FACTORY AUTOMATION

MITSUBISHI ELECTRIC COLLABORATIVE ROBOT MELFA ASSISTA

MELFA

assista

Automating the World

Our Factory Automation business is focused on "Automating the World" to make it a better, more sustainable environment supporting manufacturing and society, celebrating diversity and contributing towards an active and fulfilling role.

Mitsubishi Electric is involved in many areas including the following:

Energy and Electric Systems
A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance
Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems
Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems
Maximizing productivity and efficiency with cutting-edge automation technology.
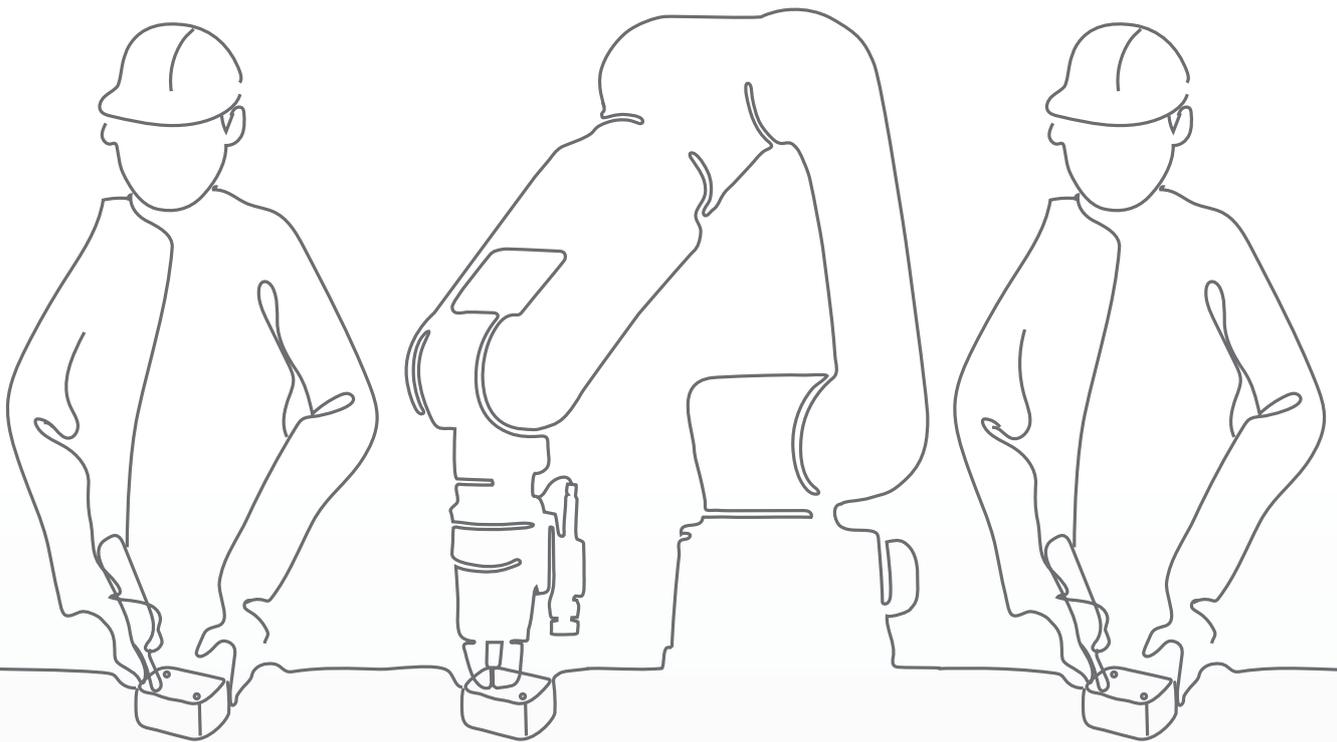
SUSTAINABLE DEVELOPMENT GOALS

The Mitsubishi Electric Group is actively solving social issues, such as decarbonization and labor shortages, by providing production sites with energy-saving equipment and solutions that utilize automation systems, thereby helping towards a sustainable society.

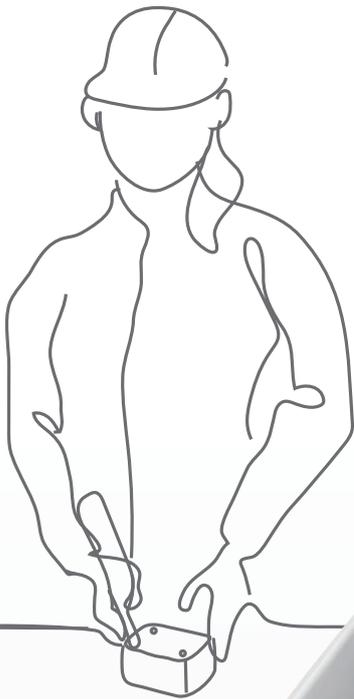**Contents**

OVERVIEW

Integrate.

Mitsubishi Electric Collaborative Robot - ASSISTA

MELFA

as**S**ista

Collaborate.

Simpler and Easier

Mitsubishi Electric Collaborative Robot - MELFA ASSISTA

can share a workspace with humans.

Simpler, Easier and more flexible.

This robot will change your perception of what a "ROBOT" is.

Easy operation with
the Operation button.

Easy Control

No robot programming expertise required.
Easy Programming

MELFA

assista

Easy connectivity with
a wide variety of components.
Easy Connecting

Easy Control

Move Easily with the Operating Buttons

The operating buttons on the robot arm provide you with easy control for ASSISTA and the teaching pendant for programming and teaching is no longer needed. The LED on the robot arm display the status of the robot.

Easy
Programming

Easy
Control

Easy
Connecting

DIRECT
TEACHING

TEACH

HAND

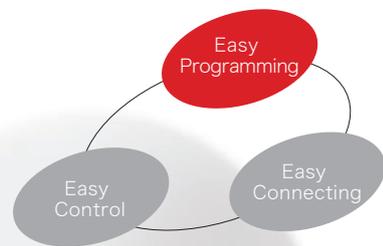RESET

START

ENABLE
LOCK

MITSUBISHI
ELECTRIC

Easy Program

No Expertise
for Robot Required.

You can create programs visually using intuitive operations with RT-Visual-Box. "Visual Programming"
- This software allows operators to simply program this robot with a "train by demonstration" programming interface. This allows them to move the robot arm position and set way-points easily.

ming

Help

X: 450.50 Y: 254.77 Z: 195.52
A: 180.00 B: -0.10 C: -144.49

Standard
Speed limit: 250 mm/s

Edit Mode

Speed Ratio 70 %

st

onitor

nitor

ory

002 001

007

004

005

003

004   005   006   001
Move   Move   Mo   Hand   W   Move   End

002   003   Hand   1s
Wait   1s   Move   Move   Hand   Wait

Flow   Library

Command

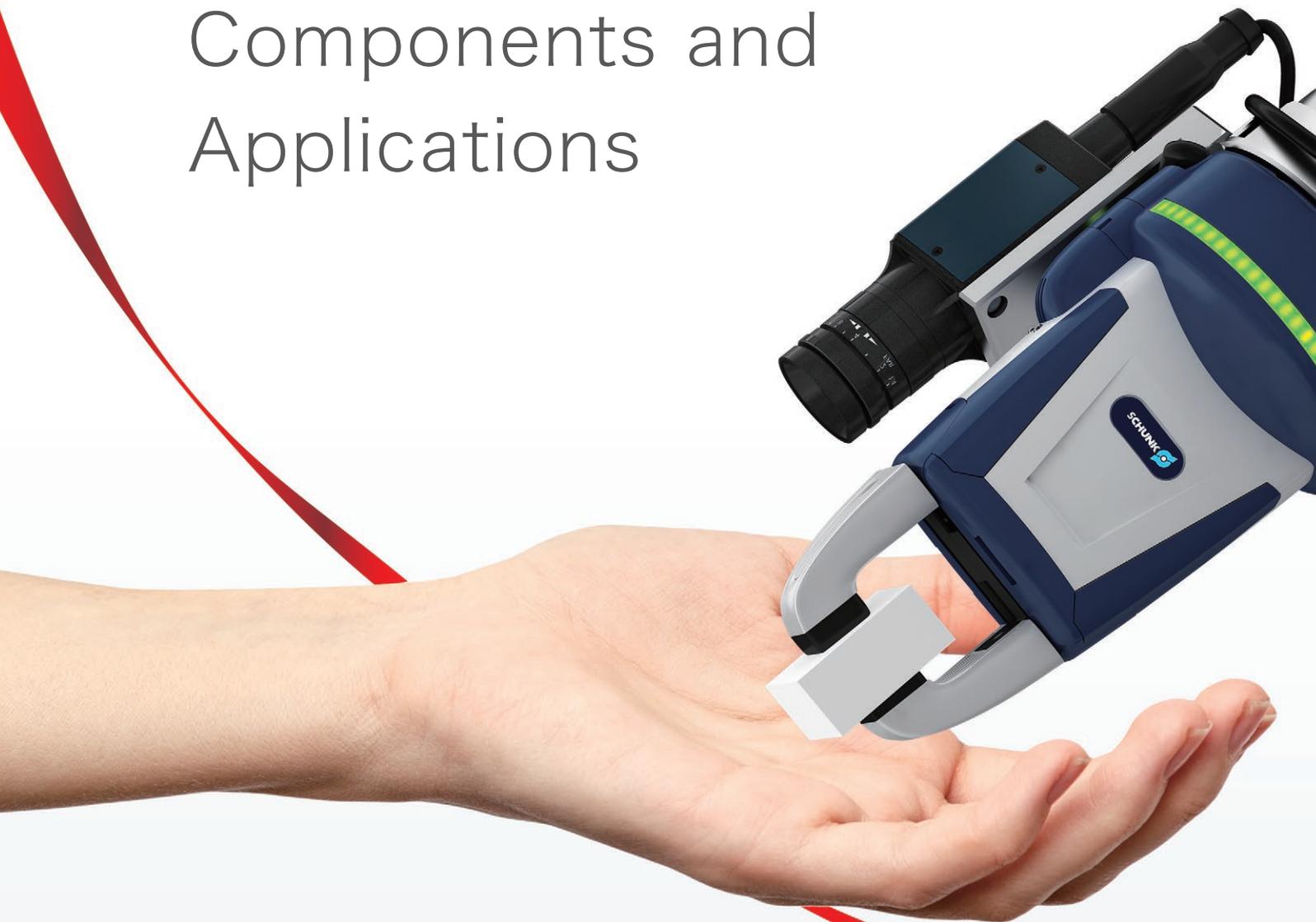Move Hand Wait Signal Calculate Vision Pause   Branch Repeat   Pallet

Easy Connect

A Wide Variety of Components and Applications

ASSISTA offers a wide variety of components—Grippers, Fingers, Vision and other peripherals—developed by a group of organizations known as MELFA Robot Partners.
These tools can easily be setup and configured for your application. ASSISTA can also be configured to move freely as as part of an AGV/AMR or as a mobile robot.

AGV: Automated Guided Vehicle
AMR: Autonomous Mobile Robot

ing

MITSUBISHI
ELECTRIC

Fence

Gripper

Sensor

AGV/AMR

e-F@ctory
Alliance

MELFA
ROBOT
PARTNER

Screw Driver

Hand Cart

Software

Vision

Robot arm

ASSISTA standard configuration

Robot
RV-5AS-D

Connect cable

Controller

Safety extension unit

CR800-05VD

Standard specifications of RV-5AS-D robot

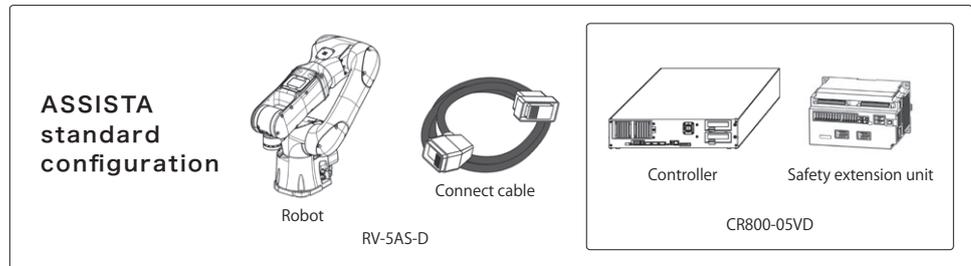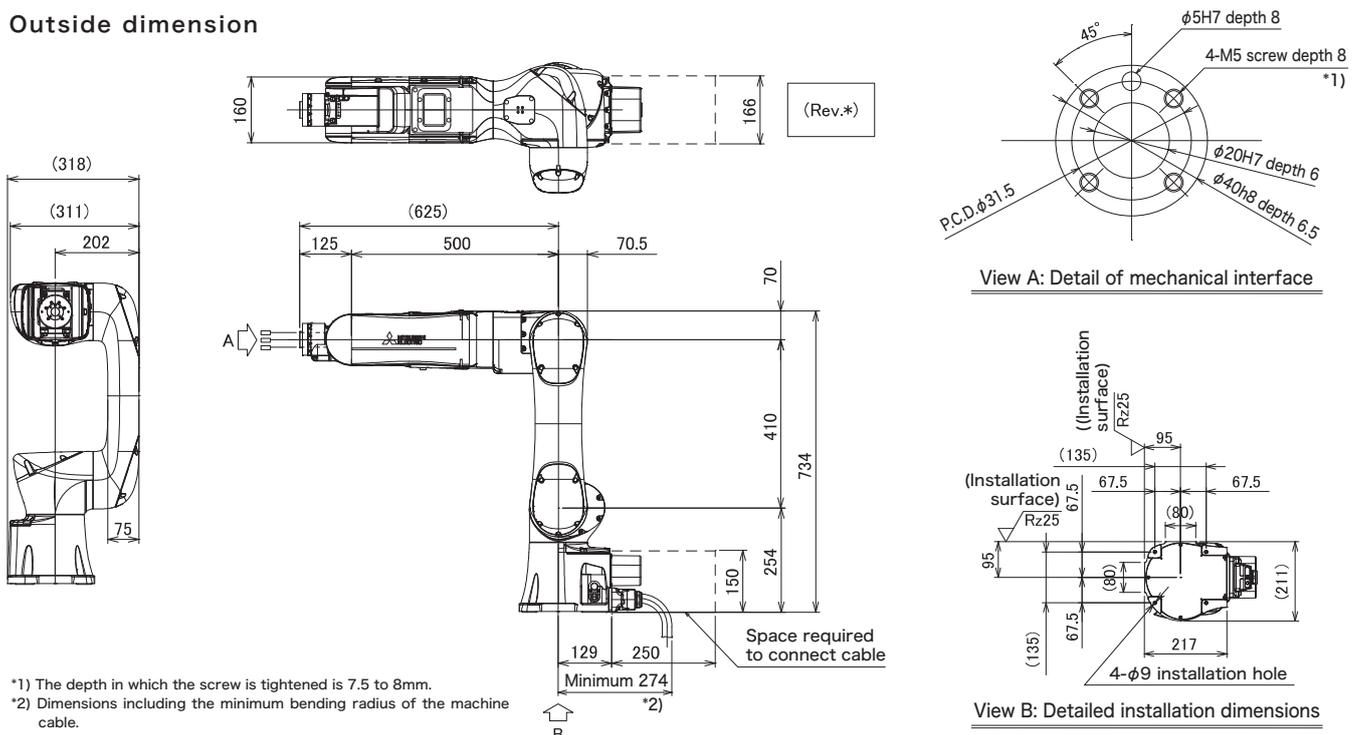| Item		Unit	Specifications
IP Rate			IP54
Degree of freedom			6
Installation posture			Floor mounted / ceiling mounted
Structure			Vertical, multiple-joint type
Operating range	Waist (J1)	Degree	±240
	Shoulder (J2)		±148
	Elbow (J3)		±150
	Wrist twist (J4)		±200
	Wrist pitch (J5)		±120
	Wrist roll (J6)		±200
Speed of motion Note1)	Waist (J1)	Degree/s	124 (59.6)
	Shoulder (J2)		124 (34.0)
	Elbow (J3)		124 (34.0)
	Wrist twist (J4)		297 (142)
	Wrist pitch (J5)		356 (215)
	Wrist roll (J6)		360
Maximum reach radius		mm	910
Maximum resultant velocity Note2)	High-speed operation mode	mm/sec	1,000
	Collaborative operation mode (Standard operation)		250
	Collaborative operation mode (Low-speed operation)		50
Load	Rating	kg	5
	Maximum Note3)		5.5
Pose repeatability		mm	±0.03
Ambient temperature Note4)		℃	0 to 40
Mass		kg	32
Wiring	Hand I/O	–	Mechanical interface: 2 inputs/4 outputs Forearm: 6 inputs/0 outputs Base: 0 inputs/4 outputs
	Force sensor cable/Spare cable	–	5-conductor (24 V/0.7 A) One of the conductors should be used for the frame ground (FG).
	LAN cable	–	Cat-5e supported
Plumbing	Primary hoses	–	Φ6 × 2
	Secondary hoses	–	Φ4 × 4 From the base of the robot to the elbow.
Supply pressure		MPa	0.54

Note1) Values in parentheses indicate the maximum speed when the input voltage is single-phase 100 to 120 VAC.
Note2) These values represent the maximum overall speed of all axes combined. The safety functions limit the robot to the speeds shown in the table. For accurate collision force data when the robot is in Collaborative operation mode, measure collision forces under actual operating conditions.
Note3) Allowable load when the mechanical interface faces downward at an inclination within ±10° to the vertical direction.
Note4) Sets the robot's operating environmental temperature as parameter OLTMX. The initial value is 30 (℃). Corresponding to the environment, the continuous control action performance and the overload-protection function are optimized.

Outside dimension

(318)
(311)
202
75
160
(625)
(Rev.*)
166
125
500
70.5
A
70
410
734
254
150
129
250
Space required to connect cable
Minimum 274
*2)
B

φ5H7 depth 8
45°
4-M5 screw depth 8
*1)
φ20H7 depth 6
φ40h8 depth 6.5
P.C.D.φ31.5

View A: Detail of mechanical interface

(Installation surface)
Rz25
95
(135)
(Installation surface)
Rz25
67.5
67.5
67.5
(80)
95
(80)
(211)
(135)
67.5
217
4-φ9 installation hole
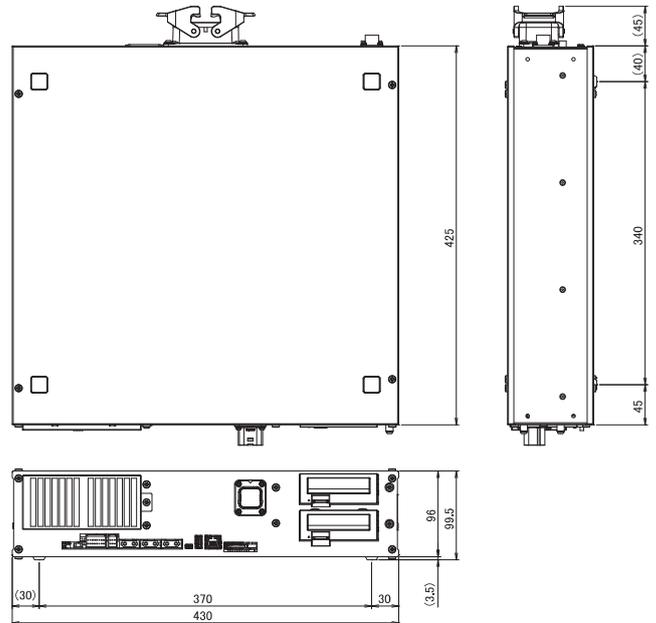
View B: Detailed installation dimensions

*1) The depth in which the screw is tightened is 7.5 to 8mm.
*2) Dimensions including the minimum bending radius of the machine cable.

CR800-05VD controller specifications of controller

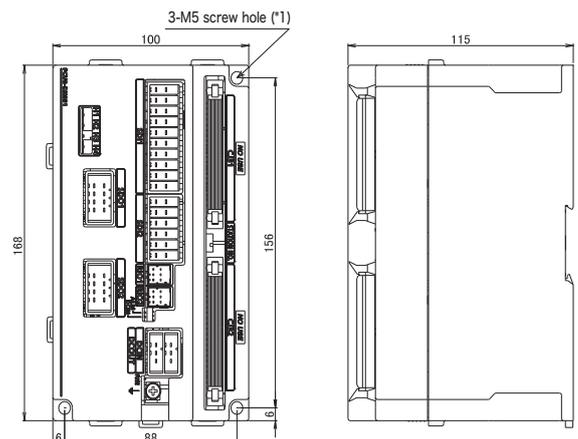| Item			Unit	Specification	Remarks
Number of control axis			–	Simultaneously 6	–
Memory capacity	Programmed positions		point	39,000	Number of program blocks when using RT VisualBox: 2000 (vision sensor not used), 1800 (vision sensor used) Number of programs: 505 (vision sensor not used), less than 500 (vision sensor used) Note1)
	No. of steps		step	78,000	
	Number of program		–	512	
Robot language			–	MELFA-BASIC VI	–
Teaching method			–	Pose teaching method, MDI method	–
External input and output	Input/output		point	0/0	Max. 64/64 by option
	Dedicated input/output		–	Assigned with general-purpose input/output	The signal number of "STOP" input signals is fixing.
	Emergency stop input Note2)		point	1 (duplicated)	
	Emergency stop output		point	1 (duplicated)	
	Mode selector switch input Note3)		point	1 (duplicated)	
	Mode output		point	1 (duplicated)	
	Robot error output		point	1 (duplicated)	
	Door switch input		point	1 (duplicated)	
	Encoder input		Channel	2	–
Safety I/O			point	8 (duplicated) / 4 (duplicated)	Safety extension unit
Interface	Force sensor interface		Channel	1	–
	Remote input/output		Channel	1	For connection to the Safety extension unit.
	USB		port	1	Ver. 2.0 HighSpeed device functions only. USB mini-B
	Ethernet		port	1	For customer: 1000BASE-T/ 100BASE-TX/10BASE-T
				1	Dedicated T/B port: 100BASE-TX/10BASE-T
	Option slot		slot	2	For option interface
	SD memory card slot		slot	1	For extended memory
	RS-422		port	1	Dedicated T/B port
Power source	Input voltage rang		V	Single phase AC 100 to 120 Single phase AC 200 to 230	The rate of power-supply voltage fluctuation is within 10%.
	Power capacity		kVA	1.0	Does not include rush current. Note4)
	Power supply frequency		Hz	50/60	
Outline dimensions			mm	430(W) x 425(D) x 99.5(H)	Excluding protrusions
Mass			kg	Approx.12.5	–
IP Rate				IP20	
Ambient temperature			℃	0 to 40	Without freeze
Ambient humidity			%RH	45 to 85	Without dew drops
Grounding			Ω	100 or less	Class D Grounding Note5)

Note1) The maximum number of usable programs differs depending on the number of types of workpieces that are registered.
Note2) Only the STO function can meet the requirements of Category 4, Performance Level e. At factory settings, the STO function meets the requirements of Category 3, Performance Level d. To make the STO function meet the requirements of Category 4, Performance Level e, change the parameter setting.
Note3) Provide a mode selector switch to change the mode (MANUAL/AUTOMATIC) of the controller.
Note4) The power capacity is the recommended value. The power capacity does not include the rush current when the power is turned ON. The power capacity is a guideline and the actual operation is affected by the input power voltage.
Note5) The robot must be grounded by the customer.

Safety extension unit

Item			Description	Remarks
Safety function	STO function		The function electrically shuts off the driving energy to the motor of the robot arm.	IEC 60204-1:2016 Corresponds to stop category 0
	SS1 function		The function to control and decelerate the motor speeds of the robot. After stopping, the robot transitions to the STO state.	IEC 60204-1:2016 Corresponds to stop category 1
	SS2 function		The function to control and decelerate the motor speeds of the robot. After stopping, the robot transitions to the SOS state.	IEC 60204-1:2016 Corresponds to stop category 2
	SOS function		Without shutting off the driving energy to the motors, this function monitors the robot so that it stays at rest.	When SOS, SLS, SLP, and STR detect error, activate SS1. EN 61800-5-2:2017 compliant
	SLS function		This is a function to monitor each part of the robot arm so that their speeds do not exceed monitoring speeds.	
	SLP function		The function monitors specified monitoring positions so that they do not go across position monitoring planes.	
	STR function		This function ensures that the torque limits of each motor in the robot are not exceeded.	
	Standard		EN ISO 10218-1: 2011 ISO/TS 15066: 2016 EN ISO 13849-1: 2015 EN 61800-5-1: 2007 EN 61800-5-2: 2017 EN 61000-6-7: 2015 EN 61326-3-1: 2017 IEC 61508-1: 2010 IEC 61508-2: 2010 IEC 61508-3: 2010	–
Safety performance	Power supply specifications		24 V DC±5% Ripple 0.2 V (P-P)	Supplied by customer
		Maximum consumption current	300 mA	–
	IP Rate		IP20	–
Safety extension unit	Weight		0.8kg	–
	Environment	Operating temperature range	0 to 40℃	It must be kept away from heat appliances and other heat sources.
		Relative humidity	45 to 75%	Without drew drop
	Input signal		8 routes (duplicated signal)	
	Output signal		4 routes (duplicated signal)	

Safety functions and safety performance of CR800-05VD controller

Fucntion	Item	Performance	Remarks
STO	Safety Level	SIL 3 (IEC 61508:2010)	Performance when parameter settings are changed
		Category 4, PL e (EN ISO 13849-1:2015)	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 years	
	Diagnostic coverage (DC)	DC = 99%	
	Probability of dangerous failure per hour (PFH)	PFH = 1.40×10^{-8} [1/hour]	
	Safety Leve	SIL 2 (IEC 61508:2010)	Factory setting
		Category 3, PL d (EN ISO 13849-1:2015)	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 years	
	Diagnostic coverage (DC)	DC = 90%	
	Probability of dangerous failure per hour (PFH)	PFH = 1.57×10^{-8} [1/hour]	
SS1,SS2, SOS,SLS, SLP	Safety Level	SIL 2 (IEC 61508:2010)	
		Category 3, PL d (EN ISO 13849-1:2015)	
	Mean time to dangerous failure (MTTFd)	MTTFd = 24 years	
	Diagnostic coverage (DC)	DC = 90%	
	Probability of dangerous failure per hour (PFH)	PFH = 3.42×10^{-7} [1/hour]	
STR	Safety Level	SIL 2 (IEC 61508:2010)	
		Category 3, PL d (EN ISO 13849-1:2015)	
	Mean time to dangerous failure (MTTFd)	MTTFd = 24 years	
	Diagnostic coverage (DC)	DC = 90%	
	Probability of dangerous failure per hour (PFH)	PFH = 3.62×10^{-7} [1/hour]	

3-M5 screw hole (*1)

The list of robot option equipment

Item	Type	Description
Machine cable (replacement)	1F-□□UCBL-41	" □□ " in type shows the length of the cables as follows. 02=2 m, 10=10 m (Changed from the original length of 5 m)
Solenoid valve set	1F-VD0□-01(Sink) 1F-VD0□E-01(Source)	Sets with one or two valves are available. Φ4 diameter output hoses The number that replaces "□" indicates the number of valves the solenoid has (1 or 2).
2-piece force sensor conversion cable set	1F-ASSISTA-ADCBL	2-piece force sensor conversion cable set (hand cable/base cable) required to connect the force sensor to the robot.
Vision sensor mounting bracket	1F-ASSISTA-2DVSFLG	Bracket required to connect a vision sensor to the hand.

The list of the controller option equipment and special specification

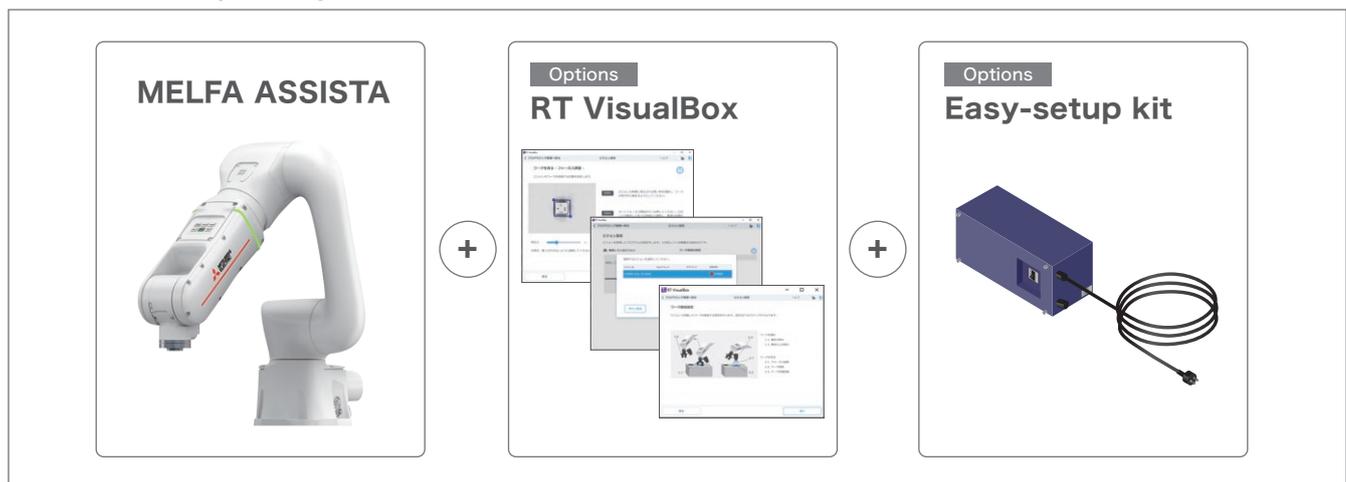| Item	Type	Description
Easy-setup kit	4F-ASSISTASETUP-JP (for Japan/NorthAmerica) 4F-ASSISTASETUP-EU (for Europe/China)	A kit which aids setup that consists of switches, a connector cable, and a 24 V power supply.
RT VisualBox	3G-30C-WINE	Windows 10, Windows 11 Supporting English.
RT ToolBox3	3F-14C-WINE	Windows 10, Windows 11 Supporting English. (With the simulation function) Ver.1.70Y or later
RT ToolBox3 mini	3F-15C-WINE	Windows 10, Windows 11 Supporting English. Ver.1.70Y or later
Simple teaching pendant	R32TB/R32TB-15	Cable length 7m, Cable length 15m
Highly efficient teaching pendant	R56TB/R56TB-15	Cable length 7m, Cable length 15m
Parallel I/O Interface	2D-TZ368(Sink type) 2D-TZ378(Source type)	DO: 32 point DI: 32 point
External I/O cable (For Parallel I/O Interface)	2D-CBL05	CBL05:5m, CBL15:15m Use to connect the external peripheral device to the parallel input/output interface.
CC-Link interface *1	2D-TZ576	Only intelligent device station, Local station.
Network base card (EtherNet/IP interface) *1	2D-TZ535	Communication interface for mounting the Anybus CompactCom module manufactured by HMS. The customer needs to prepare the EtherNet/IP module (AB6314-B-218) manufactured by HMS.
Network base card (PROFINET interface) *1	2D-TZ535-PN	Communication interface for mounting the Anybus CompactCom module manufactured by HMS. The customer needs to prepare the PROFINET IO module (AB6489-B) manufactured by HMS.
Network base card (CC-Link IE Field interface) *1	2F-DQ535	Communication interface for mounting the Anybus CompactCom module manufactured by HMS. The customer needs to prepare the CC-Link IE Field module (AB6709-B-116) manufactured by HMS.
Network base card (EtherCAT interface) *1	2F-DQ535-EC	Communication interface for mounting the Anybus CompactCom module manufactured by HMS. The customer needs to prepare the EtherCAT module (AB6707-D-224) manufactured by HMS.
SD memory card *1	2F-2GBSD	Memory card capacity 2GB.

*1 Not supported by RT VisualBox.

The list of function extension device

Item	Type name	Specifications
Force sensor set *1	4F-FS002H-W200	A set of devices necessary for force sense control function, such as a force sensor, an interface unit, and support software.
MELFA-3D Vision 3.0 *2	3F-53U-WINM	MELFA-3D Vision software

*1 Not supported by RT VisualBox.
*2 The camera head must be prepared by customers. Manufacturer: ENSENSO GmbH (Distributor: IDS Imaging Development Systems GmbH)

ASSISTA Startup Configuration

MELFA ASSISTA + Options RT VisualBox + Options Easy-setup kit

Memo

Memo

Creating Solutions Together.

Low-voltage Power Distribution Products

Transformers, Med-voltage Distribution Products

Power Monitoring and Energy Saving Products

Power (UPS) and Environmental Products

Compact and Modular Controllers

Servos, Motors and Inverters

Visualization: HMIs

Edge Computing Products

Numerical Control (NC)

Collaborative and Industrial Robots

Processing machines: EDM, Lasers

SCADA, analytics and simulation software

Mitsubishi Electric's product lineup, from various controllers and drives to energy-saving devices and CFRP laser processing machines, all help you to automate your world. They are underpinned by software, innovative data monitoring, and modelling systems supported by advanced industrial networking and Edgecross IT/OT connectivity. Together with a worldwide partner ecosystem, Mitsubishi Electric factory automation (FA) has everything to make IoT and Digital Manufacturing a reality.

With a complete portfolio and comprehensive capabilities that combine synergies with diverse business units, Mitsubishi Electric provides a one-stop approach to how companies can tackle the shift to clean energy and energy conservation, carbon neutrality and sustainability, which are now a universal requirement of factories, buildings, and social infrastructure.

We at Mitsubishi Electric FA are your solution partners waiting to work with you as you take a step toward the realization of sustainable manufacturing and society through the application of automation.
Let's automate the world together!

Note: not all products are available in all countries

Global Partner. Local Friend.

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