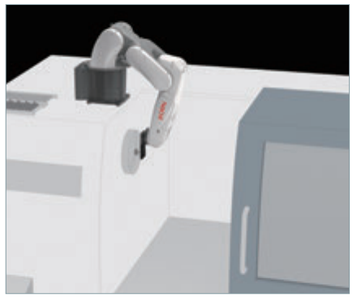
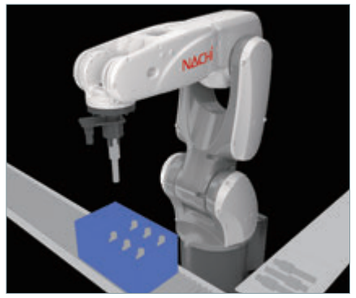
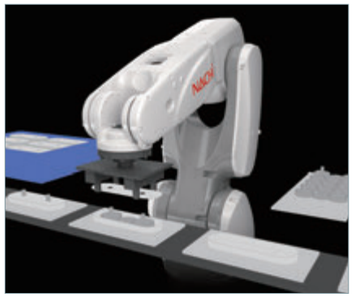
Application Examples


Machine Loading

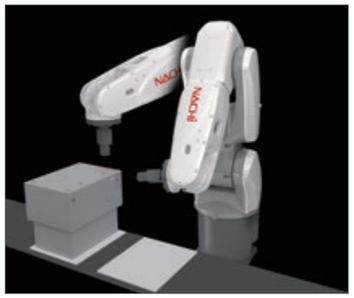

Picking

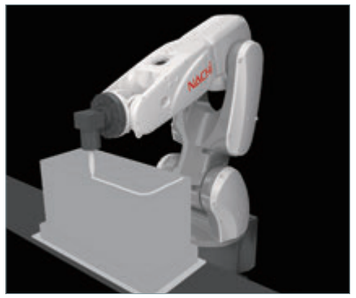

Packing/Casing


Assembling


Deburring


Finishing


Inspection


Sealing

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CATALOG NO.	R7702E-10

2019.01.V-ABE-ABE

NACHI

MZ SERIES

Ultra High Speed and Compact

CATALOG

Characteristics

Robot Body

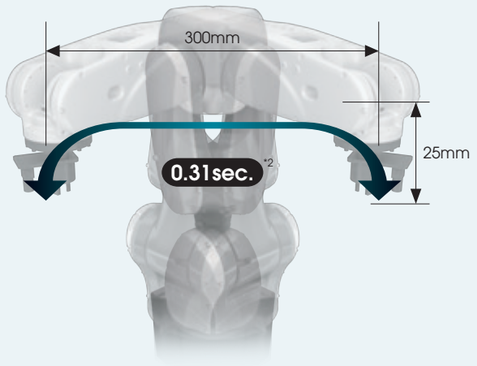
Top Perform High Speed*

*Combined max speed

Top Perform High Speed

- Contributing to improvement of productivity by high speed

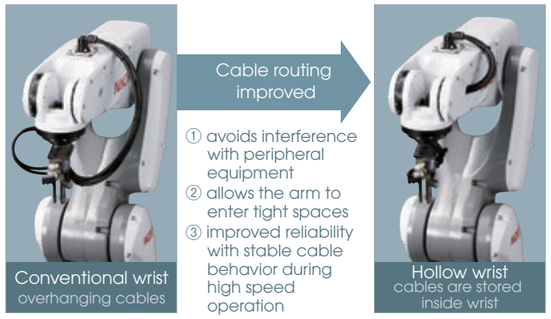
Standard Cycle Time Evaluation (go and back) *1



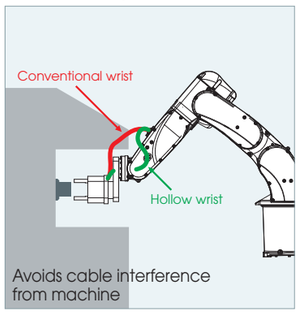
*1: Payload is 1kg. This may vary according to the robot program and installation.
*2: Value for MZ07.

Smart Cable Routing

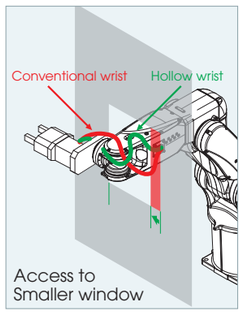
Cable and Tubes Routing through Hollow Wrist



Approaching to Machine



Entering into Cover



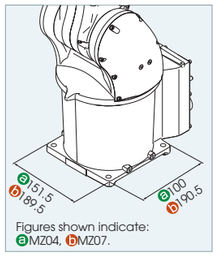
Compact & Flexible Installation

Available to All-round Mounting

Floor mount | Inverted mount | Wall mount | Tilted mount

Compact Installation Space

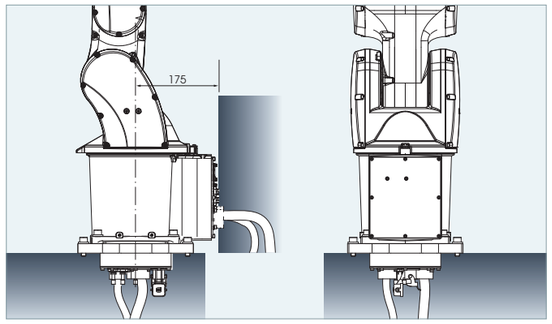
- Small bottom design enables compact installation



Figures shown indicate:
a MZ04, b MZ07.

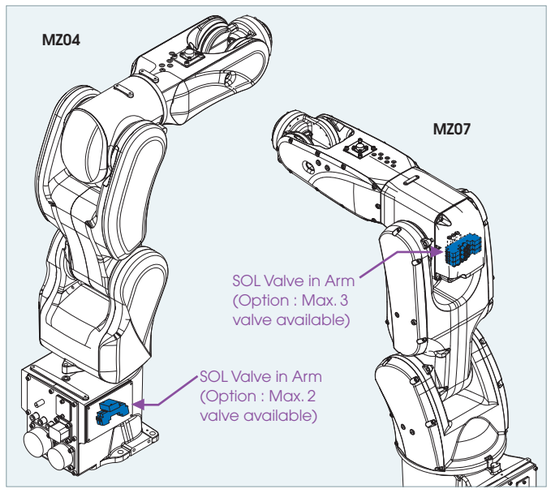
Cable Connection from Bottom Side Option

- More compact installation
- Robot can be installed close to behind wall
- Cables can be stored inside robot riser



Pneumatic Valves inside Robot Arm Option

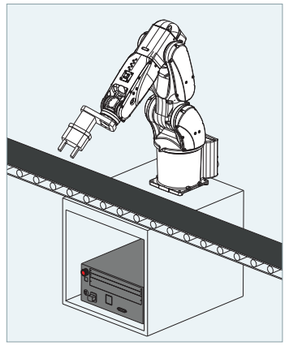
- Solenoid valves can be installed inside robot arm



Controller

Compact Cabinet

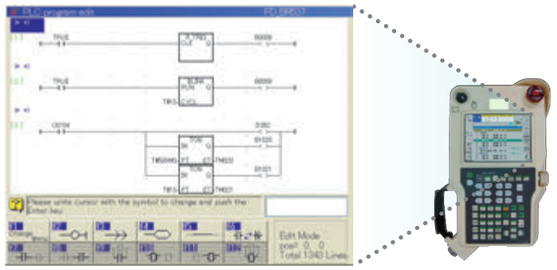
- Only 369mm in width
- Could be installed inside robot riser



User Friendly Functions

Software PLC Standard

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



Offline Simulation Tool
FD on Desk II Light Standard

- Best simulator for a feasibility study.

- Off-line programming
- Operation and layout study
- Cycle time simulation
- PLC program editing
- Operation instruction

Fieldbus Option

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

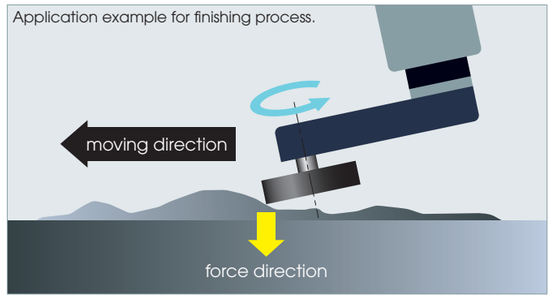
Various Application

Vision Sensor NV-Pro Option

- 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 Option

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



Robot Monitoring Unit (RMU) Option

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

User Graphical Interface FlexGui Option

- Customizable teach pendant screen menu.
- Works as a system operation console which can control peripheral devices.

Standard Specifications

Robot type **MZ0□□-01-□□□-CFD-0000**

Arm Variation

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

Application Variation

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

Installation Variation

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

*MZ04E/MZ04DE is permitted "0" only.

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

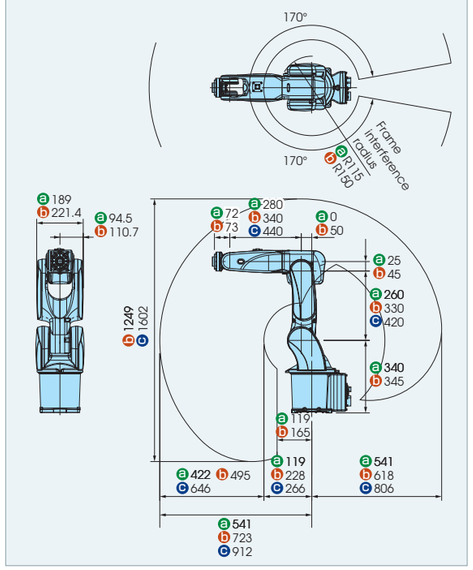
Basic Specification of Robot

Item				Specification			
Model				MZ04-01 (MZ04D-01)	MZ04E-01*5 (MZ04DE-01)	MZ07-01 (MZ07P-01)	MZ07L-01 (MZ07LP-01)
Structure				Articulated			
Controllable Axes				6		6 (5)	
Drive System				AC Servodrive			
Max. Working Envelope [rad(°)]	Arm	J1	Swivel	±2.97 (±170)			
		J2	Forward/ Backward	-2.53 ~ +1.57 (-145 ~ +90)		-2.36 ~ +1.40 (-135 ~ +80)	
		J3	Upward/ Downward	-2.18 ~ +4.88 (-125 ~ +280)		-2.37 ~ +4.71 (-136 ~ 270)	-2.43 ~ +4.71 (-139 ~ 270)
	Wrist	J4*3	Rotation 2	±3.32 (±190)			
		J5	Bend	±2.09 (±120)			
		J6	Rotation 1	±6.28 (±360)			
Max. Speed*4 [rad/s(°/s)]	Arm	J1	Swivel	8.38 (480)	3.49(200)	7.85 (450)	5.24 (300)
		J2	Forward/ Backward	8.03 (460)	2.62(150)	6.63 (380)	4.89 (280)
		J3	Upward/ Downward	9.08 (520)	3.32(190)	9.08 (520)	6.28 (360)
	Wrist	J4*3	Rotation 2	9.77 (560)		9.60 (550)	
		J5	Bend	9.77 (560)		9.60 (550)	
		J6	Rotation 1	15.7 (900)		17.5 (1000)	
Max. Payload [kg]			Wrist	4		7	
Allowable Static Loading Torque [N·m]	J4*3		Rotation 2	8.86		16.6	
	J5		Bend	8.86		16.6	
	J6		Rotation 1	4.9		9.4	
Max. Allowable Moment of Inertia*1 [kg·m²]	J4*3		Rotation 2	0.2		0.47	
	J5		Bend	0.2		0.47	
	J6		Rotation 1	0.07		0.15	
Max. Reach [mm]				541		723	912
Position Repeatability*2 [mm]				±0.02			±0.03
Ambient Temperature				0 ~ 45°C			
Installation				Floor / Wall / Tilted / Inverted mount	Floor / Inverted mount	Floor / Wall / Tilted / Inverted mount	
Protection Rating				IP40 equivalent*6		IP67	
Weight [kg]*7				26	25	36	38

1(rad)=180/π(°), 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: Using at 1000 m or lower sea level. Ambient temperature has limitations when allowable altitude is exceeded.
*5: MZ04E/MZ04DE has 80W motor or smaller in all axis.
*6: MZ04/MZ04E is IP40 equivalent, MZ04D/MZ04DE is IP67 (Protection Rating).
7: Wall mount Rear Connection Type +4kg (MZ04 Series) +6kg (MZ07* Series)
Bottom Connection Type +6kg (MZ04* Series) +8kg (MZ07* Series)

Robot Dimensions and Working Envelope

Figures shown indicate: ⓐMZ04, ⓑMZ07, and ⓒMZ07L.

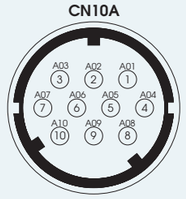


Connector Layout for Applications (Standard)

CNR010

	6	5	4	3	2	1
D	G	A20	A19	A18	A17	A16
C		A15	A14	A13	A12	A11
B	A22	A10	A09	A08	A07	A06
A	A21	A05	A04	A03	A02	A01

CN10A

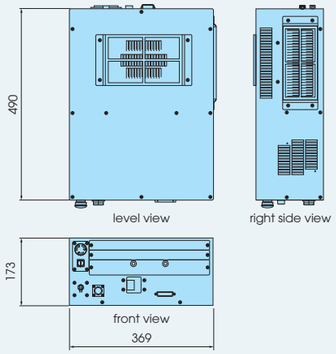


Base connector Wrist connector
(Diagram of contacts on connectors)

Basic Specification of Controller

Item		Specifications
Controllable Axes		6
Maximum Controllable Axes		7
Robot Monitoring Function		PL d (Cat. 3)
Teaching Method		Teach / Playback Robot Language
Program Number		9,999
Memory Capacity		256MB
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 Switch, Emergency Stop Button
Operating Panel		Emergency Stop and Mode Switching (Teach/Playback)
Exclusive Safety Input		External Emergency Stop, Safety Plug, External Enable Switch, Protective Stop
Network		Ethernet
External Memory Interface		USB Port
External Dimensions (mm)		369(W)×490(D)×173(H)
Weight		Approx. 17kg
Power Supply		Single phase/3φ AC200-230V ±10%
Consuming Power		0.4KVA
Protection Rating		IP20
Ambient Temperature		0~40°C (50/60Hz)
Ambient Humidity		20~85%(Without Condensation)

Controller Dimensions

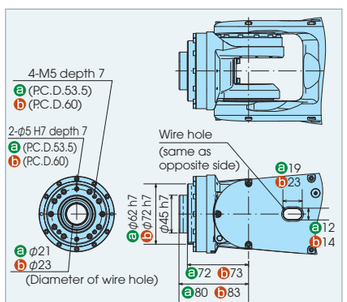


Controller Options

Item	Specifications
Additional Axes	One is possible. (Motor Capacity: up to 600W)
Fieldbus	DeviceNet, PROFIBUS, EtherCAT, CC-Link and others. EtherCAT and CC-Link are only compatible as a slave.
Digital I/O	Maximum 64/64 point
	8 photo coupler input and 8 transistor output or 8 photo coupler input and 8 relay contact output
External Memory	USB Memory (1GB)
Vision Sensor (*)	NV-Pro
Robot Monitoring Function	SIL3 Cat. 4
Protection Rating	IP54

(*) Another box is required.

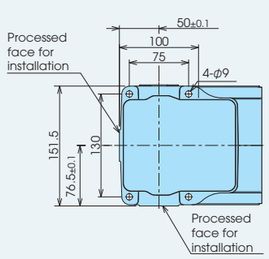
Wrist Dimensions



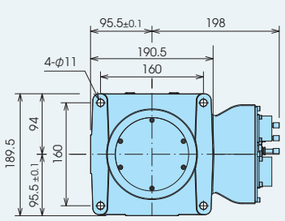
Figures shown indicate: ⓐMZ04, ⓑMZ07.

Robot Base Dimensions

MZ04

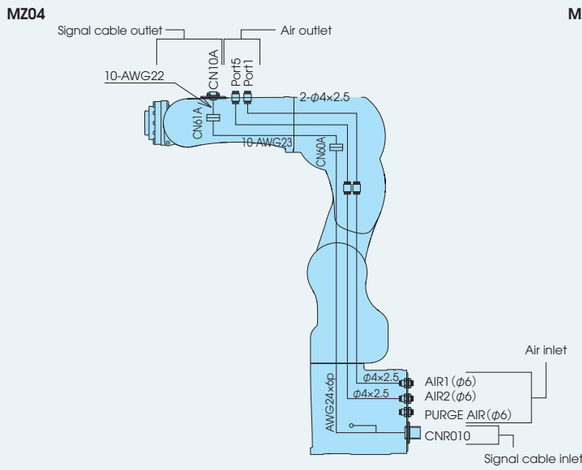


MZ07

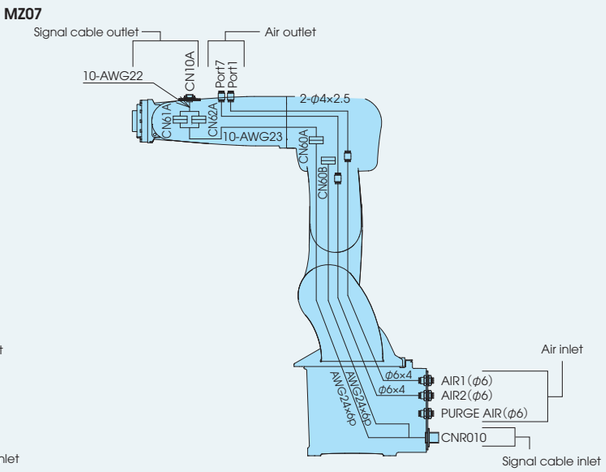


Wiring and Tubing Inside Arm (Standard)

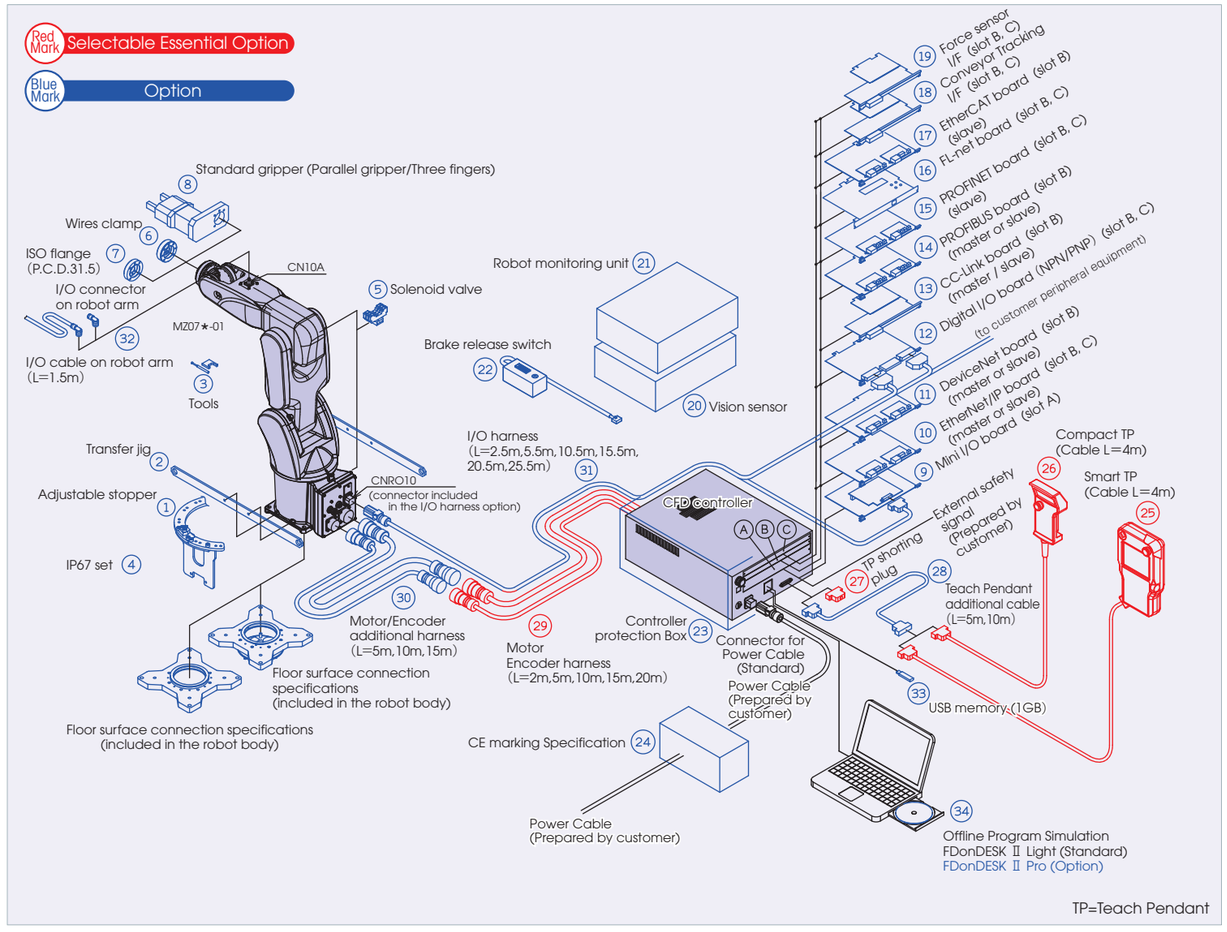
MZ04



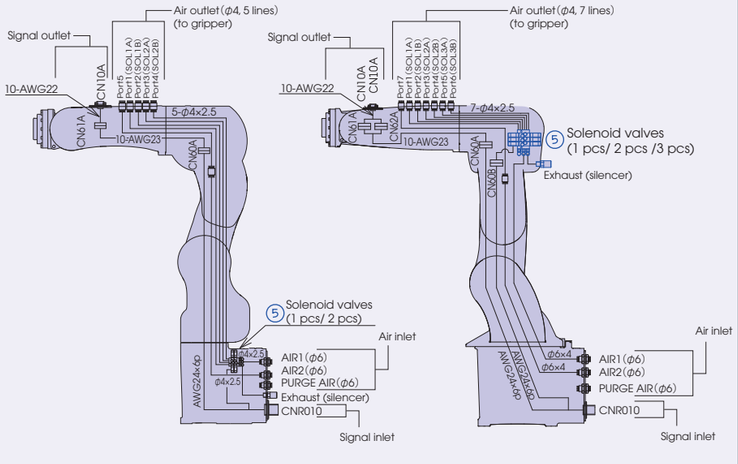
MZ07



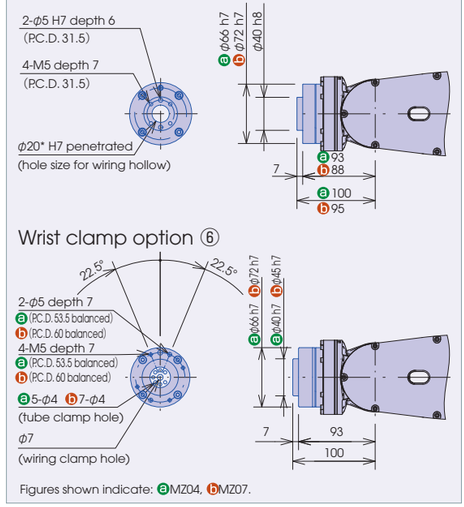
Options



Wiring and Tubing in Robot Arm (When SOL installed in Arm)



Wrist Dimensions



Figures shown indicate: ⓐMZ04, ⓑMZ07.

Option List

No.	Item	Specifications	Parts No. MZ04	Parts No. MZ07	Notes	
①	Adjustable stopper	Restriction of axis 1 to 3 working envelope	OP-S5-026	OP-S5-022		
②	Transfer jig	Common for crane transporting, inverted and wall mount	OP-S2-044	OP-S2-042		
③	Tools	Zeroing pin & Zeroing block	OP-T2-089	OP-T2-078		
④	IP67 set	Air purge unit in robot body	OP-H9-008	OP-H9-004		
⑤	Solenoid valve	1 valve	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-H5-010	OP-H5-008		
		3 valves	–	OP-H6-004		
⑥	Wires clamp	Clamp for wires and air tubes inside wrist hollow	OP-W3-016	OP-W3-012	MZ04: Air (φ4, 5 lines), signal lines	MZ07: Air (φ4, 7 lines), signal lines
⑦	ISO flange	ISO flange adapter (P.C.D.31.5)	OP-W2-013	OP-W2-012		
⑧	Standard gripper *1	Parallel gripper single S	OP-F10-009	OP-F10-002	Grip force 320N (air source 0.5MPa) Stroke 24mm	MZ04 is available with a single gripper only
		Parallel gripper double S	–	OP-F10-003		
		Parallel gripper single M	OP-F10-010	OP-F10-004	Grip force 600N (air source 0.5MPa) Stroke 30mm	
		Three fingers single S	OP-F10-011	OP-F10-005	Grip force 300N (air source 0.5MPa) Stroke 8mm	
		Three fingers double S	–	OP-F10-006		
		Three fingers single M	OP-F10-012	OP-F10-007	Grip force 410N (air source 0.5MPa) Stroke 10mm	
		Three fingers double M	–	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	FL-net board	1CH	CFD-OP101-C		Occupies (1) slot Max 2CH (2 slots)	
⑰	EtherCAT board	Slave 1CH	CFD-OP-169-B		Occupies (1) slot	
⑱	Conveyor Tracking I/F	RS422 Differential input encoder counter	CFD-OP47-A		Occupies (1) slot	
⑲	Force sensor I/F	Force sensor unit for CFD (another box)	CFD-OP152-A		Occupies (1) slot	
⑳	Vision sensor	Vision sensor unit for CFD (another box)	CFD-OP139-A		Cameras, lighting, and cables are available. Contact us for information.	
㉑	Robot monitoring unit	Robot monitoring unit for CFD (another box)	CFD-OP145-A			
㉒	Brake release switch	Brake release switch (portable type)	FD11-OP90-E			
㉓	Controller protection BOX	Upgraded to IP54 equivalent by preparing dust-proof and drip-proof box	CFD-OP133-A		W540×D700×H270	
㉔	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			
㉕	Smart TP *2	Cable length 4m	CFDTP-10-04M		These are selectable options. One of them must be selected.	
㉖	Compact TP *2	Cable length 4m	MINITP-10-04M			
㉗	TP shorting plug *2	To disconnect teach pendant	CFD-OP153-A			
㉘	Teach Pendant additional cable	5m	CFDTP-RC05M		Only one cable can be added Both ends have a connector	
		10m	CFDTP-RC10M			
㉙	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			
㉚	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 the following models if a flexible type cable is required Z102C-01-∗∗-A (∗∗ indicates length, 05 is 5 m, 10 is 10 m, and 15 is 15 m)	
		10m	Z102C-00-10-A,(Z102C-01-10-A)			
		15m	Z102C-00-15-A,(Z102C-01-15-A)			
㉛	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 (Mini I/O board) of CFD controller. IOCABLE-40B-∗∗M type Connector on both ends to directly connect CFD-OP150-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)			
㉜	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.	
㉝	USB memory	1GByte	FD11-OP93-A			
㉞	FDonDESK Ⅱ Pro	Robot Program Simulator	FDONDESK2-Pro			

*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.