Industrial Robot Communication Protocols

June 2013

Protocol structure based on the OSI model							
Protocol	**Physical**	**Data link**	**Network**	**Transport**	**Session**	**Presentation**	**Application**
EtherNet/IP	Ethernet 10/100/1000 Mbps	Ethernet CSMA/CD	IP	TCP/UDP	CIP protocol family		
ControlNet	RG-6 coaxial cables, 5Mbps	ControlNet CTDMA	ControlNet, 99 nodes	ControlNet	CIP protocol family		
DeviceNet	CAN bus with twisted pair cables, 1Mbps	CAN bus CSMA/NBA	DeviceNet, 64 nodes	DeviceNet	CIP protocol family		
Modbus-RTU or ASCII	Serial cable, ex: RS-232, RS-485	Modbus	Modbus Map, 247 nodes	Modbus			Modbus client or server + interface
Modbus-TCP/IP	Ethernet 10/100/1000Mbps	EtherNet	IP, 254 nodes/module	TCP port 502	Modbus TCP		Modbus client or server + interface
CC-Link	RS-485 coaxial cable, 10 Mbps	CC-Link	64 nodes	CC-Link	CC-Link	CC-Link	CSP*
CC-Link IE Field	Ethernet 1Gbps, copper cable	CC-Link	254 nodes	CC-Link	CC-Link	CC-Link	CSP*
CC-Link IE Control	Ethernet 1Gbps, fiber optic cable	CC-Link	120 nodes	CC-Link	CC-Link	CC-Link	CSP*
CC-Link Safety	Based on CC-Link	CC-Link	42 nodes	CC-Link	CC-Link	CC-Link	CSP*
CC-link LT	Dedicated flat cable, 2.5 Mbps, 625Kbps or 125Kbps	CC-Link	64 nodes, 8 per branch	CC-Link	CC-Link	CC-Link	CSP*
PROFIBUS	RS-485 cables, fiber optic cable or MBP	PROFIBUS Fieldbus data link	32 nodes, 126 with fiber optic cable	Not used	Not used	Not used	PROFIBUS DP (V0, V1, V2)
EtherCat	Ethernet 10/100/1000 Mbps	EtherNet w/EtherCat slave&controller chip	IP with timing layer, up to 65535 nodes	TCP/UDP	EtherCat		

* CSP for CC-Link System Profile
All nodes limit number do not do not hold account of repeaters

Protocol for controllers by robot brand											Physical interface for controllers by robot brand		
Manufacturer	**EtherNet/IP**	**DeviceNet**	**Profibus-DP**	**Profinet**	**CC-Link**	**Modbus RTU**	**Modbus TCP**	**EtherCat**	**CANopen**	**Best Fit Robotiq**	**Serial (RS-232, RS-485, RS-422)**	**TCP (Ethernet)**	**Other**
ABB	Optional	Optional	Optional	Optional	Slave	No	No	No	No	DeviceNet	RS-232 RS-422	TBD	AB RIO (Slave), Up to 2200 I/O, DeviceNet Lean
Adept	Optional	Optional	No	No	No	No	TBD	No	No	EtherNet/IP	RS-232, RS-422, RS-485	Yes	SmartServo interface standard Ethernet
Barrett **(WAM)**	No	No	No	No	No	No	No	No	No	TBD	No	No	Digital I/O, Proprietary protocol on CAN bus
Comau	Optional	Optional	Optional	Optional	No	No	TBD	No	Optional	DeviceNet	RS-232, RS-422, RS-485	Yes	Analog/Digital I/O, USB
Denso	Slave	Optional	Slave	Slave	Slave	No	No	Under development	TBD	DeviceNet	RS-232	TBD	Digital/Parallel/Standard I/O
Epson	Slave	Slave	Slave	Slave	Slave	No	No	No	TBD	DeviceNet	RS-232	Yes	-
FANUC	Optional	Optional	Optional	Optional	Slave	No	Slave	No	No	EtherNet/IP	RS-232	Yes	EtherNer Global Data (EGD)
Kawasaki	Optional	Optional	Optional	No	Slave	TBD	Optional	No	Slave	EtherNet/IP	RS-232 RS-485	Yes	USB, AB Remote I/O, Interbus, ControlNet
KUKA	Optional	Optional	Optional	Optional	No	No	No	Yes	No	EtherCAT	No	Yes	USB standard, Interbus, Analog/Digital I/O, OPC, TCP/IP
Mitsubishi	No	TBD	No	No	TBD	No	No	No	No	TBD	RS-232, RS-422, RS-485	Yes	External I/O, USB, Analog/Digital
Yaskawa - Motoman	Optional	Optional	Optional	No	Optional	No	TBD	No	No	EtherNet/IP	RS-232	Yes	Mechatrolink-II Optional 40 I/O
Nachi	Optional	Optional	Optional	No	Slave	No	No	No	No	EtherNet/IP	TBD	Yes	24v DC Discrete I/O, FL Net
OTC Daihen	Optional	Optional	Optional	No	Optional	No	No	No	No	EtherNet/IP	TBD	TBD	FL Net, JemaNet Remote I/O
Panasonic	Slave	Slave	Slave	No	Slave	No	No	No	No	TBD	TBD	TBD	I/O, Control Net (slave)
Rethink Robotics	No	No	No	No	No	No	Under development	No	No	TBD	TBD	TBD	-
Schunk **(Powerball Lightweight Arm)**	No	No	No	No	No	No	No	No	Yes	CANOpen	RS-232	TBD	CAN bus
Toshiba	Under development	Slave	Slave	Under development	Slave	No	No	Under development	No	TBD	RS-485	Yes	Proprietary extended I/O via RS-485
Universal Robots	No	No	No	No	No	No	Yes	No	No	Modbus-TCP	No	Yes	Analog/Digital, USB, FTP

This list is not exhaustive. Make sure to contact your robot manufacturer and a Robotiq representative to confirm this information.
Information relative to the latest robot manufacturer's controller.
"Yes" and "Optional" mentions are related to master devices. "TBD" means "To Be Determined".