50 YEARS

NACHI

NACHI EUROPE GmbH

OUR SYNERGY
YOUR PERFORMANCE

COMPACT 6-AXIS-ROBOTS
MZ-SERIES

CELEBRATE THE POLE POSITION

No.1 IN THE WORLD

World's fastest compact robot with load capacity up to 7kg: NACHI's MZ07

NACHI introduces – The MZ-Series

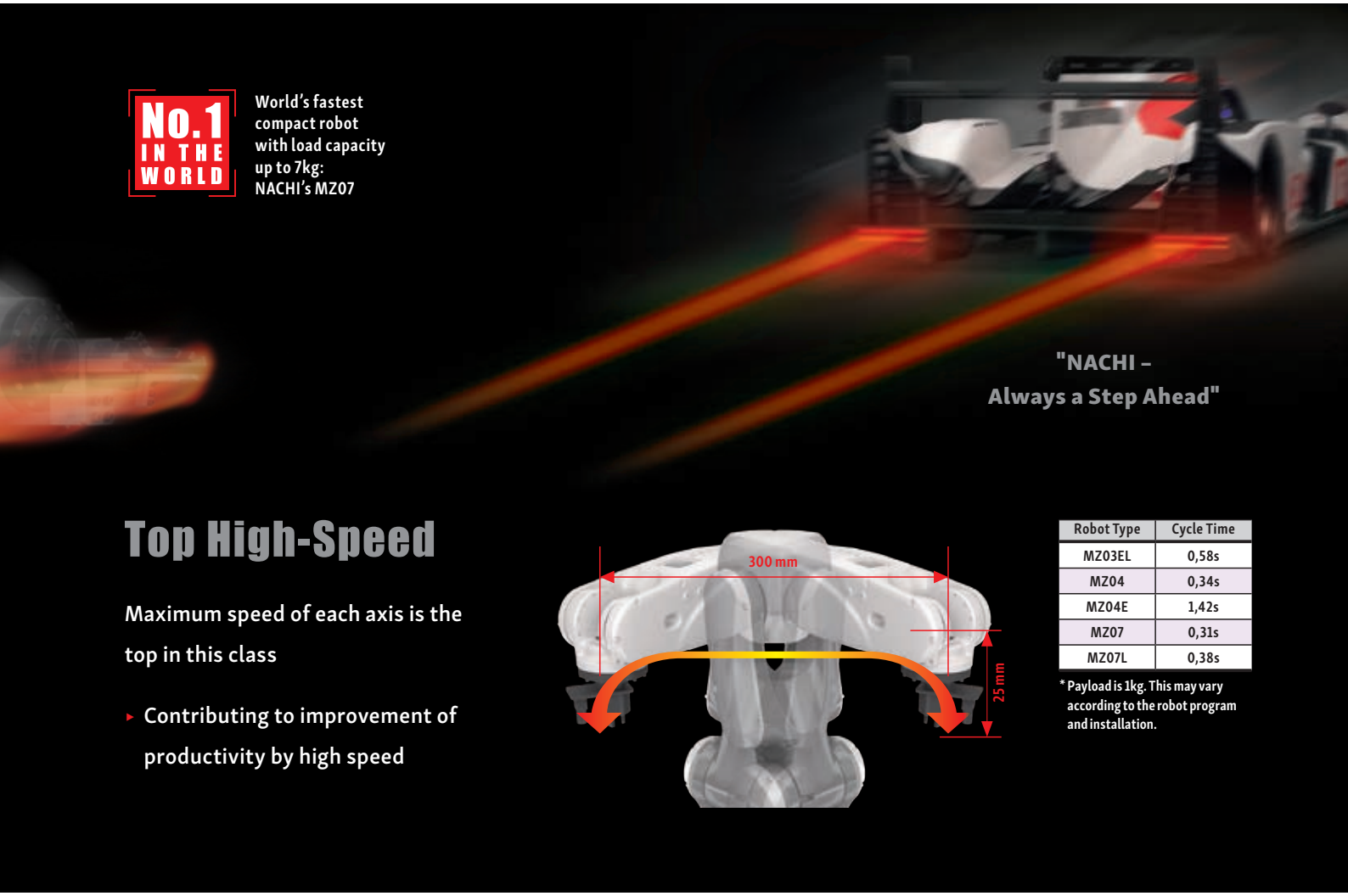
With the development of the first powerful industrial robots in the 1960s, NACHI has proven its strong innovation power in the field of industrial automation.
Since then NACHI has continuously increased its product range of industrial robots.

Applications:

- load and unload of machine tool
- linking processing stations in production lines

Main Advantages:

- protection class IP67 utilizes applications in harsh industrial environment
- compact design for minimum space requirement
- high repeating accuracy due to optimized drives and measuring systems
- inside placed valves
- intelligent wiring
- hollow wrist



No.1 IN THE WORLD

World's fastest compact robot with load capacity up to 7kg: NACHI's MZ07

"NACHI – Always a Step Ahead"

Top High-Speed

Maximum speed of each axis is the top in this class

- Contributing to improvement of productivity by high speed

Robot Type	Cycle Time
MZ03EL	0,58s
MZ04	0,34s
MZ04E	1,42s
MZ07	0,31s
MZ07L	0,38s

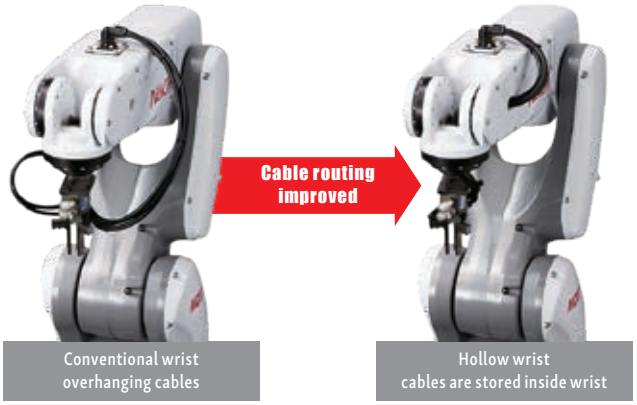
* Payload is 1kg. This may vary according to the robot program and installation.

Model Overview

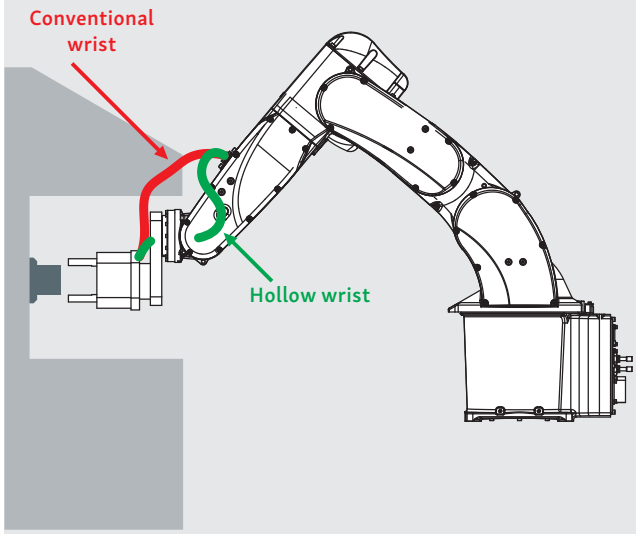
Smart Cable Routing

Cable and tubes can be routed through hollow wrist

- Avoids interference with peripheral equipment
- Allows the arm to enter tight spaces
- Improved reliability with stable cable behavior during high speed operation

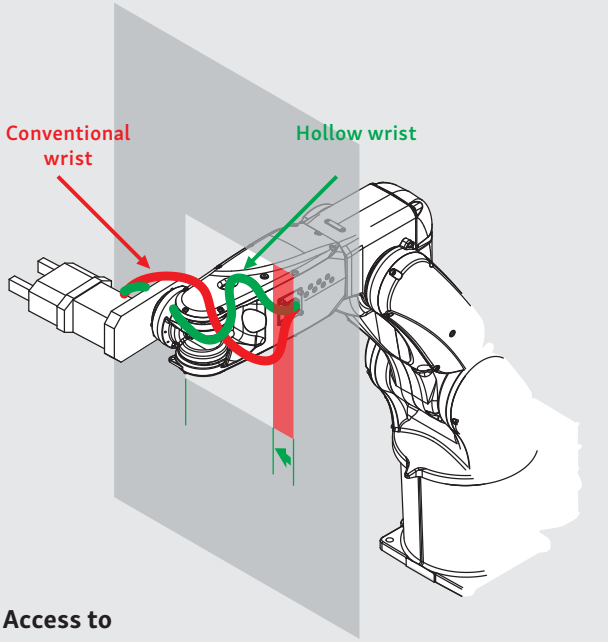


APPROACHING TO MACHINE



Avoids cable interference from machine

ENTERING INTO COVER



Access to smaller window

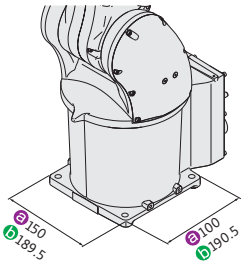
Lightweight Compact Body

The lightweight and compact robot arm helps to keep the equipment simple and saves space.

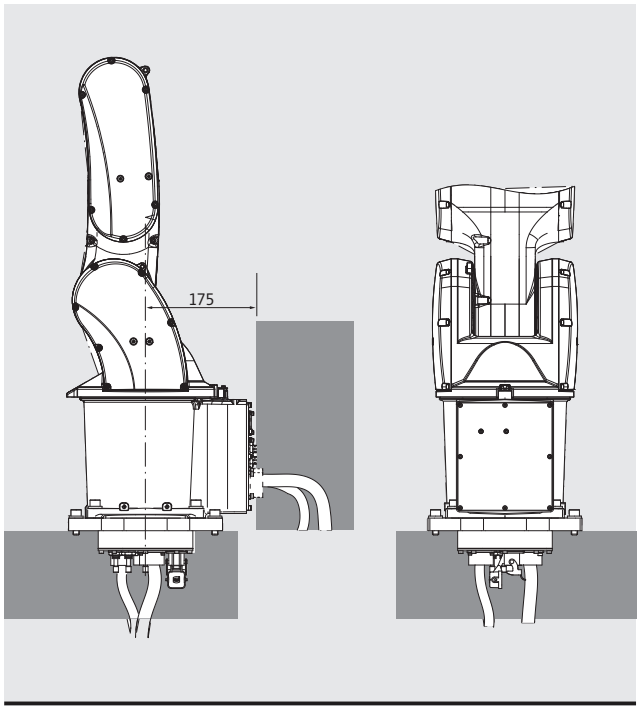
The MZ04 robot is designed to be compact. The installation area is half that of the MZ07 or the MZ03EL (DIN-A5 paper size).

Compact & Flexible Installation

- Small bottom design enables compact installation
- Cable connection from bottom side **Optional**
- More compact installation
- Robot can be installed close to behind wall
- Cables can be stored inside robot riser

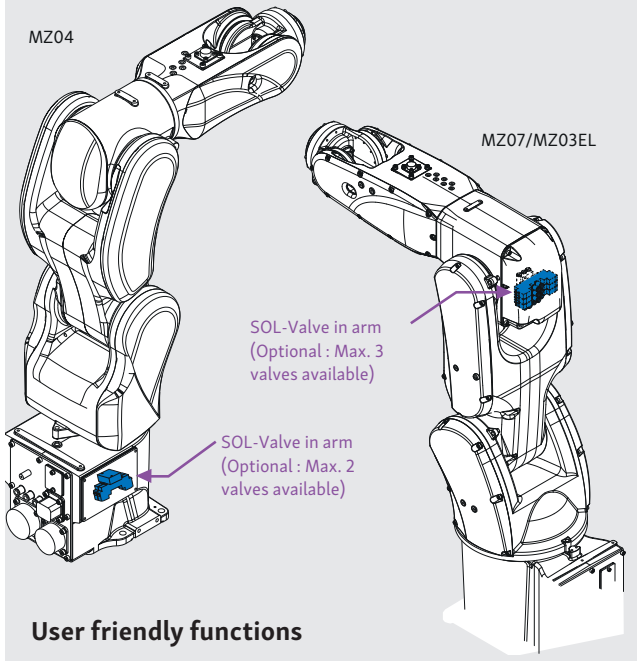


Illustrations are valid for:
ⓐ MZ04, ⓑ MZ07/MZ07L/MZ03EL.



PNEUMATIC VALVES INSIDE ROBOT ARM — OPTIONAL

- Solenoid valves can be installed inside the robot arm.



User friendly functions

AVAILABLE TO ALL-ROUND MOUNTING

Floor mount | Inverted mount | Wall mount | Tilted mount

Standard Specifications

Robot type MZ0□□-01-□□□-CFD-0000

ARM VARIATION

Mark 1	Mark 2	Specification	Notes
3	EL	3,5kg payload, Standard arm	6 axes, Max reach 1102mm
4	(none)	4kg payload, Standard arm	6 axes, Max reach 541mm
	D	4kg payload, Standard arm	6 axes, Max reach 541mm, IP67
	E	4kg payload, Standard arm	6 axes, Max reach 541mm, Low power type
7	(none)	7kg payload, Standard arm	6 axes, Max reach 723mm
	L	7kg payload, Long arm	6 axes, Max reach 912mm
	P	7kg payload, Standard arm	5 axes, Max reach 723mm (does not have J4)
	LP	7kg payload, Long arm	5 axes, Max reach 912mm (does not have J4)

CONNECTION VARIATION

Mark	Specification	Notes
0	Rear connection	Robot to controller cable is connected at robot rear
B	Bottom connection	Robot to controller cable is connected at robot bottom

INSTALLATION VARIATION

Mark	Specification	Notes
0	Standard	J1 working envelope ±30° at wall mounting
W	Wall mount	J1 working envelope ±170° at wall mounting

APPLICATION VARIATION

Mark	Specification	Solenoid valve			Signal wires	Notes
		MZ03EL	MZ04	MZ07		
0	Standard	Up to 3	Up to 2	Up to 3	10 wires	–
V	Vision sensor	Up to 2	Up to 1	Up to 2	10 wires	LAN cable, Light cable
U	Vision sensor (cross laser)	Up to 1	Up to 1	Up to 1	10 wires	LAN cable, Light cable, Laser cable
F	Force sensor	Up to 1	Up to 1	Up to 1	10 wires	6 freedom Force sensor cable
S	Additional axis	Up to 1	Up to 1	Up to 1	10 wires	1 motor and 1 encoder cable

BASIC SPECIFICATION OF ROBOT

Item				Specification			
Robot Model				MZ03EL-02	MZ04-01	MZ07-01 (MZ07P-01)	MZ07L-01 (MZ07LP-01)
Construction				Articulated			
Number of Axis				6		6 (5)	
Drive System				AC Servodrive			
Max. Working Envelope	Arm	J1	Swivel	±170°	±170°		
		J2	Forward/Backward	-135° ~ 80°	-145° ~ +90°	-135°~ +80°	
		J3	Upward/Downward	-155° ~ 270°	-125° ~ +280°	-136° ~ 270°	-139° ~ 270°
	Wrist	J4*3	Rotation 2	±190°			
		J5	Bend	±120°			
		J6	Rotation 1	±360°			
Max. Speed*4 [°/s]	Arm	J1	Swivel	300	480	450	300
		J2	Forward/ Backward	230	460	380	280
		J3	Upward/Downward	360	520	520	360
	Wrist	J4*3	Rotation 2	550	560	550	
		J5	Bend	550	560	550	
		J6	Rotation 1	1000	900	1000	
Max. Payload [kg]		Wrist		3.5	4	7	
Allowable Static Loading Torque [N • m]		J4*3	Rotation 2	6.0	8.86	16.6	
		J5	Bend	6.0	8.86	16.6	
		J6	Rotation 1	2.9	4.9	9.4	
Max. Allowable Moment of Inertia*1 [kg • m²]		J4*3	Rotation 2	0.12	0.2	0.47	
		J5	Bend	0.12	0.2	0.47	
		J6	Rotation 1	0.03	0.07	0.15	
Max. Reach [mm]				1102	541	723	912
Position Repeatability*2 [mm]				±0.03	±0.02		±0.03
Ambient Temperature				0 ~ 45°C			
Installation				Floor / Wall / Tilted / Inverted mount			
Dust Proof, Drip Proof				IP67	IP40 equivalent*5	IP67	
Robot Mass [kg]				39	26	30	32

1[N • m]=1/9,8[kgf • m]

*1: Note that the allowable moment of inertia of wrist varies with the wrist load conditions.

*2: JIS B 8432 compliant.

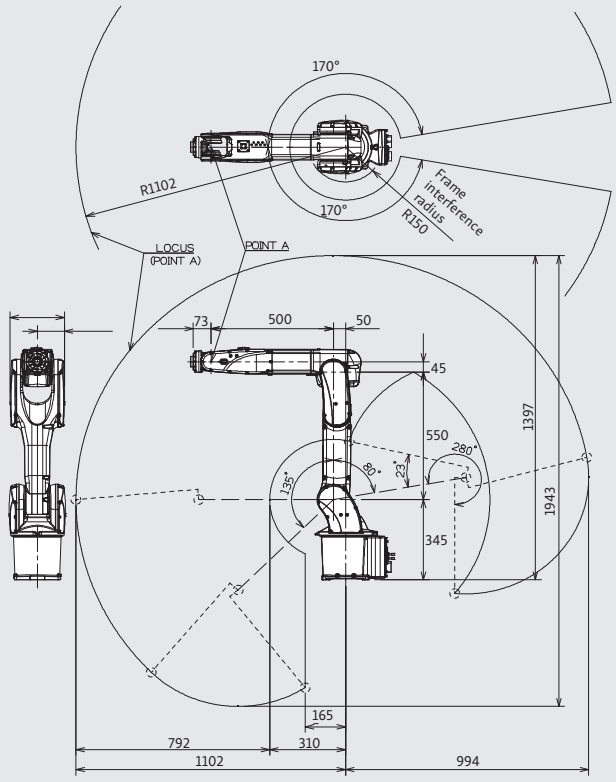
*3: MZ07P-01 and MZ07LP-01 don't have J4 axis.

*4: The „Max. speed" in this table is the available maximum value and will change depending on the workprogram and the wrist load condition.

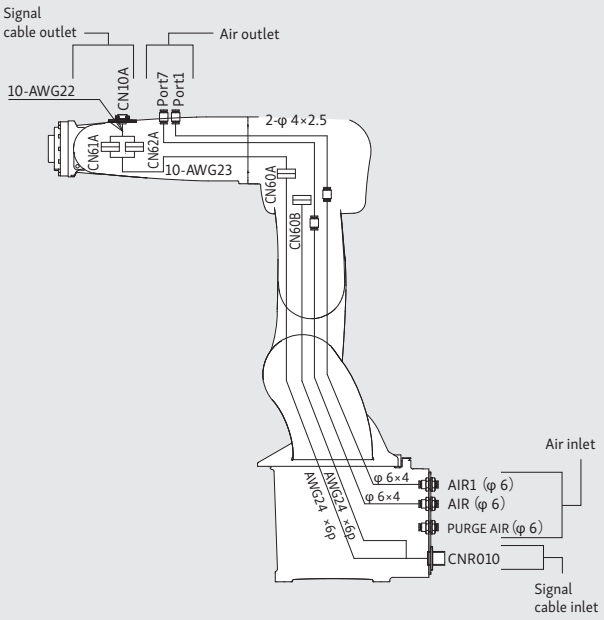
*5: IP67 specifications can be selected as an option for the MZ04.

MZ03EL

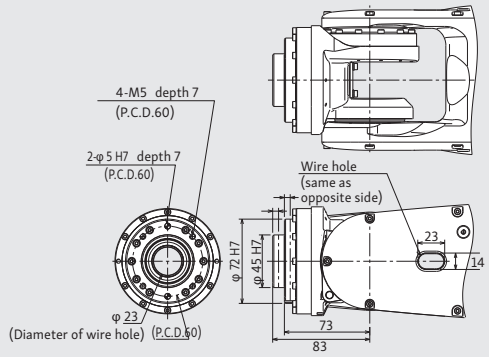
ROBOT DIMENSIONS AND WORKING ENVELOPE



WIRING AND TUBING INSIDE ARM (STANDARD)

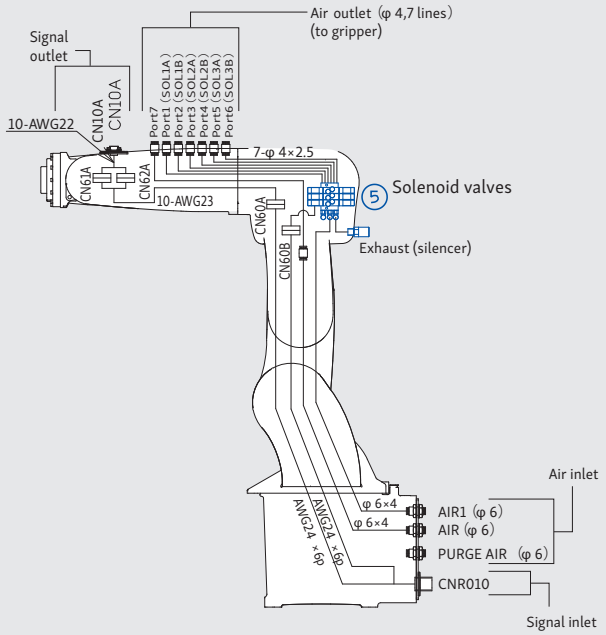


WRIST DIMENSIONS

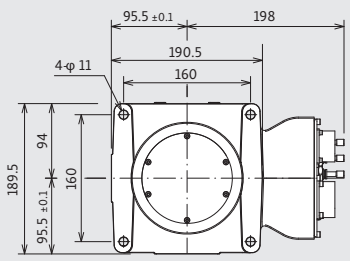


WIRING AND TUBING IN ROBOT ARM

(when SOL installed in arm)

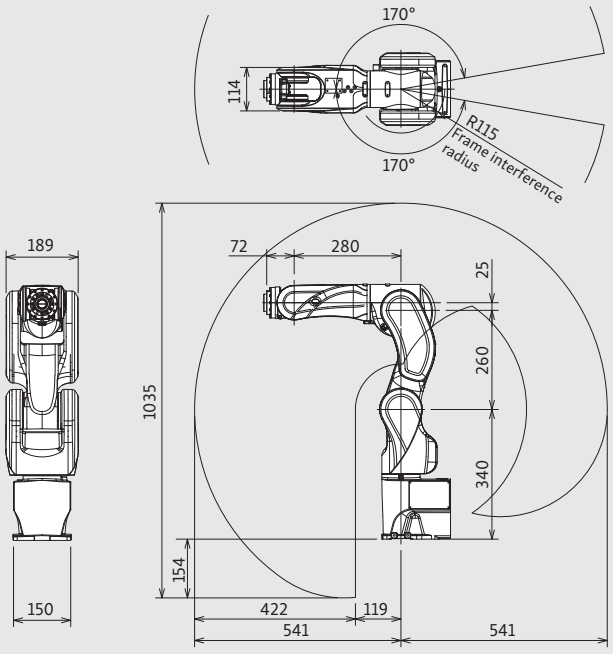


ROBOT BASE DIMENSIONS

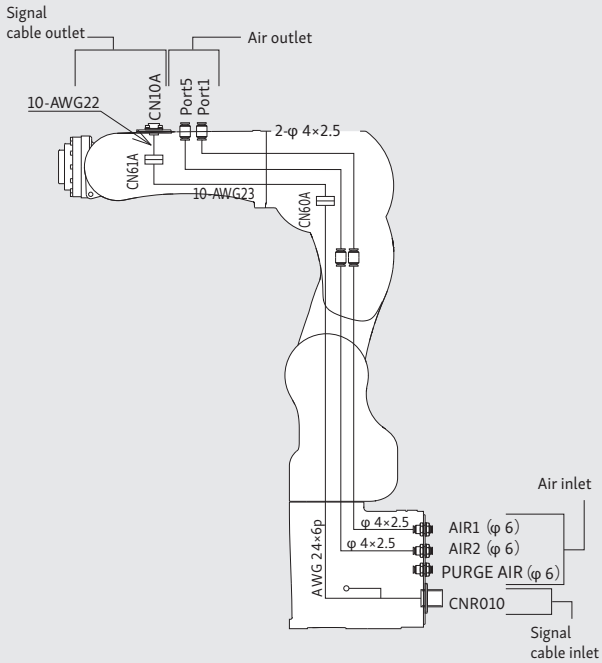


MZ04

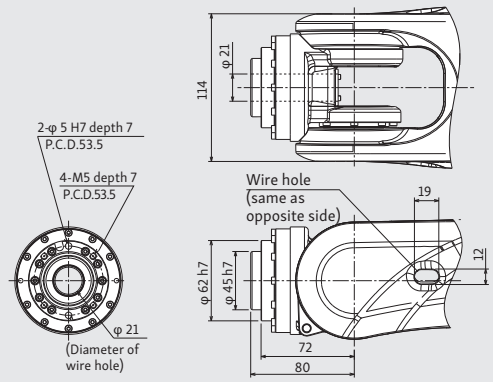
ROBOT DIMENSIONS AND WORKING ENVELOPE



WIRING AND TUBING INSIDE ARM (STANDARD)

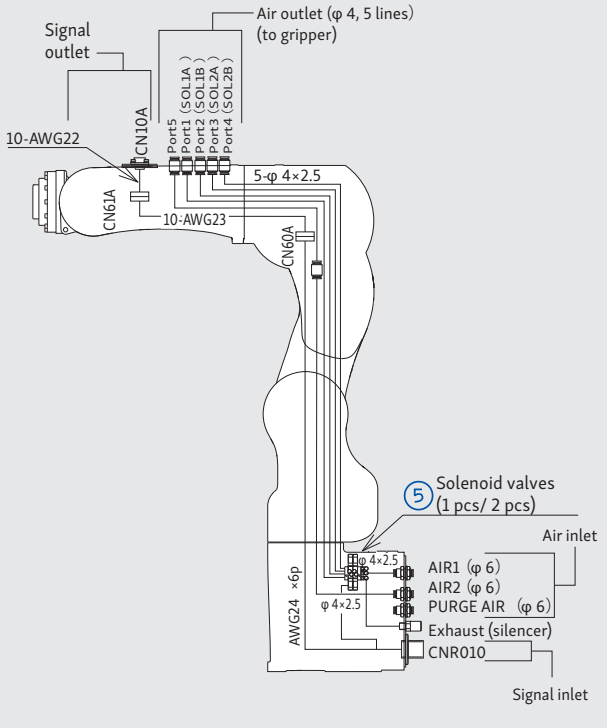


WRIST DIMENSIONS

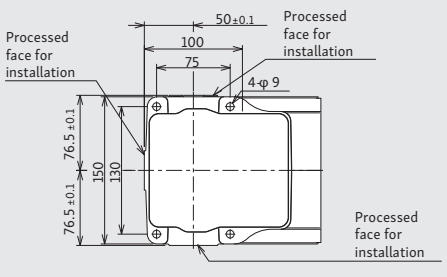


WIRING AND TUBING IN ROBOT ARM

(when SOL installed in arm)



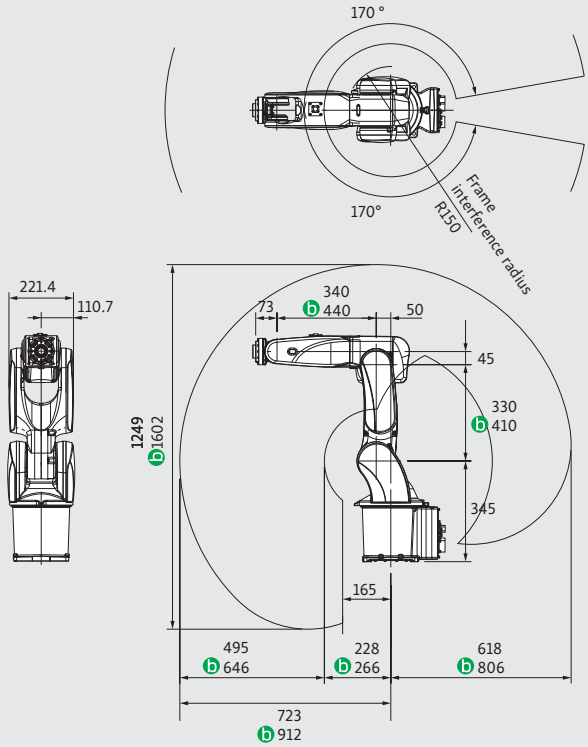
ROBOT BASE DIMENSIONS



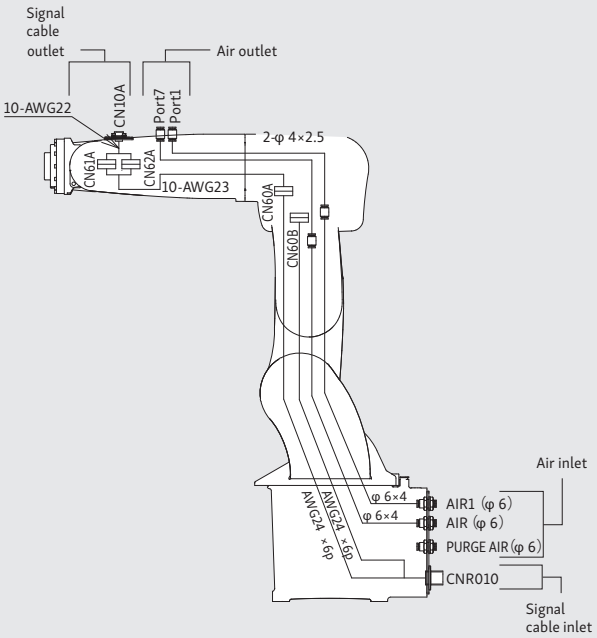
MZ07

ROBOT DIMENSIONS AND WORKING ENVELOPE

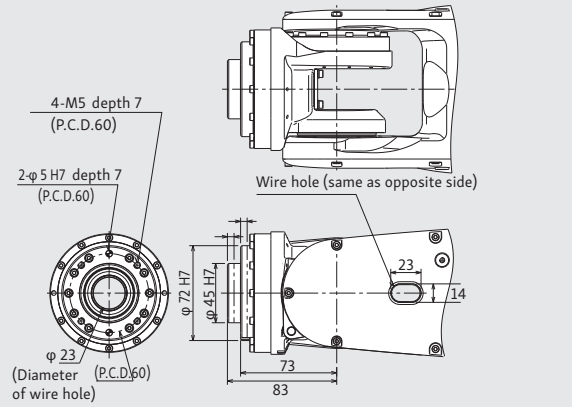
Figures shown indicate: MZ07 and ⓑMZ07L



WIRING AND TUBING INSIDE ARM (STANDARD)

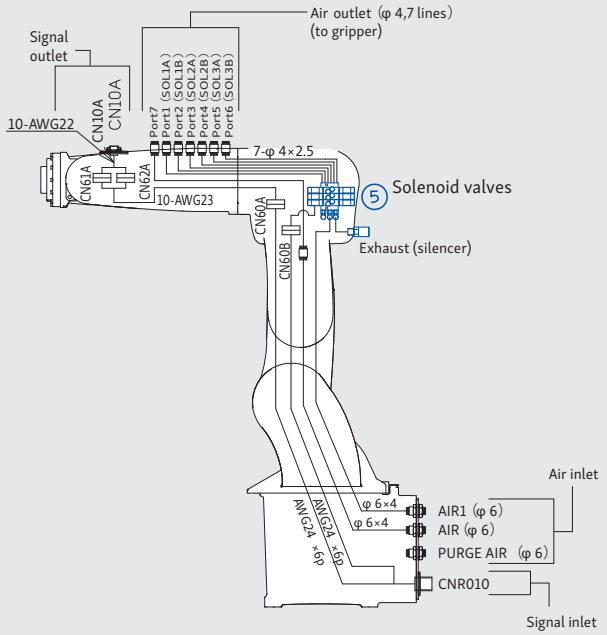


WRIST DIMENSIONS

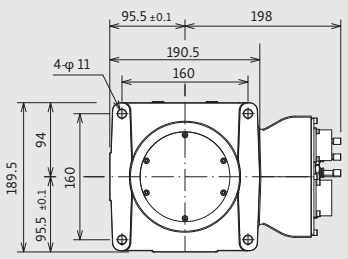


WIRING AND TUBING IN ROBOT ARM

(when SOL installed in arm)



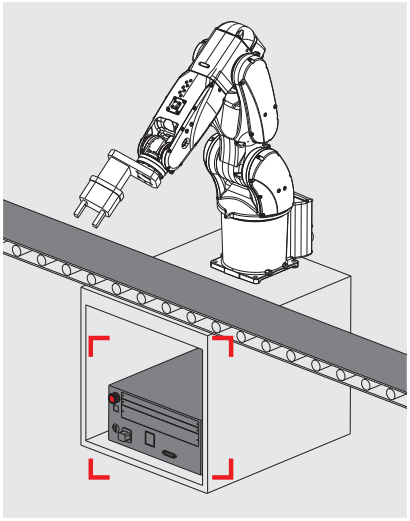
ROBOT BASE DIMENSIONS



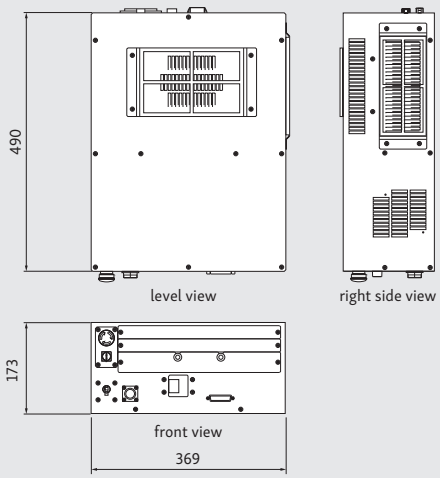
Controller

Compact Cabinet

- Only 369mm in width
- Could be installed inside robot riser



CONTROLLER DIMENSIONS



CONTROLLER OPTIONS

Item	Specification
Additional Axis	One additional axis is possible (Motor Capacity: up to 600W)
Fieldbus	DeviceNet, EtherNet/IP, PROFIBUS, PROFINET, CC-Link
Digital I/O	Up to 2pcs of 32 point/32 point I/O Board
	8 photo coupler input and 8 transistor output or 8 photo coupler input and 8 relay contact output
External Memory	USB Memory
Vision Sensor *1	NV-Pro
Robot Monitoring Unit *1	Category 4, SIL 3
Controller Protection Box	IP54 equivalent dust-proof and drip-proof box

*1: Another box is necessary.

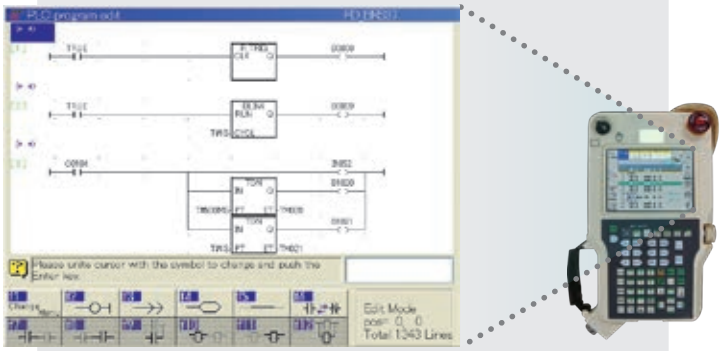
BASIC SPECIFICATION OF CONTROLLER

Item		Specification
Controlled Axis		6-Axes
Maximum Control Axis		7-Axes
Safety Function		PLd Category-3
Teaching Method		Teach / Playback Robot Language
Program Number		9999 programs
Memory Capacity		256 MB (2560000 program steps equivalent)
Teach-Pendant	Smart TP	5.7" Color LCD Touch Panel, Cable Length: 4m
	Compact TP	Monochrome, 20 characters x 4 lines Display, Cable Length: 4m
	Common	3 Position Enable SW, Emergency Stop Button
Operating Panel		Emergency Stop, Mode select switch (teach/playback)
Exclusive Safety Input		External Emergency Stop, Safety Plug, External Enable Switch, Protective Stop
Network		Ethernet
Memory Device		USB Port
External Dimension		369 mm(W)×490 mm(D)×173 mm(H)
Weight		Approx. 17 kg
Primary Power Supply		3-Phase AC200-230V ±10 % Single Phase AC200-230V ±10 %
Consuming Power		0.4 KVA
Dust Proof, Drip Proof		IP20
Ambient Temperature		0 ~ 40°C
Ambient Humidity		20 ~ 85% (Non-condensing)

Controller

SOFTWARE PLC – STANDARD

- Control peripheral equipment by robot controller
- Simplifies system configuration to reduce cost



OFFLINE SIMULATION TOOL – FD ON DESK LIGHT – STANDARD

Best simulator of first for primary study

- Offline Programming
- Robot Layout Investigation
- Cycle Time Simulation
- PLC Ladder Editing
- Operation Training

Various applications

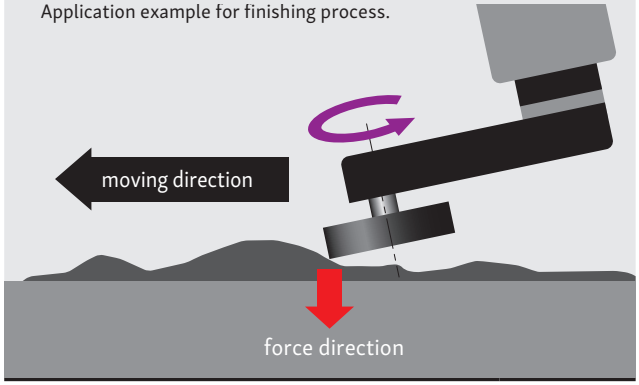
VISION SENSOR NV-PRO — OPTIONAL

- Operation by using teach pendant, high speed processing
- Various application available by 2D and 3D vision sensing, dimension measurement and parts type districting

FORCE SENSOR — OPTIONAL

- Assembling (inserting, following, phasing), polishing, deburring

Application example for finishing process.

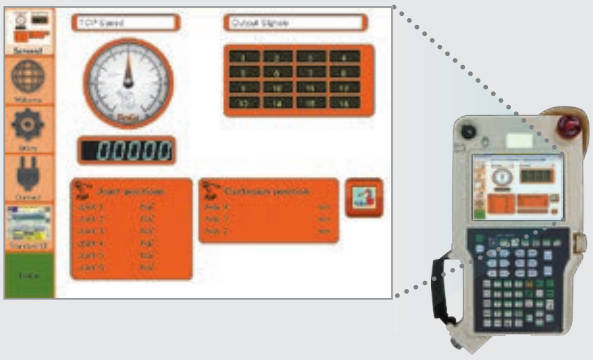


ROBOT MONITORING UNIT (RMU) — OPTIONAL

- Safety unit to monitor robot position and speed
- Reducing cost and space saving

USER GRAPHICAL INTERFACE FLEXGUI — OPTIONAL

- Customizing teach pendant display.
- Operator can use teach pendant as a system operating panel

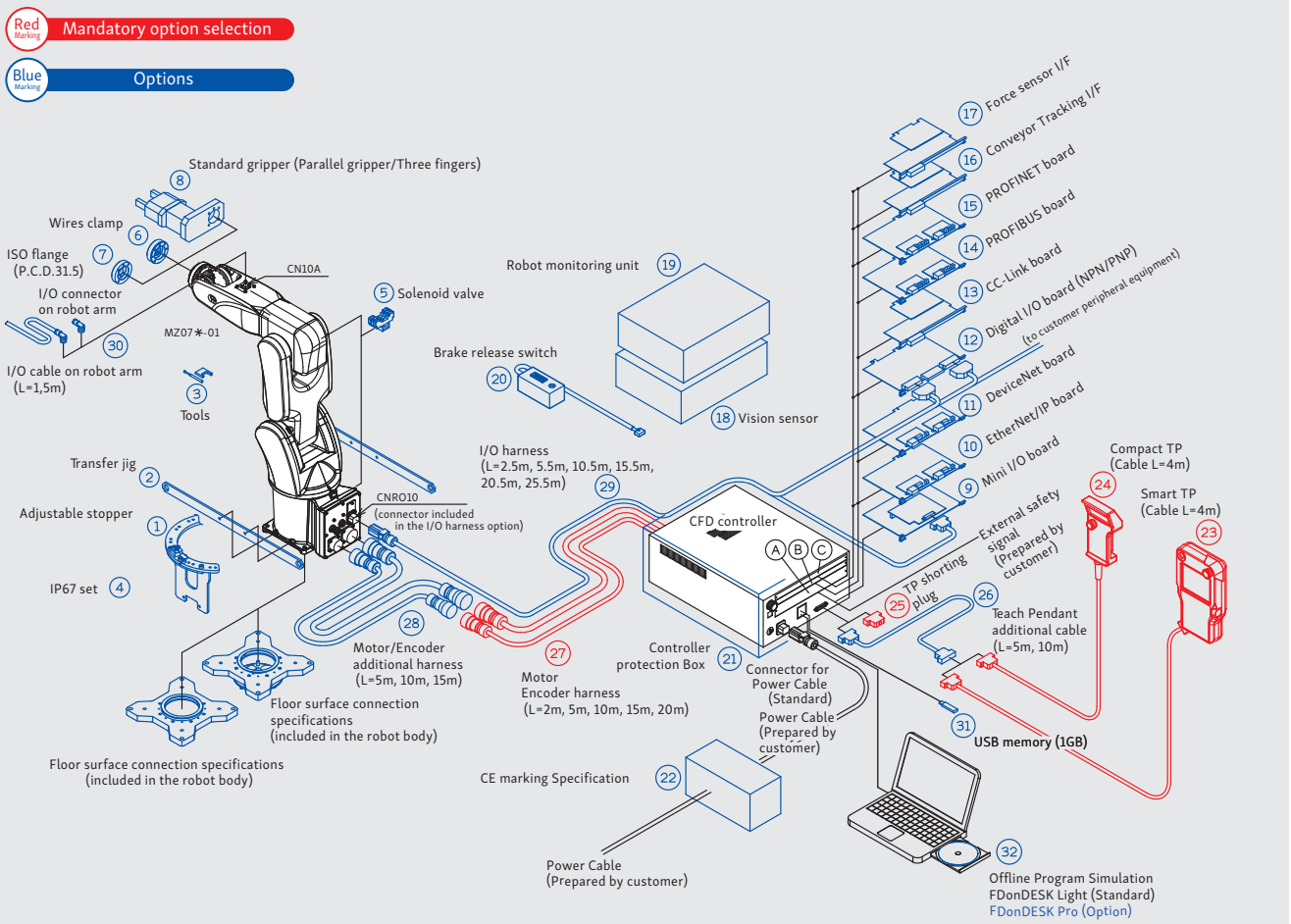


FIELD BUS — OPTIONAL

- DeviceNet (Master, Slave)
- EtherNet/IP (Master, Slave)
- EtherCAT
- CC-Link (Master, Slave)
- PROFIBUS (Master, Slave)
- PROFINET (Slave)

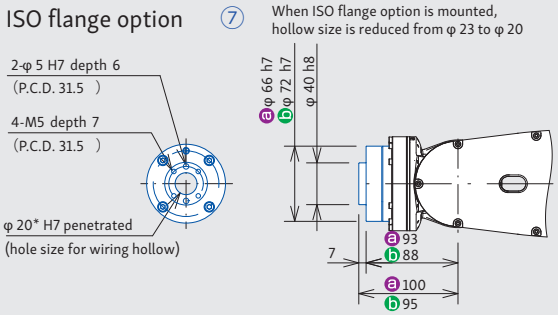
DeviceNet and EtherNet/IP is a trademark of ODVA (Open DeviceNet Vender Association, Inc.).

CC-Link is a trademark of CC-Link Partner Association : CLPA. PROFIBUS and PROFINET is a trademark of PROFIBUS & PROFINET International.

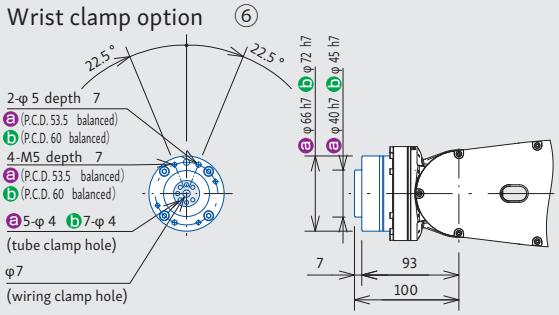


WRIST DIMENSIONS

ISO flange option ⑦



Wrist clamp option ⑥

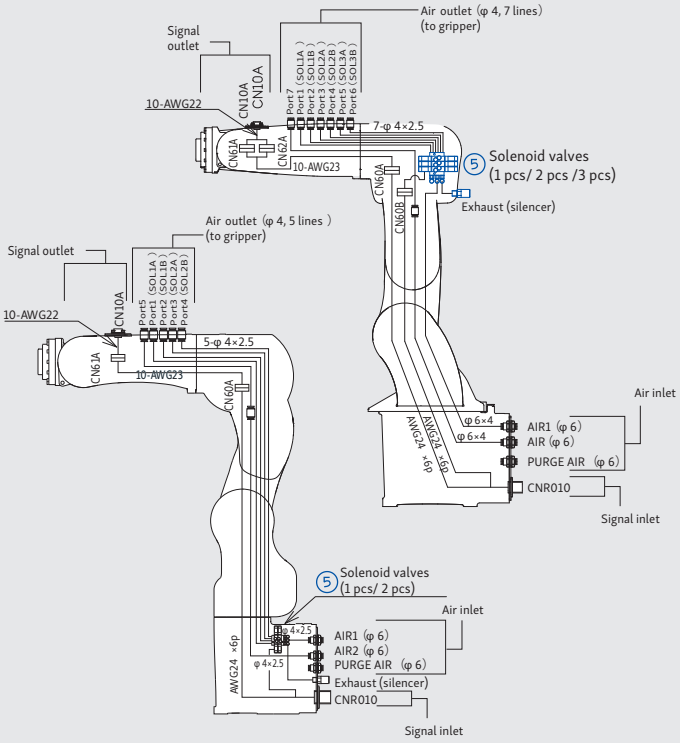


Figures shown indicate: ⓐMZ04, ⓑMZ07/MZ03EL.

WIRING AND TUBING IN ROBOT ARM

(when SOL installed in arm)

MZ07/MZ07L/MZ03EL



OPTION LIST

No.	Item	Specifications	Parts No.			Notes	
			MZ03EL	MZ04	MZ07		
①	Adjustable stopper	Restriction of axis 1 to 3 working envelope	OP-S5-025	OP-S5-026	OP-S5-022		
②	Transfer jig	Common for crane transporting, inverted and wall mount	OP-S2-042	OP-S2-044	OP-S2-042		
③	Tools	Zeroing pin & Zeroing block	OP-T2-078	OP-T2-089	OP-T2-078		
④	IP67 set	Air purge unit in robot body	OP-H9-004	OP-H9-008	OP-H9-004		
⑤	Solenoid valve	1 valve	OP-H4-004	OP-H4-006	OP-H4-004	2 position double Pressure range : 0.1 to 0.5 MPa- Coil voltage rating 24 VDC	MZ04 supports up to 2 solenoid valves
		2 valves	OP-H5-008	OP-H5-010	OP-H5-008		
		3 valves	OP-H6-004	-	OP-H6-004		
⑥	Wires clamp	Clamp for wires and air tubes inside wrist hollow	OP-W3-012	OP-W3-016	OP-W3-012	MZ04: Air (φ 4, 5 lines), signal lines	MZ07: Air (φ 4, 7 lines), signal lines
⑦	ISO flange	ISO flange adapter (P.C.D.31.5)	OP-W2-012	OP-W2-013	OP-W2-012		
⑧	Standard gripper *1	Parallel gripper single S	OP-F10-002	OP-F10-009	OP-F10-002	Grip force 320N (air source 0.5 MPa) Stroke 24mm	MZ04 is available with a single gripper only
		Parallel gripper double S	OP-F10-003	-	OP-F10-003		
		Parallel gripper single M	OP-F10-004	OP-F10-010	OP-F10-004	Grip force 600Nv (air source 0.5MPa) Stroke 30mm	
		Three fingers single S	OP-F10-005	OP-F10-011	OP-F10-005	Grip force 300N (air source 0.5MPa) Stroke 8mm	
		Three fingers double S	OP-F10-006	-	OP-F10-006		
		Three fingers single M	OP-F10-007	OP-F10-012	OP-F10-007	Grip force 410N (air source 0.5MPa) Stroke 10mm	
		Three fingers double M	OP-F10-008	-	OP-F10-008		
⑨	Mini I/O board	I/O Photo coupler 8 inputs / NPN Transistor 8 outputs	CFD-OP150-A			Mounted on sequence board of slot A	
		I/O Photo coupler 8 inputs / Relay contact 8 outputs	CFD-OP150-B				
⑩	EtherNet/IP board	Master 1CH	CFD-OP130-A			Occupies (1) slot	Up to (2) slots available
		Slave 1CH	CFD-OP130-B				
		Master 1CH + Slave 1CH	CFD-OP130-C				
		Slave 2CH	CFD-OP130-D				
		Master 2CH	CFD-OP130-E				
⑪	DeviceNet board	Master 1CH	CFD-OP131-A			Occupies (1) slot	
		Slave 1CH	CFD-OP131-B				
		Master 1CH +Slave 1CH	CFD-OP131-C				
		Slave 2CH	CFD-OP131-D				
		Master 2CH	CFD-OP131-E				
⑫	Digital I/O board	I/O Photo coupler 32 inputs / NPN Transistor 32 outputs	CFD-OP125-A			Occupies (1) slot	
		I/O Photo coupler 64 inputs / NPN Transistor 64 outputs	CFD-OP125-B			Occupies (2) slots	
		I/O Photo coupler 32 inputs / PNP Transistor 32 outputs	CFD-OP151-A			Occupies (1) slot	
		I/O Photo coupler 64 inputs / PNP Transistor 64 outputs	CFD-OP151-B			Occupies (2) slots	
⑬	CC-Link board	Both master and slave 1CH	CFD-OP98-B			Occupies (1) slot	
⑭	PROFIBUS board	Master 1CH	CFD-OP132-A			Occupies (1) slot	
		Slave 1CH	CFD-OP132-B				
		Master 1CH + Slave 1CH	CFD-OP132-C				
		Slave 2CH	CFD-OP132-D				
		Master 2CH	CFD-OP132-E				
⑮	PROFINET board	Slave 1CH	CFD-OP136-B			Occupies (1) slot	
		Slave 2CH	CFD-OP136-D				
⑯	Conveyor Tracking I/F	RS422 Differential input encoder counter	CFD-OP47-A			Occupies (1) slot	
⑰	Force sensor I/F	Force sensor unit for CFD (another box)	CFD-OP152-A			Occupies (1) slot	
⑱	Vision sensor	Vision sensor unit for CFD (another box)	CFD-OP139-A			Cameras, lighting, and cables are available. Contact us for information.	
⑲	Robot monitoring unit	Robot monitoring unit for CFD (another box)	CFD-OP145-A				
⑳	Brake release switch	Brake release switch (portable type)	FD11-OP90-E				

OPTION LIST

No.	Item	Specifications	Parts No.			Notes
			MZ03EL	MZ04	MZ07	
㉑	Controller protection BOX	Upgraded to IP54 equivalent by preparing dust-proof and drip-proof box	CFD-OP133-A			W540×D700×H270
㉒	UL specification	Some parts are replaced to conform to UL standard	CFD-UL-A			
	CE marking specification	CE marking compliant, separate unit	CFD-CE-A			
	KCs specification	Some parts are replaced to conform to Korean KCs standard	CFD-KCS-A			
㉓	Smart TP *2	Cable length 4 m	CFDTP-10-04M			These are selectable options. One of them must be selected.
㉔	Compact TP *2	Cable length 4 m	MINITP-10-04M			
㉕	TP shorting plug *2	To disconnect teach pendant	CFD-OP153-A			
㉖	Teach Pendant additional cable	5m	CFDTP-RC05M			Only one cable can be added. Both ends have a connector.
		10m	CFDTP-RC10M			
㉗	Motor/Encoder harness	2m	Z101C-J1-02-A			Connects robot to controller. One of these options must be selected. Select one of them.
		5m	Z101C-J1-05-A			
		10m	Z101C-J1-10-A			
		15m	Z101C-J1-15-A			
		20m	Z101C-J1-20-A			
㉘	Motor/encoder additional harness (Flexible type extension harness)	5m	Z102C-00-05-A, (Z102C-01-05-A)			One extension, 25 m maximum. Both ends have a connector. Select one of the following models if a flexible type cable is required. Z102C-01-**-A (** indicates length, 05 is 5m, 10 is 10m, and 15 is 15m)
		10m	Z102C-00-10-A, (Z102C-01-10-A)			
		15m	Z102C-00-15-A, (Z102C-01-15-A)			
㉙	I/O harness (I/O harness for connecting to Mini I/O board)	2.5m	IOCABLE-10-02M, (IOCABLE-40-02M)			I/O cable between robot and controller. IOCABLE-10-**M type Controller side is separate cable, so cable manufacturing and signal assignment must be done by customer. IOCABLE-40-**M type Connector on both ends to directly connect CFD-OP150-A or B (Mini I/O board) of CFD controller.
		5.5m	IOCABLE-10-05M, (IOCABLE-40-05M)			
		10.5m	IOCABLE-10-10M, (IOCABLE-40-10M)			
		15.5m	IOCABLE-10-15M, (IOCABLE-40-15M)			
		20.5m	IOCABLE-10-20M, (IOCABLE-40-20M)			
		25.5m	IOCABLE-10-25M, (IOCABLE-40-25M)			
㉚	I/O cable on robot arm	1.5m	IOCABLE-20-01M			Tool side is separate cable. Manufacturing needs to be done by customer.
	I/O connector on robot arm	Connector only Soldering type	IOCABLE-20-00			This is connector only. Manufacturing needs to be done by customer.
㉛	USB memory	1GByte	FD11-OP93-A			
㉜	FDonDESK Pro	Robot Program Simulator	FDonDESK Pro			Following utilities are added on „FDonDESK Light“ 0 Program creation utility from CAD data 0 Multi robot control

*1: Grip force may vary according to the supplied air pressure (0.3 to 0.5 MPa) and finger length.
*2: „TP" means teach pendant.
All option is shipped with robot by kit (sub assembly). Please install it by customer after reading option install procedure.

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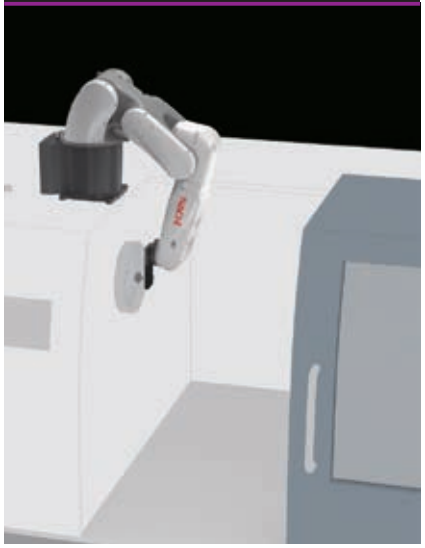
Application Examples

MACHINE LOADING



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50 YEARS

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