is possible, through the BBC3 Protocol on support TCP / IP, with the motion controller connected both with variable exchange as well as with upload / download of files. The terminal is furthermore equipped with an integrated remote service software which renders its Internet access, particularly simple and quick.

Product specification:
- Display LCD TFT from 5.7 inches up to 15 inches
- CPU ARM Cortex A8 1 GHz fanless
- 512 MB Dynamic ram DDR3-800
- Removable SD card 1 GB hosting the application software
- 256 MB NAND internal flash hosting the operating system
- 2GB internal eMMC (Solid State Disk) hosting the system software
- 2 USB ports
- 1 RS232/422/485 serial port
- Possibility to connect to an external keyboard/mouse
- 1 Ethernet interface 100 Mbits/s
- 1 Ethernet interface 10/100 Mbits/s
- Supplied from the 24VDC
- Microsoft Windows Embedded Compact 7 Pro (C7P)

Programming:
- RTM run-time software to execute RDT projects
- REMOTE SERVICE software via VPN
- User friendly configurator

RIG8 - AS6014.001

Product specification:
- 8" colour TFT LCD touch screen display 1024X768
- CPU: ARM® Cortex® A9
- Mass Memory eMMC: 4GB
- Keybord right side: 18 buttons
- Keybord botton side: 10 buttons
- Led: One led tri-color red-green-yellow
- Emerrgency button: double contact
- Enable button: double contact, 3 state
- Connection cable 8m
- Kernel: Linux
- External measures: mm 275*232*106, 1 Kg

Programming:
- RTM run-time software to execute RDT projects
- REMOTE SERVICE software via VPN
- User friendly configurator

RDT - Programming software to design your HMI

RDT is an RDE plug-in, allowing to design customized HMI's (Human Machine Interface).
It offers the user a set of controls such as:
- Customizable operating push-buttons
- ComboBox
- ListBox
- Static image
- Dynamic image
- Static text field
- Dynamic text field
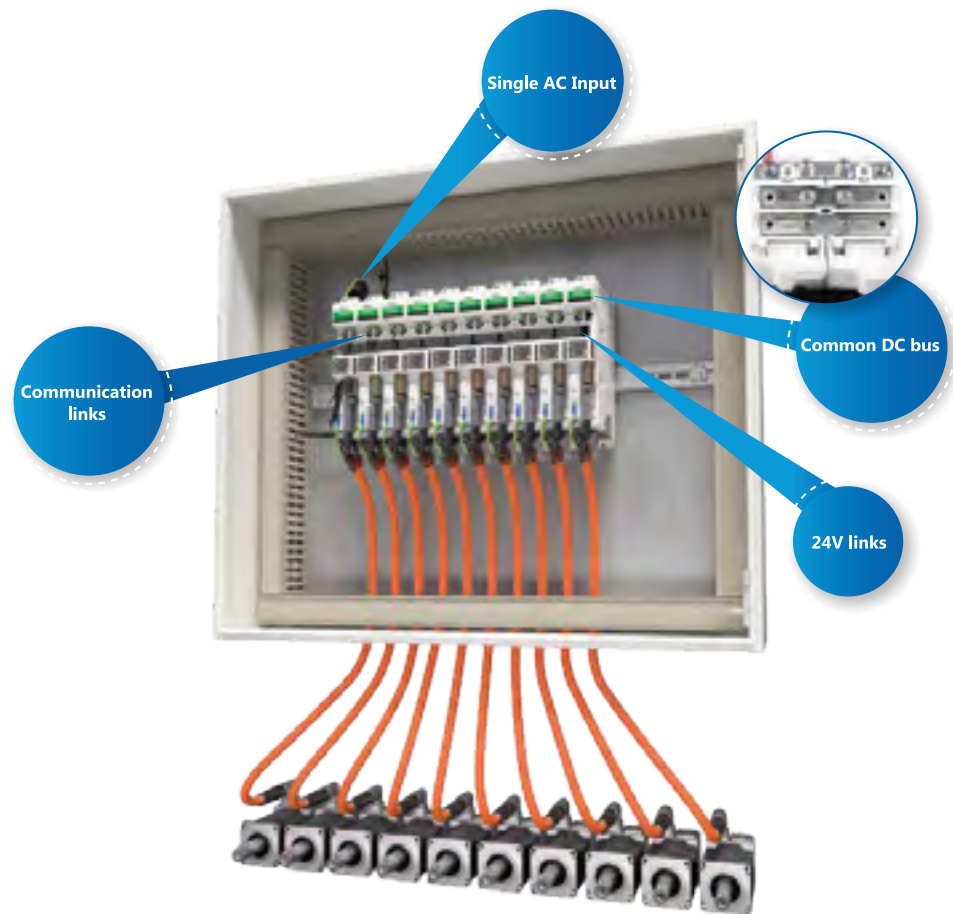- Edit field
- Slider
- Trend

Through these controls the user will be able to build the required project pages, to add actions, macros, help windows, to handle password levels, recipes, alarms history, multi-lingual facilities and many other utilities.

Each Robox motion controller can be associated to a serial device or a TCP/IP address thus allowing centralized diagnosis.

The resulting HMI application can run on any industrial PC, equipped with Windows or Linux operating system, through the RTM runtime software.

Human machine interfaces: HMI

16

17

Servo Drives

Single AC Input

Common DC bus

Communication links

24V links

Drive dimensions at a glance

Dimensions (mm)	Frame 1	Frame 2	Frame 3
Width	40 mm	40 mm	40 mm
Depth	174 mm	174 mm	174 mm
Height	233 mm	278 mm	328 mm
Nominal current @ 400 V	1.5-3-4.2 A	6-8-10.5 A	13.5-16 A
Peak current @ 400 V	4.5-9-12.6 A	18-24-31.5 A	40.5-48 A

Safety MiS250

Option Module for Advanced Safety to perform autonomously:
- Safe Stop 1 (SS1)
- Safe Stop 2 (SS2)
- Safety Limited Speed (SLS)
- Safe Operating Stop (SOS)
- Safe Direction (SDI)
- Safe Speed Monitor (SSM)
- Safe Emercency Stop (SES)
- Safely Limited Position (SLP)
- Safely Limited Acceleration (SLA)
- Safe Brake Control (SBC)

Or via FSOE, using the SSCU programmable safety PLC, the Safe Limited Speed and Safe Limited Position at TCP level exploiting the SARC (Safe ARithmetic Calculations) power. See 'Programmabile Safety PLC' chapter.

SI-µPAC - AS3055.001

Motion controller able to control up to 32 axes, driven through EtherCAT fieldbus.

Main features:
- Microprocessor ARM Cortex A9 Single Core (600MHz)
- Memory:
  Micro SD flash memory
  1 GB DRAM
  512 Kbyte retentive memory ram for parameters and alarm history storage
- Communication:
  n. 1 10/100 Mbits/s Ethernet channels dedicated to Master fieldbus (EtherCAT CoE, SoE, EoE) for axes control and/or remote I/O
  n. 1 10/100 Mbits/s Ethernet channel for general purposes (TCP/IP, UDP, TFTP, Modbus/TCP, Ethernet/IP, Robox BCC/31/TCP)
  n. 1 USB-B-UART serial channel for general purposes (Robox BCC/31, DF1)
  Diagnostic web server
  O.P.C. Server, ActiveX, .Net Library, rLibQt, rLibJava e rLibC++ available for communication in Windows environment
- Remote service
- Real-time clock calendar

Programmable through RDE3 Development Environment.

INTEGRATED DRIVES
NEARBY CONFIGURATION

> RID20-E
AS9201.013/014

> RID20-IE
AS9202.013/014
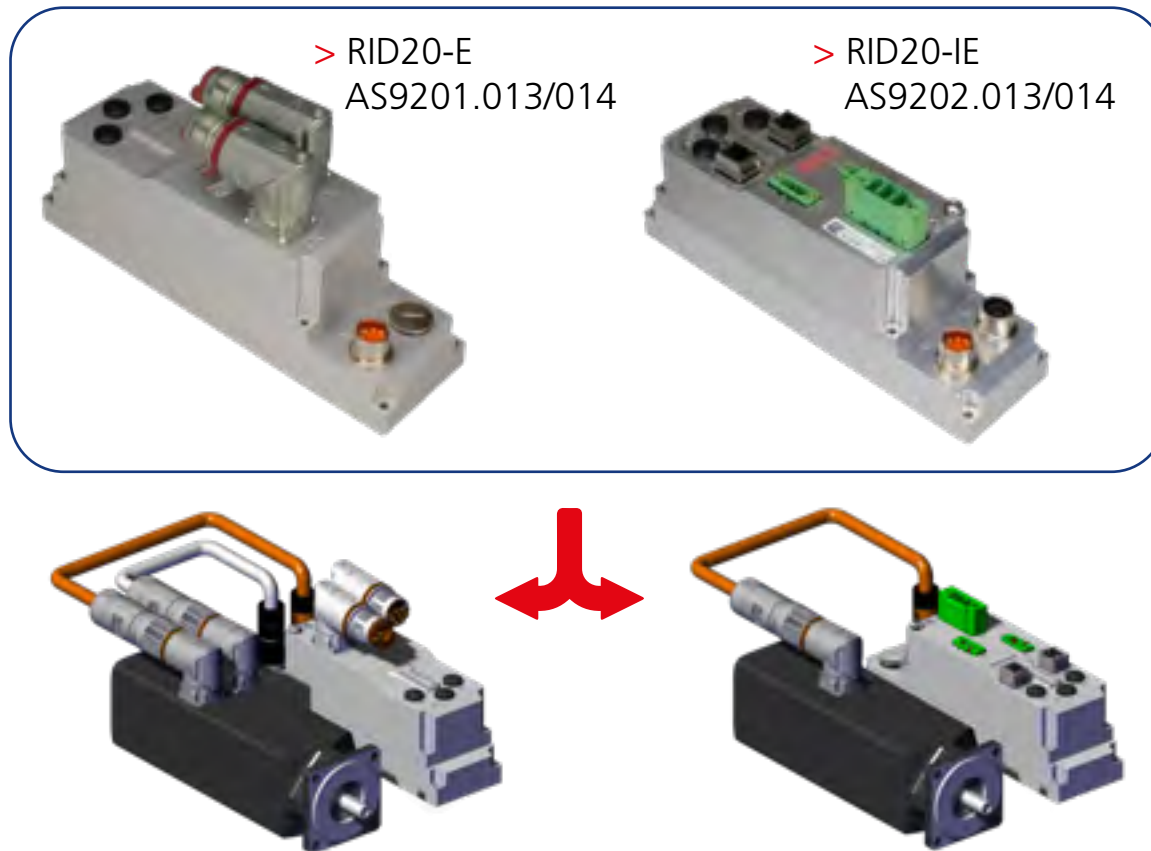
RID20-E, RID20-IE Robox Integrated Drive - AS920X.01X

Product specification:
- Extremely compact dimensions 220 x 60 x 116 (mm) 1,5 kg
- Current, speed and position loop closed inside
- Up to 800 DC power supply
- Up to 2KW
- Auxiliary power supply 18-36 VDC
- Strong capability to support high temperatures and vibrations
- EtherCAT interface.
- Position transductor circuit configurable
- Safe Torque off circuits
- Holding brake control 24Vdc driving up to 0.7A
- Accelerometer for vibration analisys

Storage:
- Internal Flash memory 16MB

Communication:
- EtherCAT (CoE) (FoE) or CANopen DS402
- RS232 interface for developers

Transducers:
- Resolver
- Endat 2.1, 2.2, 3.0 (rotary/linear encoders)
- TamagawaSeiki (TS56xxNxx, SA35-17/33bit-PLS5V)
- SinCos (linear motor with SinCos transducer)
- SSI (rotary encoders)
- Hiperface DSL
- BiSS-C

I/O's:
- 3 channels for digital I/O with speed, overcurrent threshold and function input/output, configurable

Connectors RID20-E:
- Two hybrid connectors, receptacle angled rotatable, for power supply (800 V DC and auxiliary 18-36 V DC)
- Three M12 connectors, for digital I/O, serial interface, Safe Torque-Off signals
- One or two M15 connectors for motor phases and transducer cables (RID20-E Itec version)

Connectors RID20-IE
- Three PCB connectors, for power supply (800 V DC and auxiliary 18-36 V DC) and STO
- Two RJ45 connectors for EtherCAT network
- Three M12 connectors, for digital I/O, serial interface, Safe Torque-Off signals
- One or two M15 connectors for motor phases and transducer cables (RID20-IE itec version)

Product codes
- RID20-E AS9201.013 (Degree of Protection: IP 67)
- RID20-E AS9201.014 (Degree of Protection: IP 67)
- RID20-IE AS9202.013 (Degree of Protection: IP 20)
- RID20-IE AS9202.014 (Degree of Protection: IP 20)

ROBOX MOTOR DRIVE

Drives information common to all the RMD.
- Up to 800 DC power supply
- Auxiliary power supply 18-36 VDC
- Strong capability to support high temperatures and vibrations

- Safety Torque-Off function (STO) selectable on the single drive or on all the drives in the chain
- Internal accelerometer for vibration analysis (3 Axes)
- Diagnostics leds
- EtherCAT (CoE) (FoE) (Main Fieldbus Communication)
- RS232 interface (Local communication service)
- 2 digital inputs, IEC61131-2 type 1, 24VDC (with debounce filter)
- 1 output/power-supply line (24VDC, up to 480mA), short-circuit and overcurrent protected, can be cycled as slow digital output
- 2 HTEC hybrid connectors, with rotatable angled receptacle, for power supply (800 VDC and auxiliary 18-36 VDC), fieldbus and torque off (STO) signals (common for all the drives in the chain)
- 1 M12 connector, RS232 and Holding-brake button signals
- 1 M12 connector, for input and output digital signals
- 1 M12 connector, for torque-off signals (local handle)

> RMD65

ROBOX MOTOR DRIVE 2.2NM (100DT)

- Speed 3000/4500/6000 RPM
- Resolver/ENDAT 2.2
- Option absolute multiturn
- Option brake

> RMD82

ROBOX MOTOR DRIVE 3.2NM (100DT)

- Speed 3000/4500/6000 RPM
- Resolver/ENDAT 2.2
- Option absolute multiturn
- Option brake

> RMD102

ROBOX MOTOR DRIVE 7.2NM (100DT)

- Speed 3000 RPM
- Resolver/ENDAT 2.2
- Option absolute multiturn
- Option brake

Integrated drives: RID/RMD

SPECIAL PRODUCTS

> Robox motion controller µRP-2

> Robox USB DONGLE
  AS3045.001

> SoM-2 System on Module
  19513B.502

> SINAMICS S120 Robox EtherCAT Interface

SIEMENS

> SINAMICS S120 Robox CANopen Interface

SIEMENS

Robox motion controller µRP-2

In just 55x80x34 mm and an overall volume equal to almost 1/7 of its bigger brother (RP-2), it represents the goal of miniaturization, without sacrificing computing power.
It can be used in truly demanding applications with a high number of axes to control. It allows you to fully exploit the performance of the EtherCAT fieldbus.
Thanks to the integration of an Ethernet switch with 4 ports available externally, it guarantees maximum connectivity without the use of additional components.
AS1019.011 supports full compatibility with the wide range of AXIOLINE expansion modules.
AS1019.001 for cold plate mounting

Robox USB DONGLE - AS3045.001

RP-2 axis control emulator for educational purposes or simulation stations.

ROBOX SoM-2 19513B.502

Product specification:
This SoM has the same CPU of RP-2/µRP-2 and can be used into a customized mother board.
It can be programmed with RDE in the same way of RP-2/µRP-2.

SINAMICS S120 Robox EtherCAT Interface AS3031.005

Product specification:
• This board allows to interface the Sinamics S120 drive to an EtherCAT fieldbus as a slave device
• It is plugged in the appropriate slot of the CU320-2
• It allows multi-axis synchronous operation at a sync frequency ranging from 50Hz to 4KHz
• Position, velocity, torque modes and integrated positioner are provided
• When working in position, it interpolates the reference regardless of the master frequency
• UL Certification

SINAMICS S120 Robox CANopen Interface AS3031.002

Product specification:
• It allows to interface Sinamics drives to a CANopen DS301, DS402 fieldbus as a slave device
• It is plugged in the Sinamics in the appropriate slot
• It allows multi-axis synchronous operation at sync frequency ranging from 20 to 500Hz
• Position, velocity, torque modes are provided
• When working in position control, it interpolates the reference at 1KHz regardless of the master frequency

SPECIAL PRODUCTS

Tubular Linear Motor

> RID20-E
  AS9201.011

> Integrated Drives
  Shuttle Configuration

Customized Motor

Servo Motor

RID20-E Shuttle configuration AS9201.011

The RID20-E Integrated Drive can be applied as shuttle configuration in customized rotary or linear motor up to 2kW.
The specifications are the same of RID20-E NEARBY CONFIGURATION.
The connections to the motor are realized through:
• 1 PPM SAMTEC connector for power motor phases
• 1 PMM SAMTEC connector for position motor transducer
• 1 PMM SAMTEC connector for holding brake
• 1 PMM SAMTEC connector for thermal motor sensor

Special products

AGV LINE

www.mpsengineering.it

www.bertolottispa.com

www.gmebrasil.com.br

www.mecfond.it

www.tecmas-monza.it

The vehicle is controlled by a gyroscope able to measure its rotations around its vertical axis. Communication with the supervisor PC is obtained via WIFI.
The movement can be controlled by any Robox motion controller.
By using the gyro information, the traction odometry and a precise detection of suitable magnets on the floor, the vehicle is driven, according to a map, inside the factory with a special algorythme implemented by using RDE development environment.
Robox has a complete software to manage one or many AGVs. Besides Inertial Magnetic Navigation, Robox offers laser triangulation and natural guidance (SLAM).

RHAM - AS3009.X14 magnet detector

Magnet detection device
Product specification:
• 16x16 Hall sensor matrix
• Magnet position detected through a microcontroller integrated algorithm with 0.1 mm precision
• Communication with the Robox motion controller via EtherCAT
• Available with or without integrated gyro

RHAM - AS3009.X13 magnet detector

Magnet detection device
Product specification:
• 16x4 Hall sensor matrix
• Magnet position detected through a microcontroller integrated algorithm with 0.1 mm precision
• Communication with the Robox motion controller via EtherCAT
• Available with or without integrated gyro

AGV MANAGER

AGV MANAGER is a software tool running on Windows/Linux platforms, allowing to describe the plant operation for AGV's controlled by the Robox inertial guidance system.

• Communicates with the agv through:
    - Radio modem via serial link
    - wireless lan with protocol TCP/IP or UDP
• Communicates:
    - with PLC, through RS232 serial
    - with PLC, through an OPC server
    - with PLC, in ethernet with protocol send/receive or fetch/write
    - In a generic manner, through the reading/writing of files
• Communicates with the database:
    - SQL Server
    - MySql
    - PostgresSQL
    - ODBC
• It is responsible for the movement of many AGVS simoultaneously:
    - handles automatically algorithmes of anticollision and priority among Agvs
    - Calculates automatically the best path to assign to each agv, by respecting the direction of the path and the Agv orientation, as defined in the plant map.
• It supplies an integrated development environment (x-script) to describe the Agvs movement behaviour
    - with great flexibility and adaptation to the peculiarities of each plant
    - without any need of external compiling tools
    - by processing the infos received through the AgvManager native interfaces or by exchanging information through other channels (socket,...)
    - it gives the possibility to integrate "plugin" specifically written for an application, to increase the specific functionality of AgvManager   for the single plant
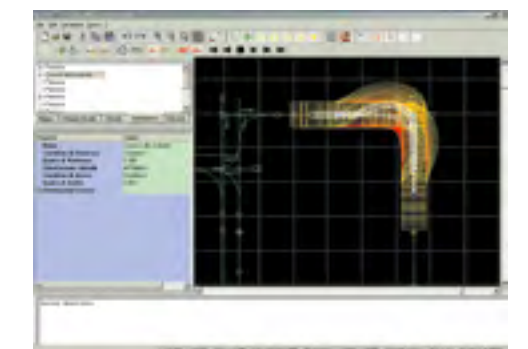

RAT is a software tool running on Windows/Linux platforms, allowing to describe the plant map for AGV's
Exploiting the possibility to import lay-outs in DXF format (both of the plant and of the vehicle) the user will draw the routes, customize their crossings, speeds, behaviour (bends, radius, speed or clockwise - counterclockwise rotation), start and load/unload points, etc.
RAT also allows to simulate the mission length or the dimension of the space occupied, in order to optimize the AGV operation.

RDE

A fully integrated development environment that guides the users to design, develop, debug, delivery and install their software, for any field of application in motion control.
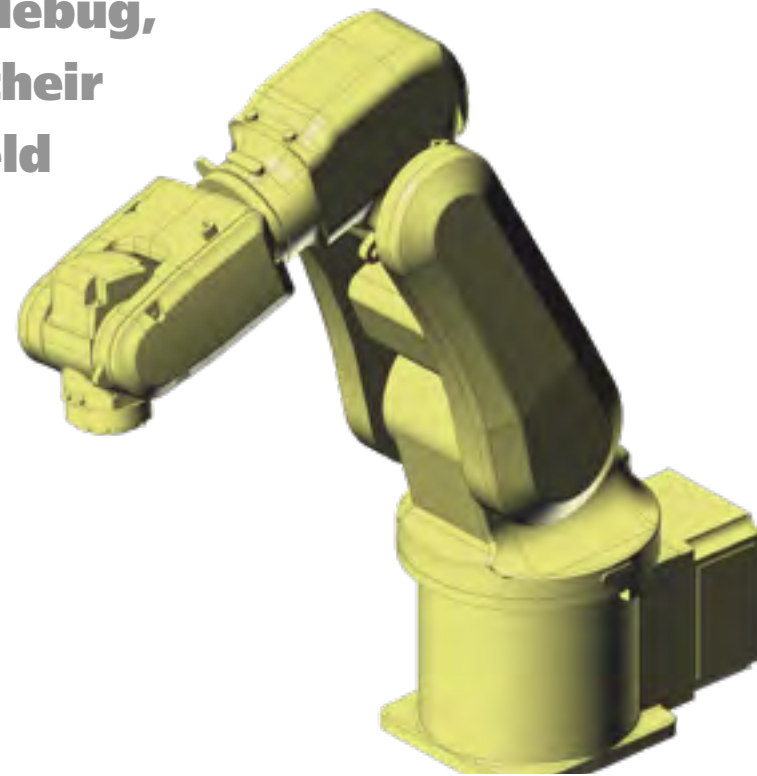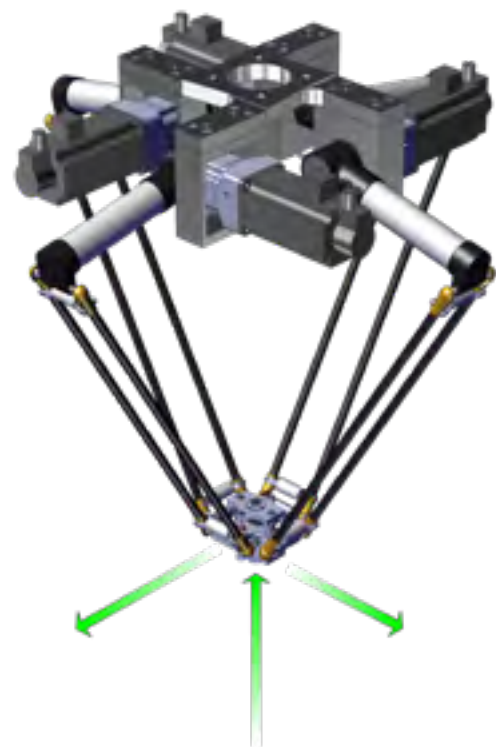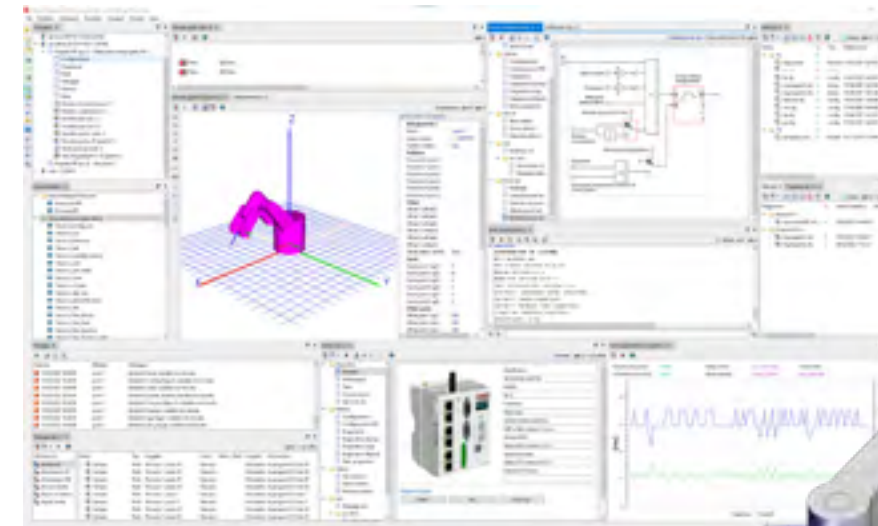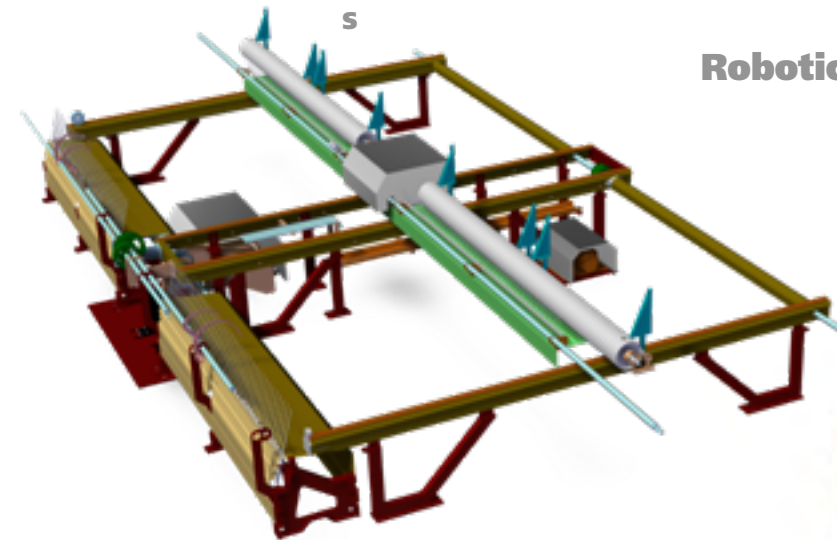
A modern and flexible development tool

Robotics Applications
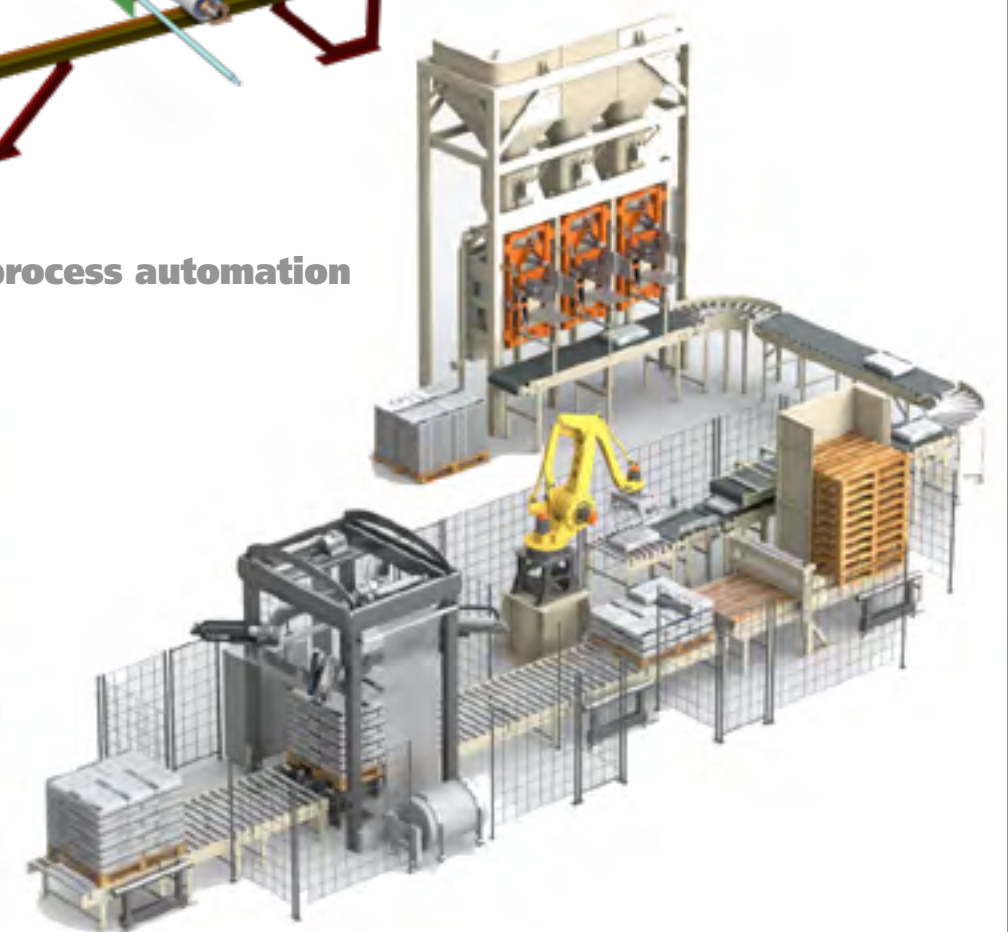
Industrial process automation

Robox Development Environment

AGV

RDE basic functions:
- Allows to write, compile and debug the application software
- Permits to evaluate the behaviour of the controlled machine and therefore to choose the best solution to optimize it
- Allows to describe the controlled machine in a graphic form configuring the axes, the powersets and the robots geometrical structures
- Allows to describe the devices present in the fieldbuses
- Runs on personal computers with Microsoft Windows 10 (build 1803 and later)
- Communicates with the Motion Controllers via Ethernet (TCP/IP) or serial link
- Integrated electronic documentation

RDE offers the programmer the following languages to write the application software:
- Structured text with motion libraries (suitable for motion control applications) for ex. electric shafts, electronic cams, flying shears, axes tracking and gearing. Possibility to monitor and make "live" modifications of the program
- Structured text with robotics libraries (suitable to describe palletizing cycles, pick&place and paths in general, for ex: cutting, drawing, glueing etc...). Possibility to monitor and make "live" modifications of the program
- Ladder IEC1131 (suitable for plc programming)
  Possibility to monitor and make "live" modifications of the rungs
- ISO (interpreter of ISO sources generated by external CAD/CAM)
- PLCopen function blocks library
- OB, Object Blocks (extended concept of Function Block). They are available in the other Robox languages
- C++ allows the programmer to design his own OB in order to create his own libraries
- RPL Robot programming language
- R++ Object Oriented Programming Language
  A modern object oriented structured text, that makes easier to develop application and user's libraries

RDE offers the programmer, for a user friendly debugging, the following tools:
- Oscilloscope (synchronous with the motion task)
- Monitor (to watch the variables values)
- Graphical panels (to realize cock-pits to debug the controlled machine)
- Breakpoints: on the execution of an instruction (stopping the execution or just counting the event occurrences), on a variable read operation, on a variable write operation
- Trace on tasks
- Step by step instructions (to follow the program flow)
- "live" modification (to modify LD/ST tasks without re-booting the system)
- 3D Graphical panels (for a virtual simulation of the controlled machine)
- Graphical panels to interact (display and edit) with the devices (drives) connected to the fieldbus
- System Monitor (allows the realtime monitoring of the main functionalities of the controlled machine)
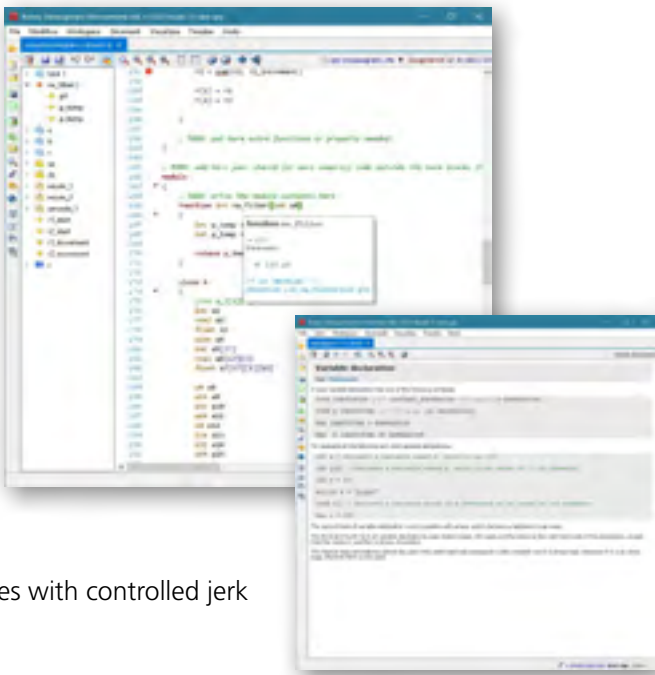
Structured text with MOTION libraries

It allows to easily approach the following problems:
- Solving synchronization problems for any number of rotating and/or translating axes
- Programming even sophisticated motion laws by simply writing their equations
- Building electronic cams
- Live modifications

List of some motion libraries

MV_CAM	Execute a CAM
MV_CRIMPER	Suitable for packaging machine
MV_FOLLOW	Flying shear
MV_PHASE_ADJ	Phasing between two axes
MV_REACH_TARGET	Axes tracking
MV_TO_N_CJ	Interpolated mission up to 32 axes with controlled jerk
etc...	

## Structured text with ROBOTICS libraries

- Fly move for pick&place applications etc...
- Continuous path control for cutting/glueing etc..
- Linear, circular, spline interpolation at the "tool point"
- Built-in coordinate transformation for the main robotics structures (anthropomorphous, scara, cilindric, delta, ect...)
- ISO (interpreter of ISO sources generated by external CAD/CAM)

List of some Robotic libraries
MV_FLY_JOINT
MV_FLY_CART
MV_LINEAR
MV_SPLINE
MV_CIRC
PE_EXEC_PATH

In the menu:
project ⊳ configurator
the user can easily:
- Parameterize the structure and the most relevant variables
- Parameterize the power handling using the power set configuration tool
- Parameterize the alarms handling

The system is able to handle more than one axes group simultaneously etc...
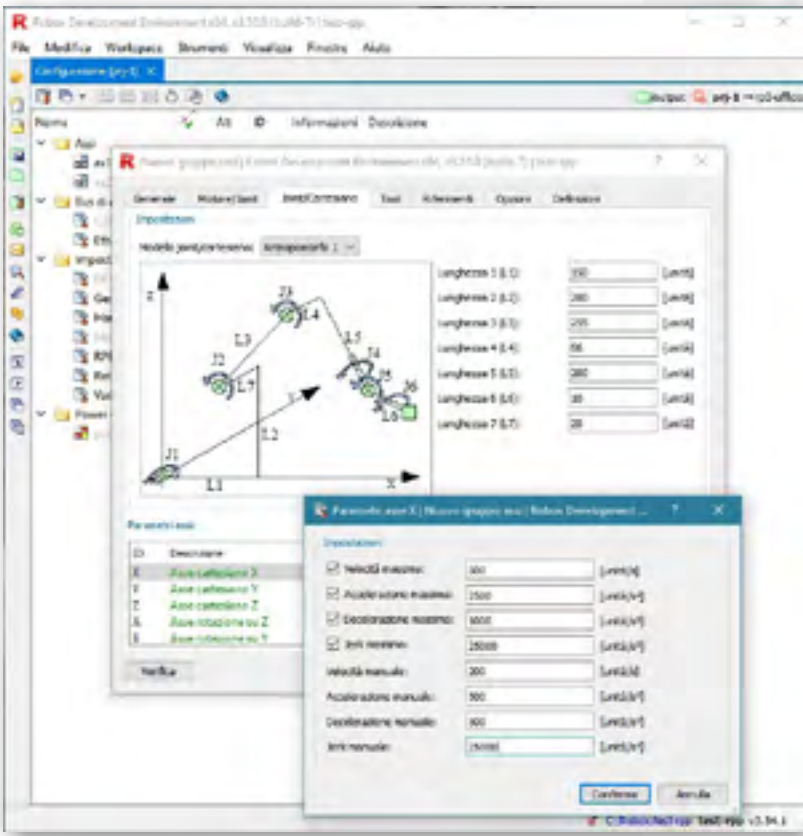
Ladder diagram

Suitable for PLC programming
- Complete list of elements (IEC61131)
- Monitor
- Live modifications (off-line and on-line)
- Mathematical blocks
- OB full integration
- PLCopen Function Blocks Library

OB use
from LD

OB

Object Blocks (extended concept of Function Block) are predefined CLASSES (ex: PID , MUX, BELT, PLC OPEN etc) which the user can instance in his project.
It is possible to use the methods offered by the class, invoking them from the other languages.

In the menu:
project ⇨ configurator
the user can easily define the predefined OB's that he prefers to use, make instances, and configure its parameters.

Object Block (extended concept of Function Block) can be developed by the user to build his own classes of libraries
Starting with the definition of the interface (parameter and methods) it is possible to write any kind of software in C++, exploiting the power of the object oriented philosophy (a low level Interface is available with the operative system)

The OB developer can also modify an existing OB to add new features (properties,methods etc..) or use other existing OB's
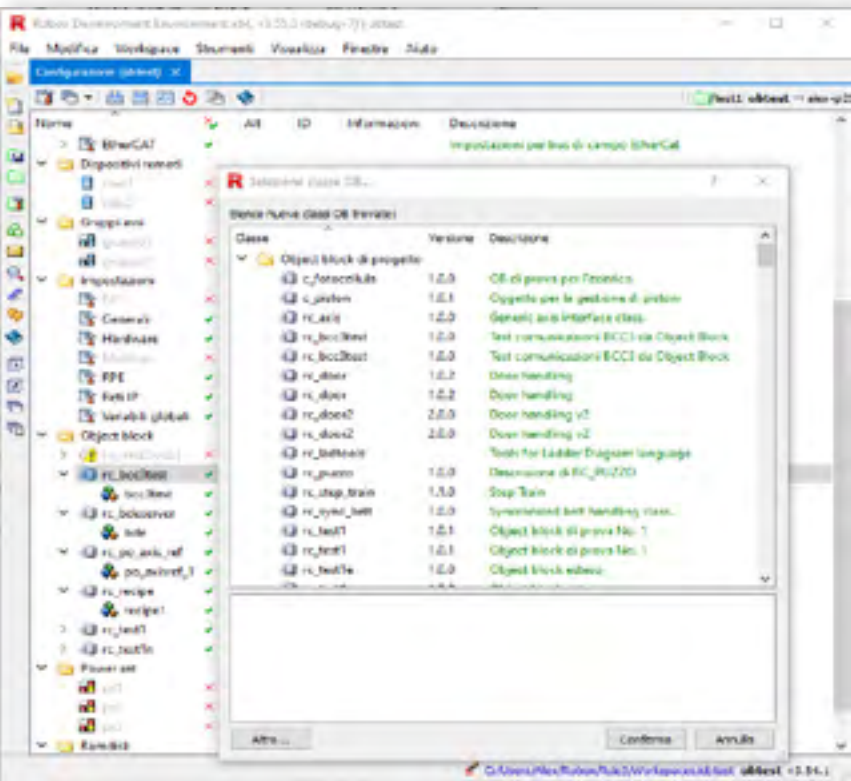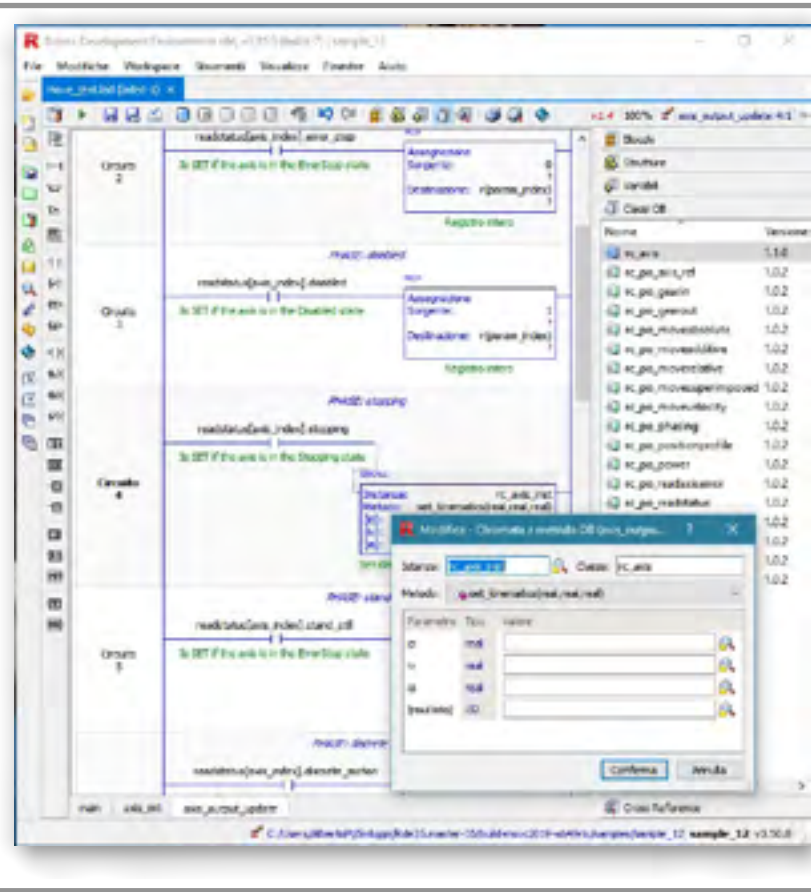
The graphical configurator allows to describe both the hardware and software, easily and rapidly.
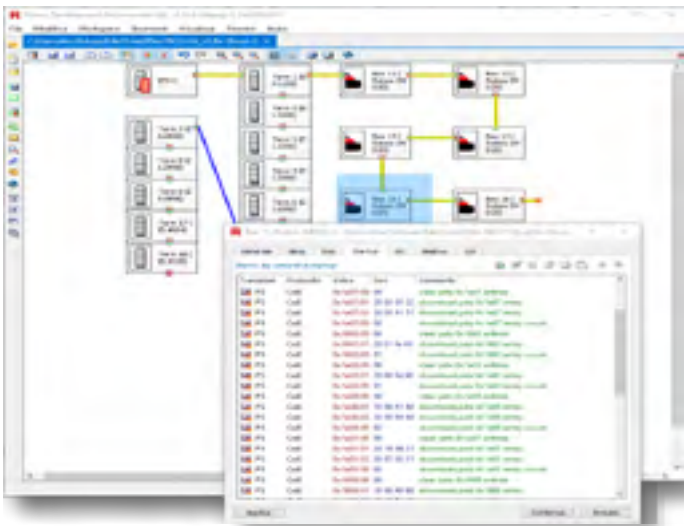
RFBCED (Robox Fieldbus editor configurator)
It allows to describe the EtherCAT net (PDO contents etc...)
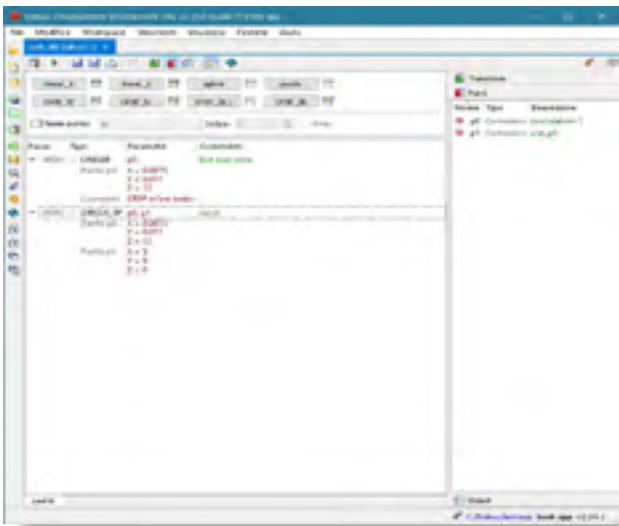
PLIBED (Path Library Editor)
It allows to edit and test the paths and points libraries
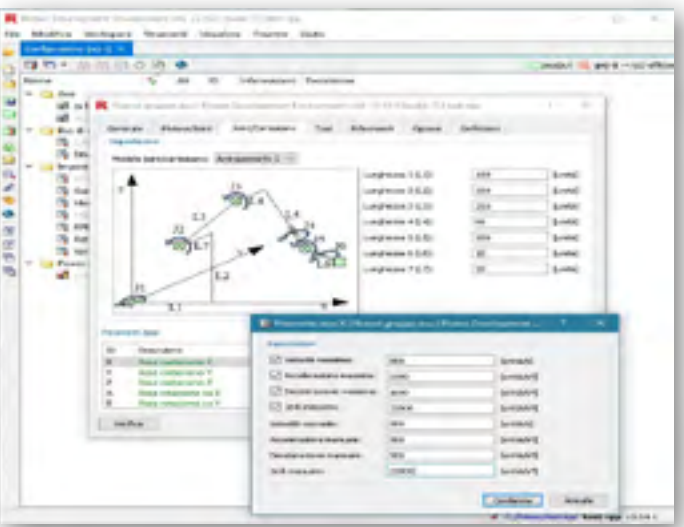
Axes group configurator
It allows to group the axes and make a selection from different kinematics etc.
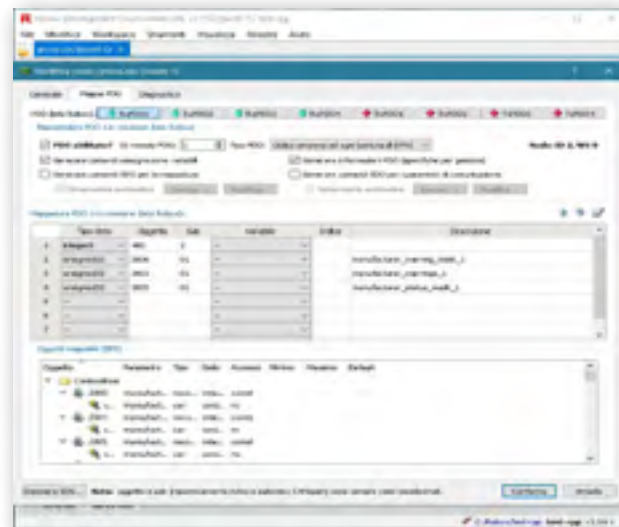
COC (CANopen configurator)
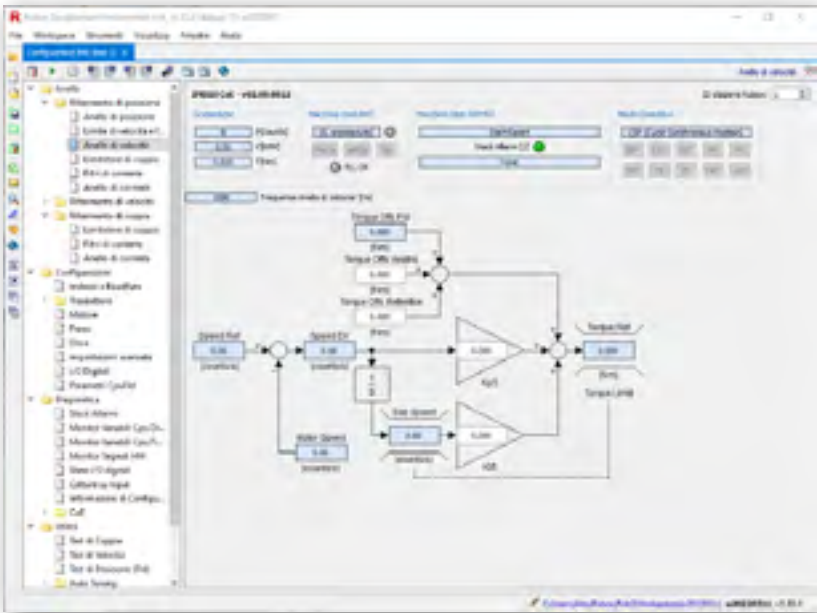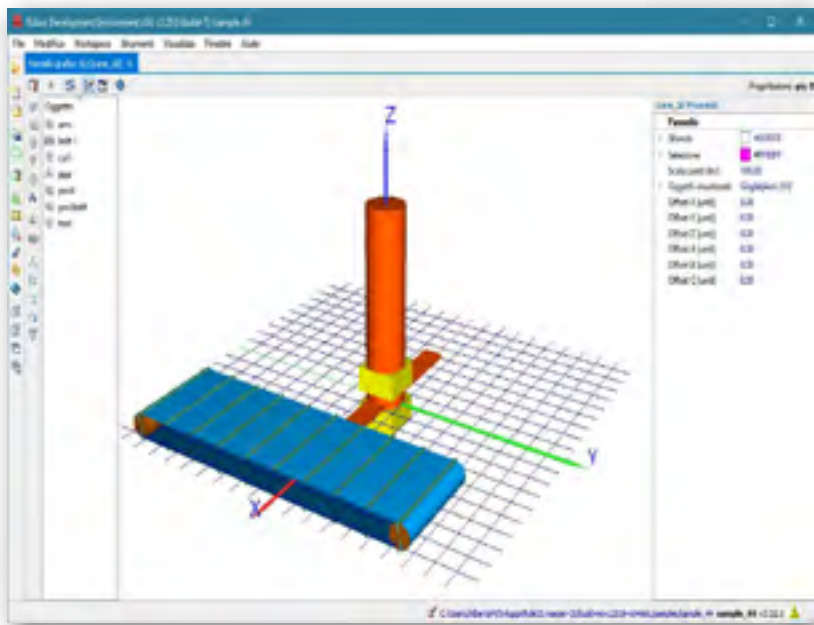It allows to describe the CANopen net
(PDO contents etc...)

Machine Configurator
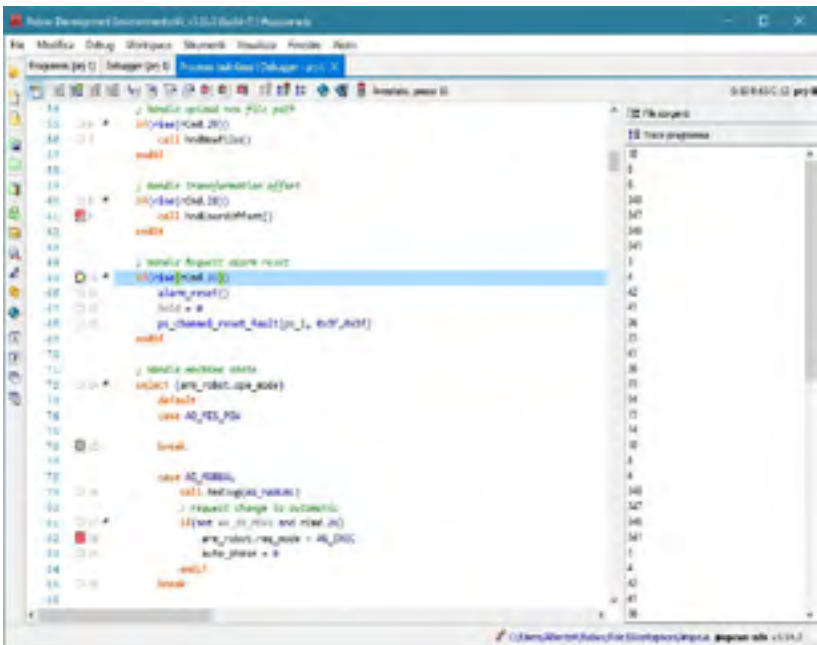It allows to describe an axis, a group of axes, kinematics, a power set etc.
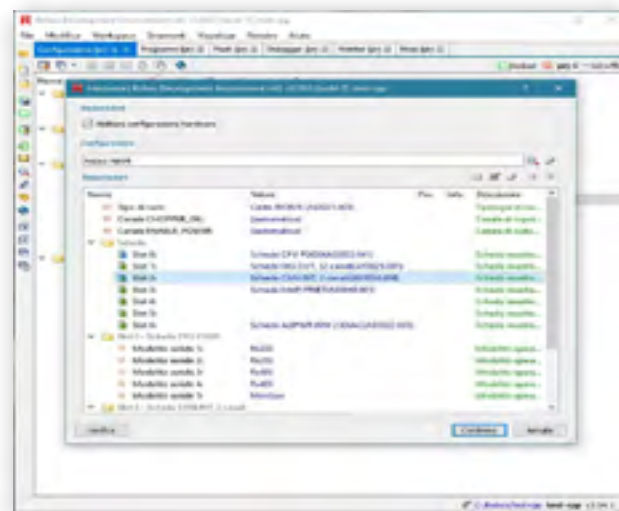
Hardware configurator
It allows to select the Robox motion controller where the application will run.
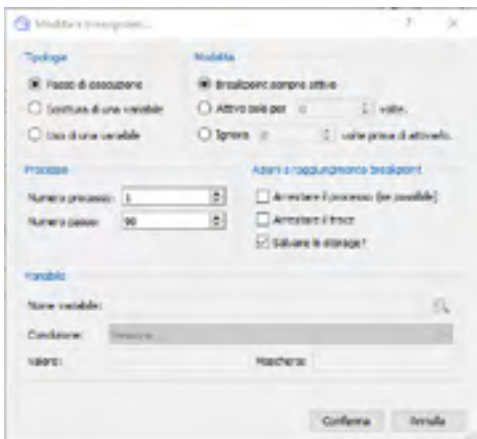
RDE development environment
3D graphic panel

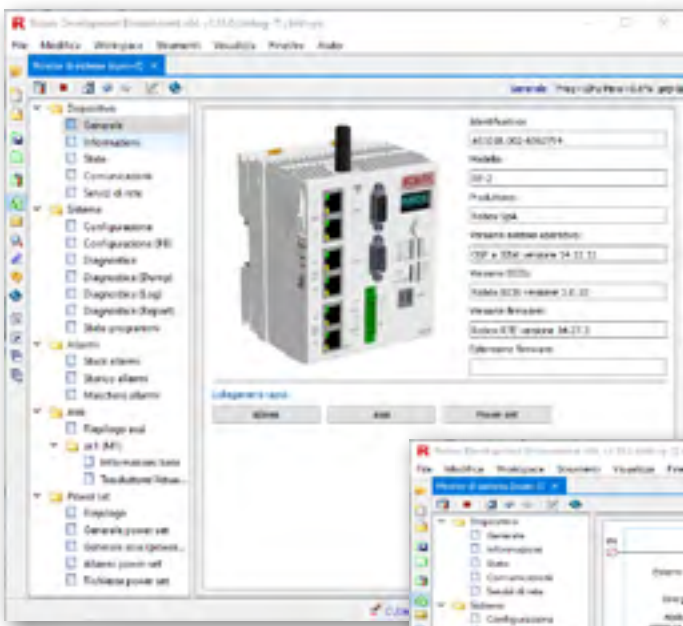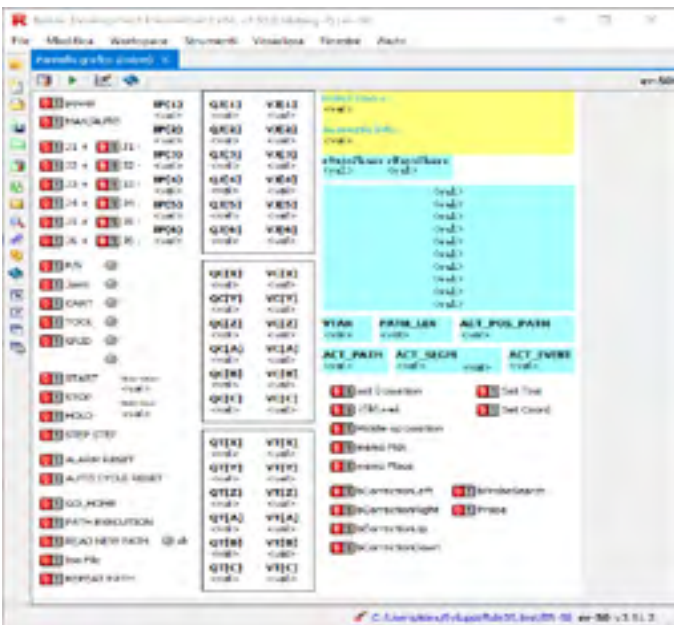**RDE development environment**
graphic IMD configurator

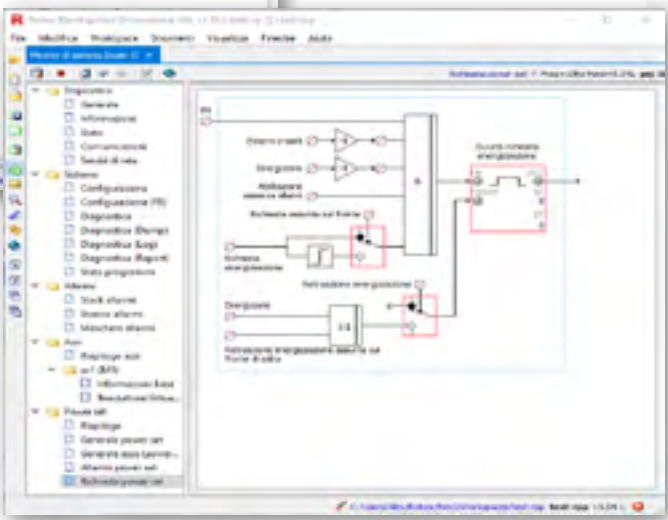**RDE development environment**
breakpoint/trace

RDE development environment
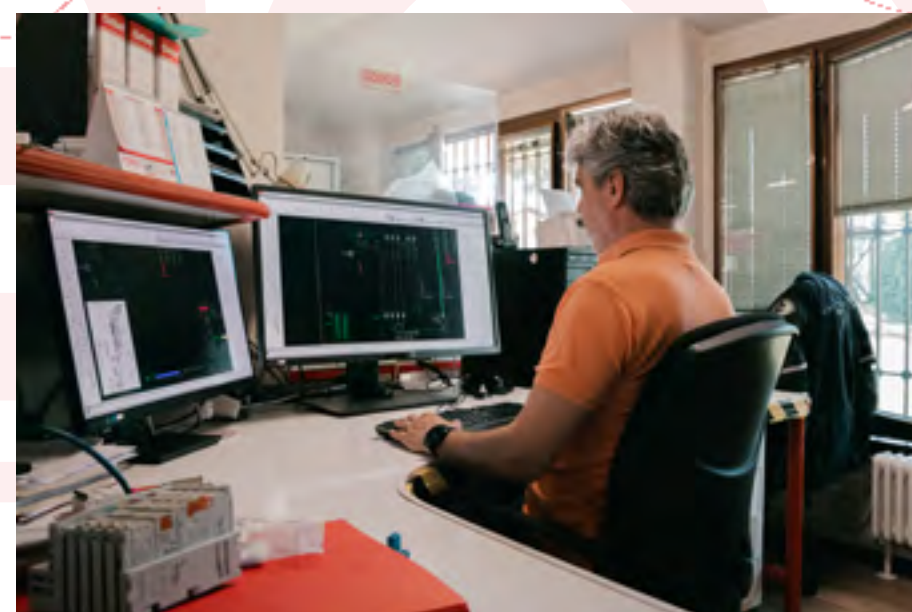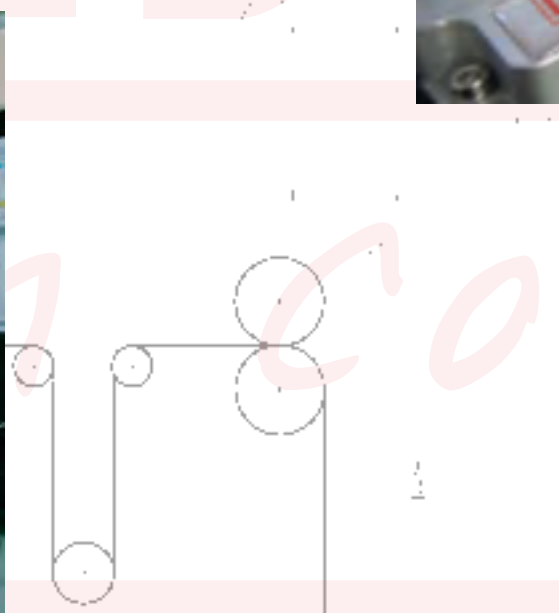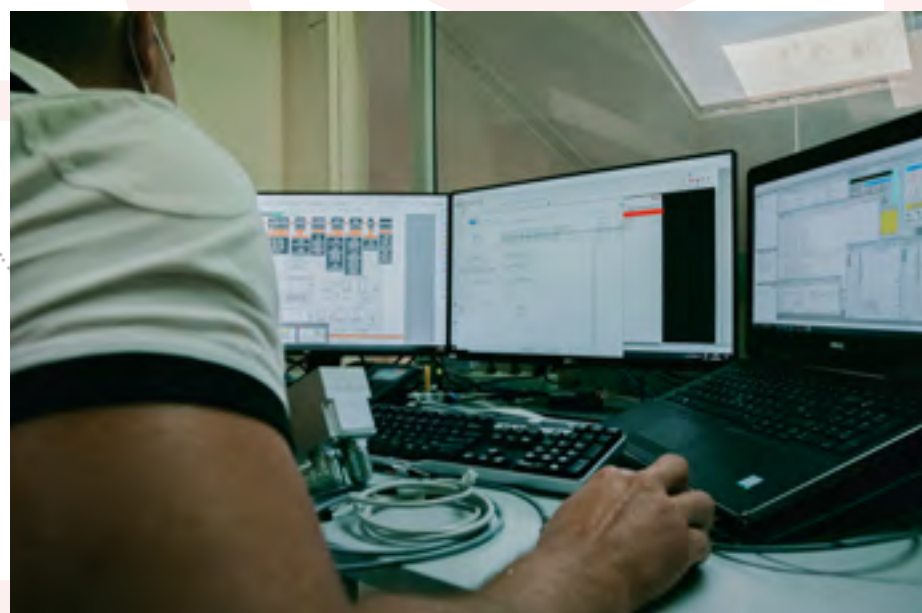oscilloscope/monitor

RDE development environment
system monitor

RDE development environment
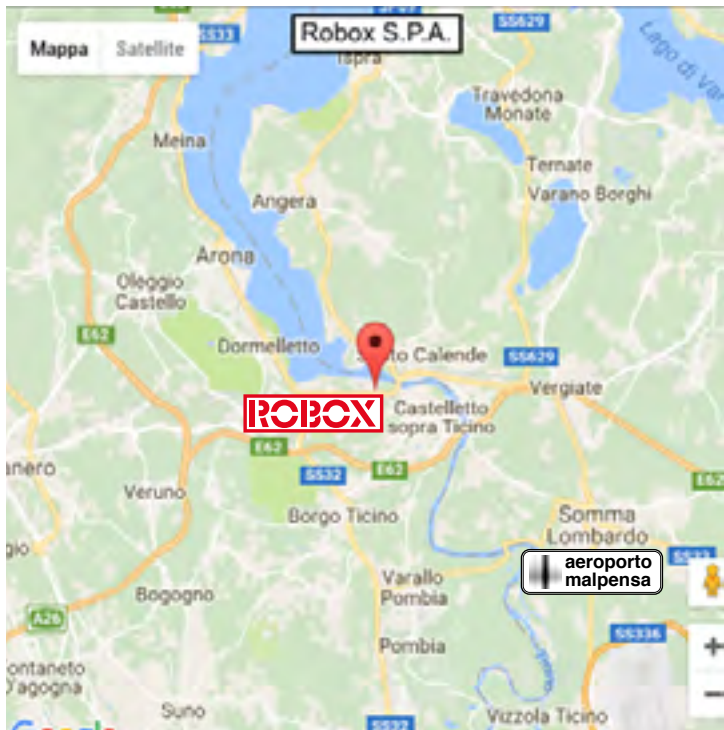graphic panel

ROBOX
motion control

How to reach us

GPS COORDINATES: LATITUDE 45° 43' 15" North-longitude 8° 37' 6" East
It's very simple both from Milano, Torino and Genova directions. Leave the A8/A26 highway at Castelletto Ticino.

ROBOX S.p.A.
via Sempione, 82 · 28053 Castelletto Sopra Ticino (NO) Italy
tel. +39 0331 922086
e-mail: info@robox.it
http://www.robox.it

ROBOX Smart Motion (Wuhu) co., ltd.
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Jiujiang Zone, WUHU City, Anhui Province - 241000 CHINA
http://www.robox.com.cn