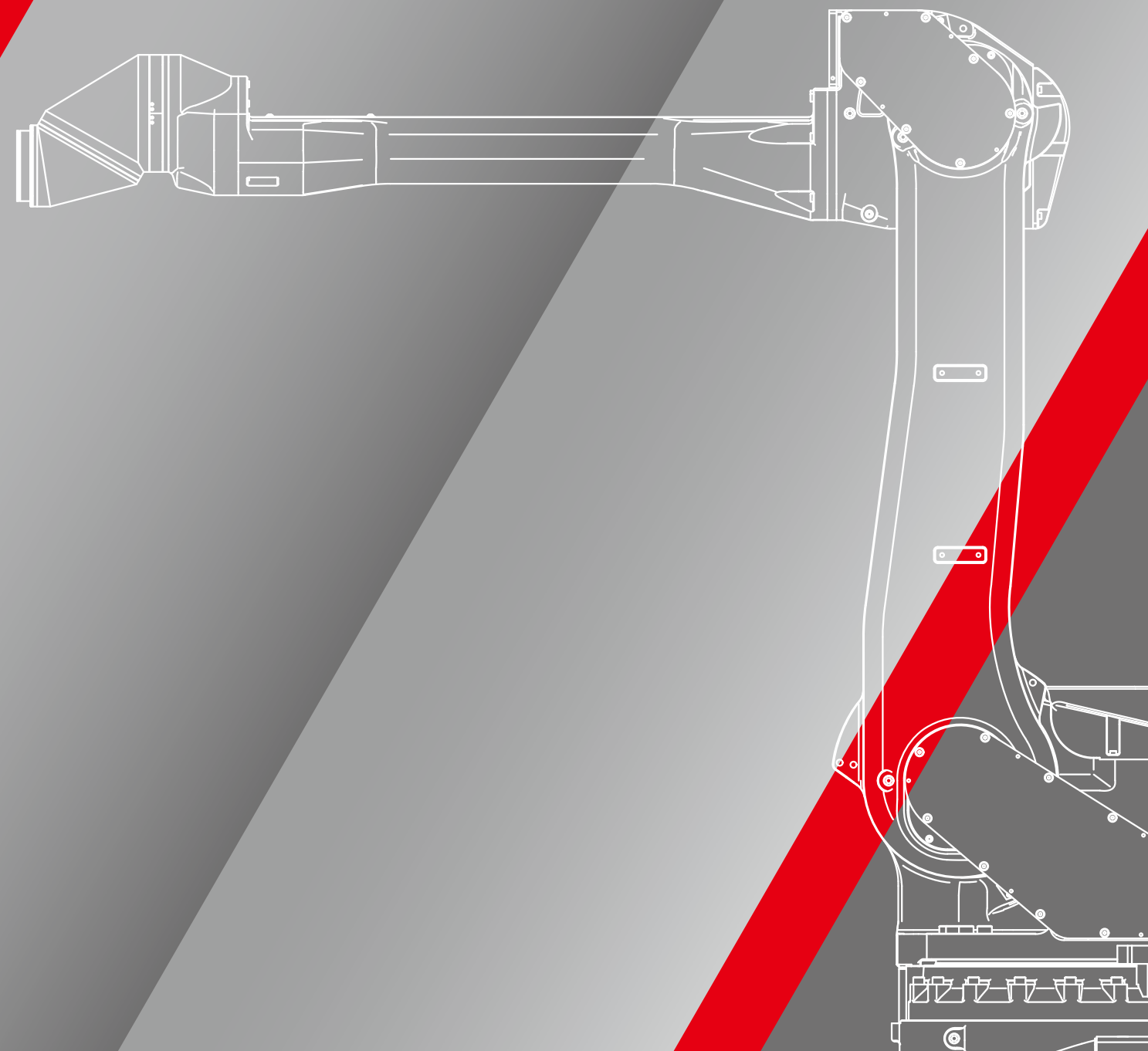


Kawasaki Robot

K series

Painting robots explosion-proof and painting package cells



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Kawasaki Robot



CAUTIONS TO BE TAKEN TO ENSURE SAFETY

- For those persons involved with the operation / service of your system, including Kawasaki Robot, they must strictly observe all safety regulations at all times. They should carefully read the Manuals and other related safety documents.
- Products described in this catalogue are general industrial robots. Therefore, if a customer wishes to use the Robot for special purposes, which might endanger operators or if the Robot has any problems, please contact us. We will be pleased to help you.
- Be careful as Photographs illustrated in this catalogue are frequently taken after removing safety fences and other safety devices stipulated in the safety regulations from the Robot operation system.



ISO certified in Akashi Works and Nishi-Kobe Works.

A selection of robots is available to match your painting application.

Kawasaki K-series robots are explosion-proof painting robots developed on Kawasaki's concept of "Simple and friendly." This range of robots covers all painting applications from small to large, and the fully integrated hose system provides maximum protection against external dust and dirt.

Features

A broad range of robots

Kawasaki offers five basic types of painting robot from the KF121 for small workpieces to the KJ314 for inner and outer bodies of automobiles. We provide a range of robots that covers the requirements of all applications and installations.

Built-in hoses

The hollow wrist (3R) prevents paint mist from adhering on tubes and cables and can minimize the chance of painting defects. The inner diameter of the hollow wrist is either 40 or 70 mm.



Enhanced peripheral units

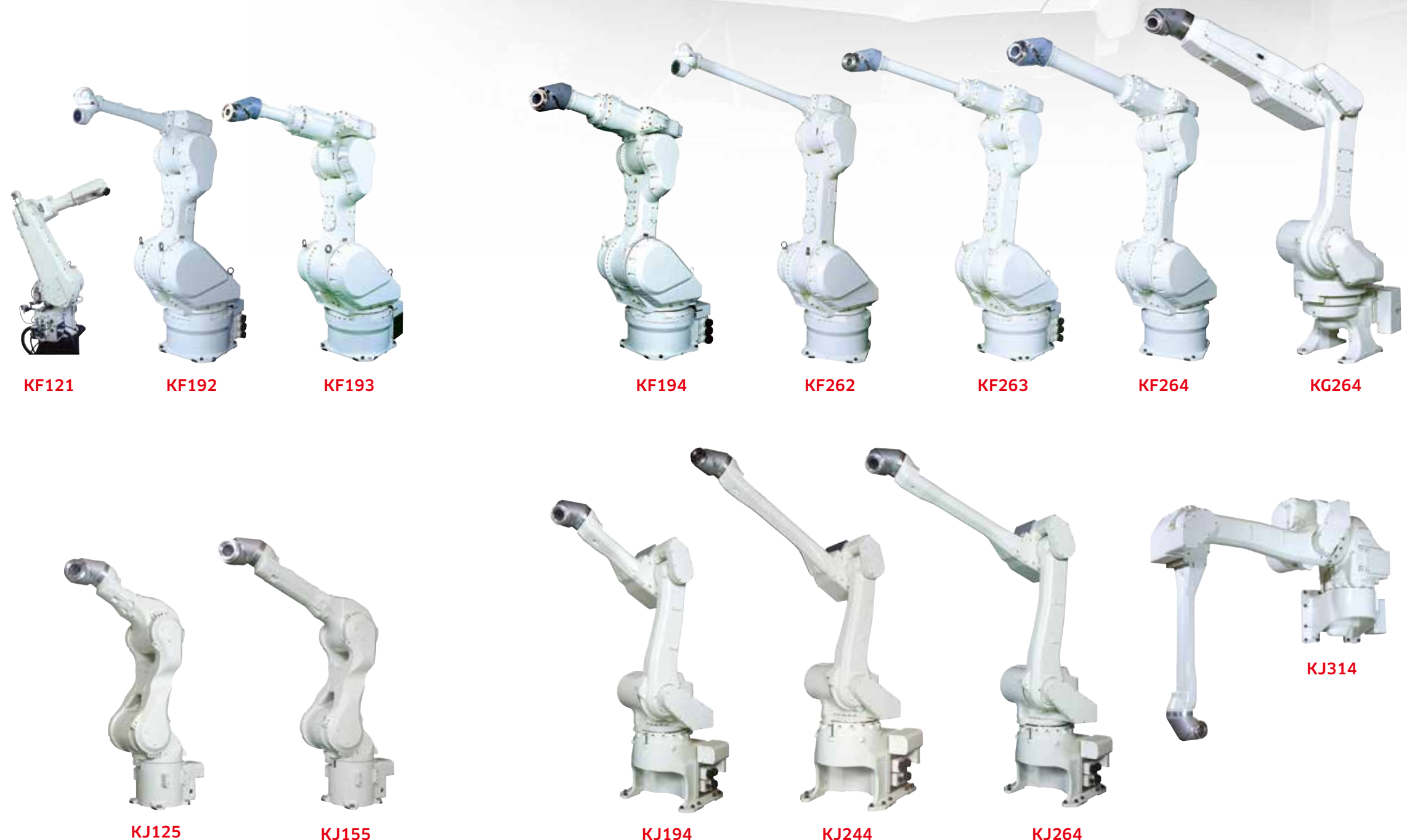
A control panel is provided to enhance the ease of system development and to interface with the robot traveling unit, workpiece transfer unit, rotation unit, and other devices.

Significant painting experience

Gathering painting robot experience has enabled Kawasaki to put together a robot that will match your every need. The K series has used this information and is now equipped with more advanced functions than ever, resulting in a robot of great capability.

Customer support

Our professional staff will be available for support from the initial planning stage right up to system start up. This service will be of great benefit to those new to painting applications.



		KF121	KF192	KF193	KF194	KF262	KF263	KF264	KG264		KJ125	KJ155	KJ194 (Floor, Shelf)	KJ194 (Wall)	KJ244 (Floor, Shelf)	KJ244 (Wall)	KJ264 (Floor, Shelf)	KJ264 (Wall)	KJ314
Type		Articulated robot									Articulated robot								
Degree of freedom (axes)		6									6								7
Payload (kg)		5	Wrist : 12 Arm : 20						Wrist : 20 Arm : 30		Wrist : 8 Arm : 5		Wrist : 15 Arm : 25						
Max. reach (mm) *1		1,240	1,973	1,973	1,978	2,665	2,665	2,668	2,665		1,299	1,545	1,940	1,940	2,490	2,490	2,640	2,640	3,100
Wrist type		RBR	BBR	3Rø40 *2	3Rø70 *2	BBR	3Rø40 *2	3Rø70 *2			3Rø50 *2		3Rø70 *2						
Position repeatability (mm)		±0.2	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5		±0.15 *3	±0.15 *3	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5
Motion range (°)	Arm rotation (JT1)	±160	±150	±150	±150	±150	±150	±150	±120		±160	±160	±120	+30 --120 *4	±120	+30 --120 *4	±120	+30 --120 *4	±120
	Arm out-in (JT2)	±90	+110 --60	+110 --60	+110 --60	+110 --60	+110 --60	+110 --60	+120 --60		+130 --80	+130 --80	+130 --80	+130 --80	+130 --80	+130 --80	+130 --80	+130 --80	+130 --80
	Arm up-down (JT3)	±150	+90 --80	+90 --80	+90 --80	+90 --80	+90 --80	+90 --80	+90 --65		+90 --75	+90 --75	+90 --65	+90 --65	+90 --65	+90 --65	+90 --65	+90 --65	+90 --65
	Wrist swivel (JT4)	±270	±360	±720	±720	±360	±720	±720	±720		±720	±720	±720	±720	±720	±720	±720	±720	±720
	Wrist bend (JT5)	±145	±360	±720	±720	±360	±720	±720	±720		±720	±720	±720	±720	±720	±720	±720	±720	±720
	Wrist twist (JT6)	±360	±360	±410	±410	±360	±410	±410	±410		±410	±410	±410	±410	±410	±410	±410	±410	±410
	Arm swing (JT7)	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	±90
Painting speed (m/s)		—	1.2	1.2	1.2	1.2	1.2	1.2	1.5		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Allowable moment (N·m)	Wrist swivel (JT4)	7.8	33.3	33.1	35.3	33.3	33.1	35.3	79.9		21.8	21.8	56.2	56.2	56.2	56.2	56.2	56.2	56.2
	Wrist bend (JT5)	7.8	28.8	26.7	27.7	28.8	26.7	27.7	61.3		17.0	17.0	43.4	43.4	43.4	43.4	43.4	43.4	43.4
	Wrist twist (JT6)	2.9	7.9	7.9	7.9	7.9	7.9	7.9	15.6		8.0	8.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Allowable moment of inertia (kg·m²)	Wrist swivel (JT4)	0.17	1.28	1.27	1.44	1.20	1.27	1.44	3.33		0.90	0.90	2.19	2.19	2.19	2.19	2.19	2.19	2.19
	Wrist bend (JT5)	0.17	0.96	0.82	0.89	0.90	0.82	0.89	1.95		0.54	0.54	1.31	1.31	1.31	1.31	1.31	1.31	1.31
	Wrist twist (JT6)	0.06	0.11	0.10	0.10	0.11	0.10	0.10	0.12		0.12	0.12	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Mass (kg)		140	690	720	750	720	740	770	795		190	195	530, 520	520	540, 530	530	540, 530	530	720
Mounting		Floor, Wall									Floor, Shelf			Wall	Floor, Shelf	Wall	Floor, Shelf	Wall	
Installation environment	Ambient temperature (°C)	0 - 40									0 - 40								
	Relative humidity (%)	35 - 85 (No dew, nor frost allowed)									35 - 85 (No dew, nor frost allowed)								
Power requirements (kVA) *5		1.5	5							3		5							
Explosion-proof construction	America	Compliant *6	—					Compliant *6		to be acquired		Compliant *6							
	Canada	Compliant *7	—					Compliant *7		to be acquired		Compliant *7							
	Europe	Compliant *8									to be acquired		Compliant *8						
	Korea	Compliant *8									to be acquired		Consult with Kawasaki				Compliant *8		
	China	Compliant *8									to be acquired		Compliant *8						
	Japan & Asia (except China & Korea)	Compliant *9									Compliant *10								
Controller	America, Canada	E37	—					E35		E35									
	Europe	E47	E45							E45									
	Japan & Asia	E27	E25							E25									

* 1 : Maximum reach : The RBR (Roll Bend Roll) wrist refers to the distance from the center of JT1 to the center of JT5. The BBR (Bend Bend Roll) wrist is the distance from the center of JT1 to the center of JT4. The 3R (Roll Roll Roll) wrist of the 6-axis robots is the distance from the center of JT1 to the intersection of JT4 and JT5 axes. The 3R (Roll Roll Roll) wrist of the 7-axis robot is the distance from the center of JT7 to the intersection of JT4 and JT5 axes.

* 2 : Hose built-in

* 3 : Conforms to ISO9283

* 4 : Motion range of JT1 varies depending on the direction of the mounting surface. Viewing from the robot backside, when the mounting surface is located on the left, it is [+120 to -30]. When the surface is on the right side, it is [+30 to -120].

* 5 : Varies depending on the payload and motion patterns.

* 6 : Combination of pressurized type and intrinsically safety type (CL1 ZN1 AExpIIB T4 / AExIIB T4)

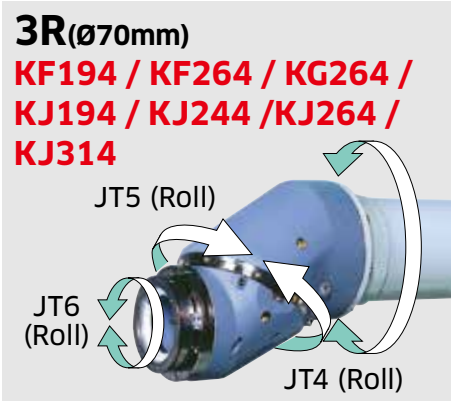
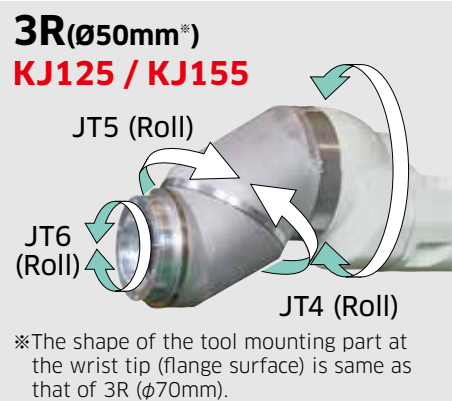
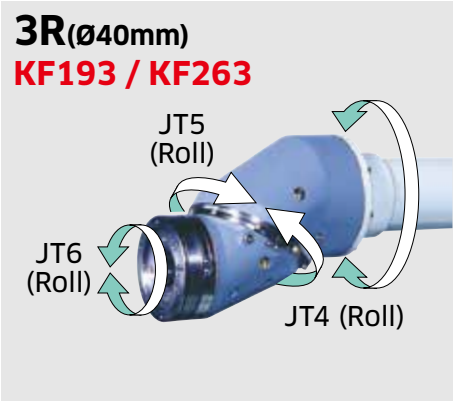
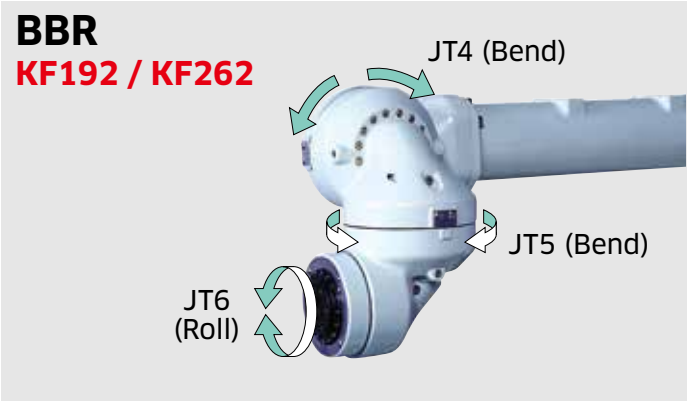
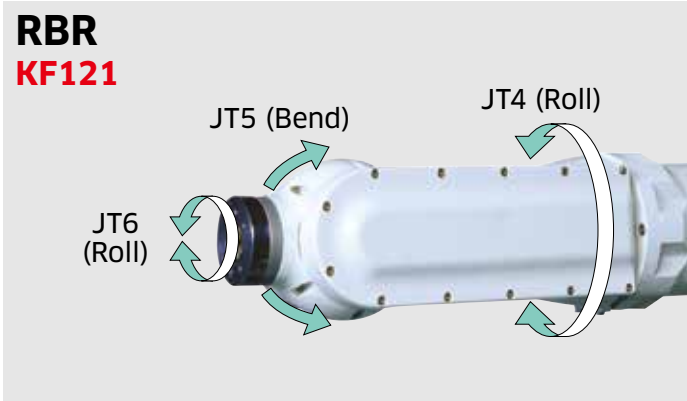
* 7 : Combination of pressurized type and intrinsically safety type (CL1 ZN1 ExpIIB T4 / ExIIB T4)

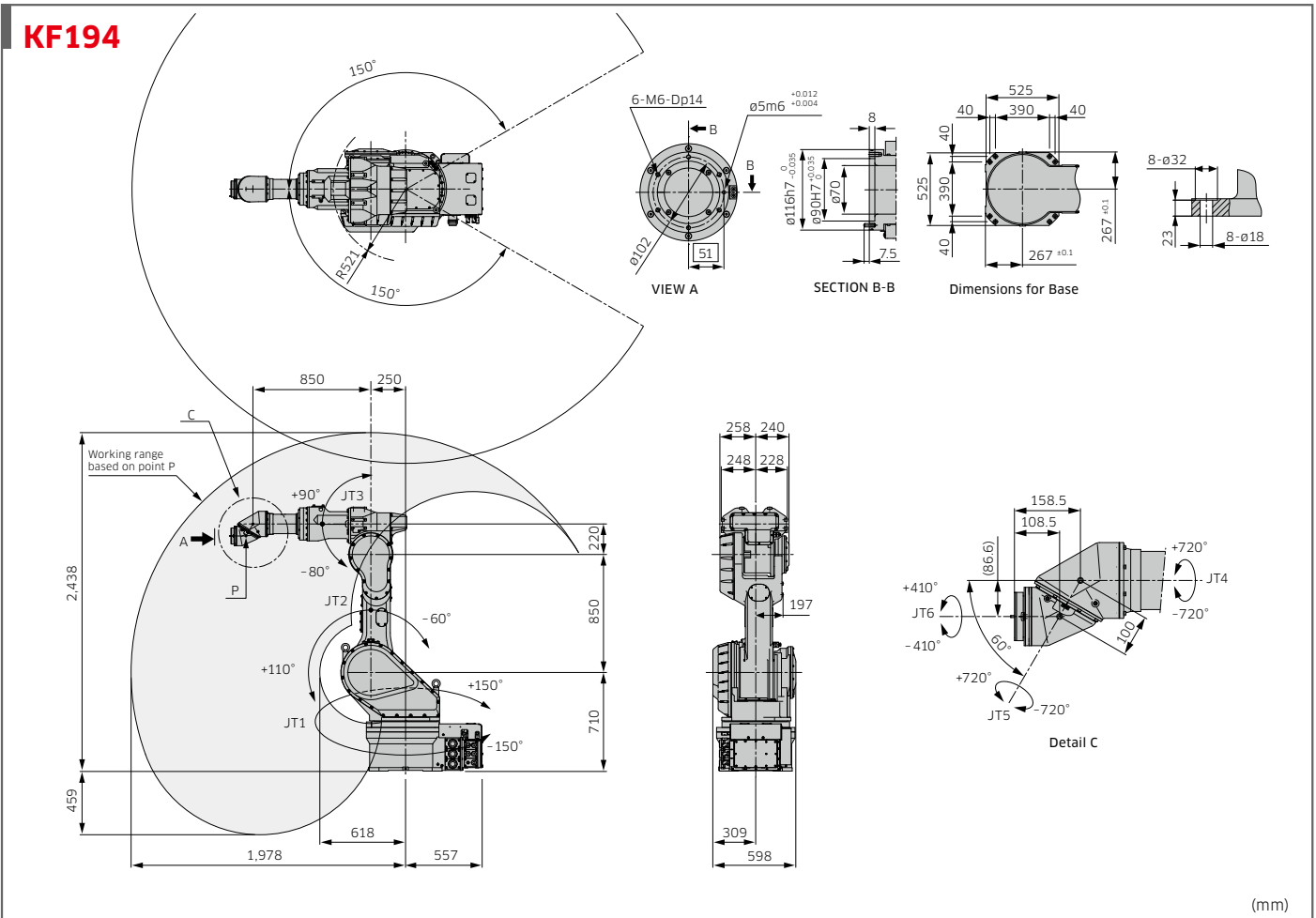
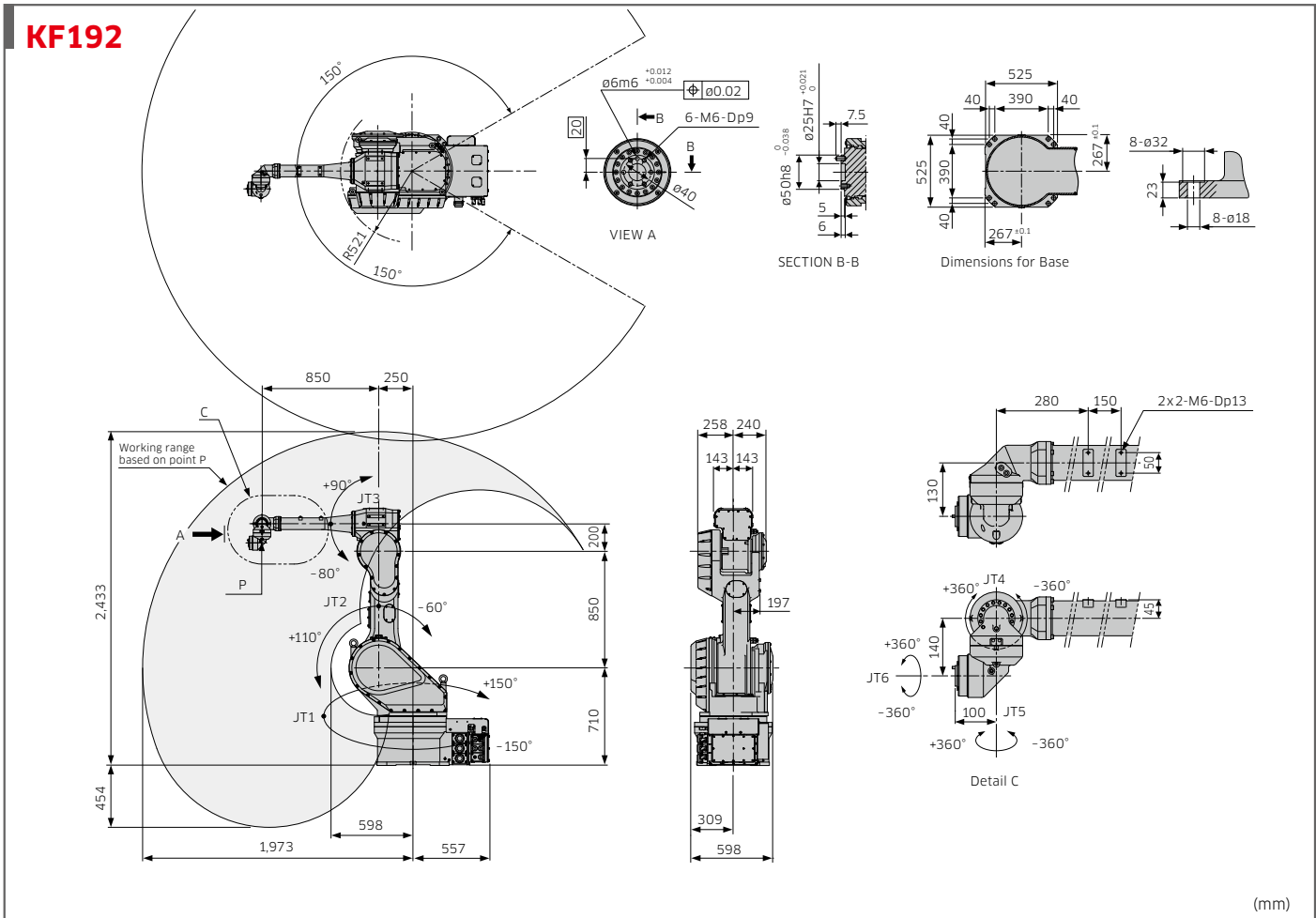
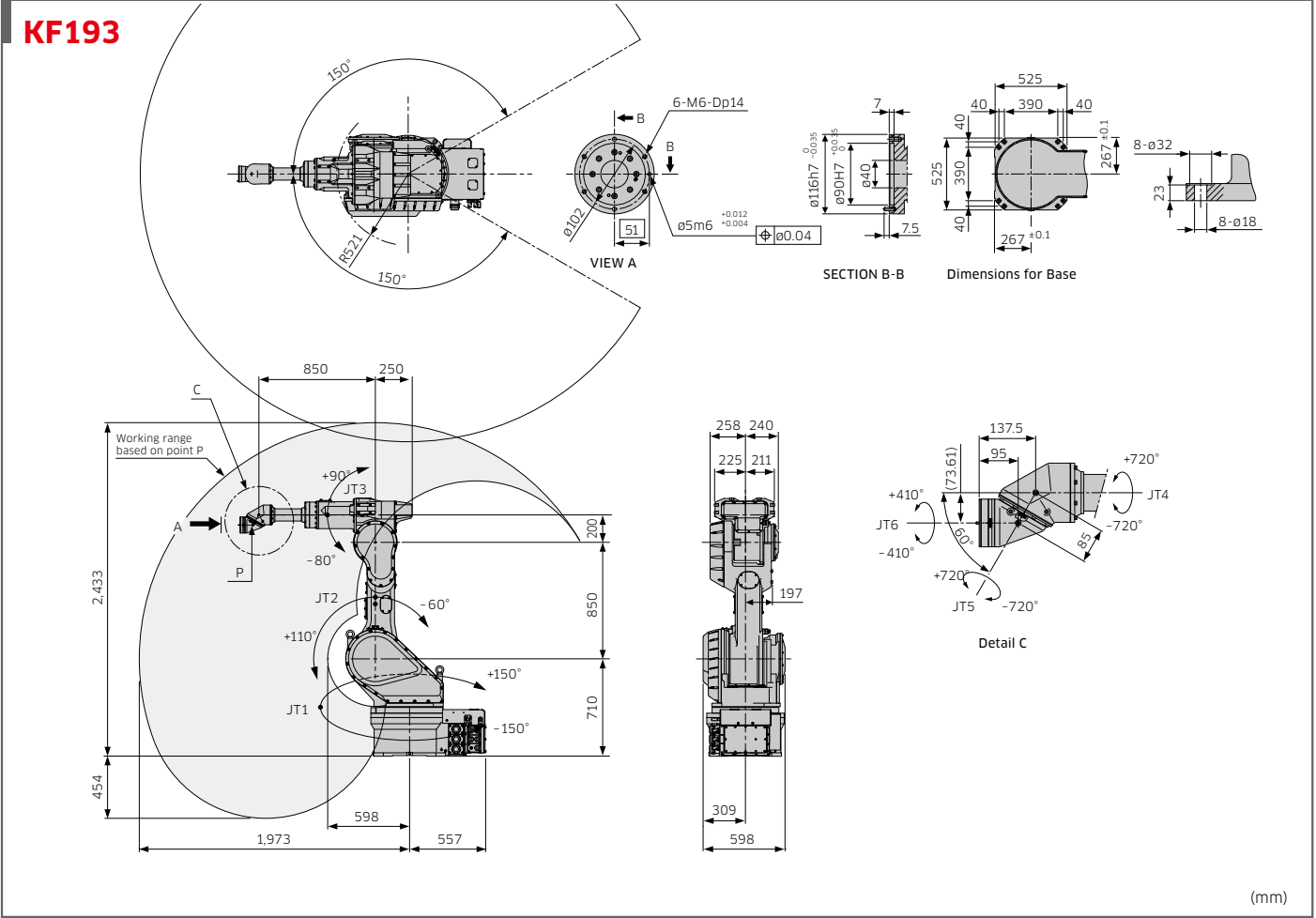
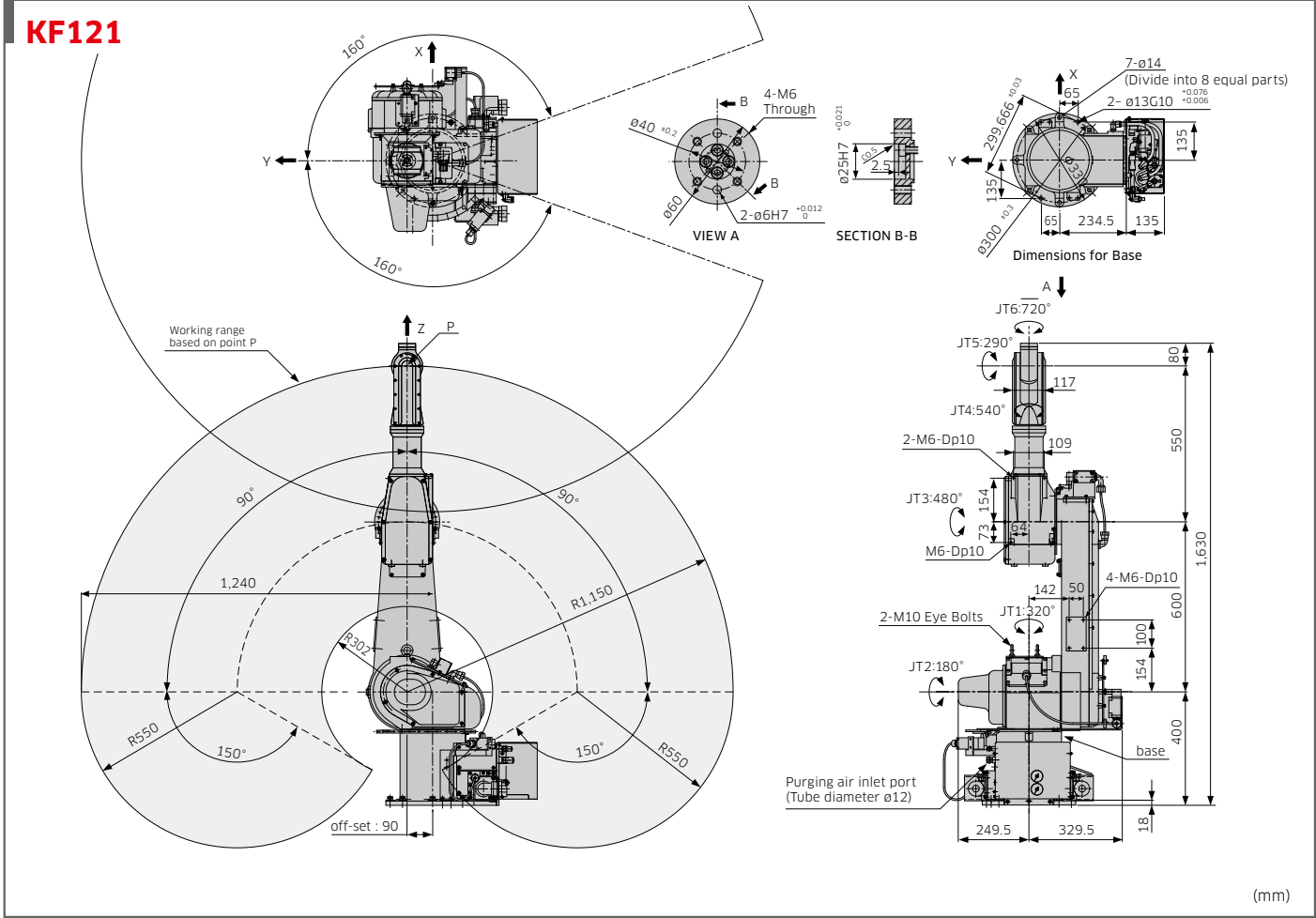
* 8 : Combination of pressurized type and intrinsically safety type (II2G EXpIIB T4/ExIIB T4)

* 9 : Combination of pressurized type and intrinsically safety type (ExpIIB T4 / ExIIB T4)

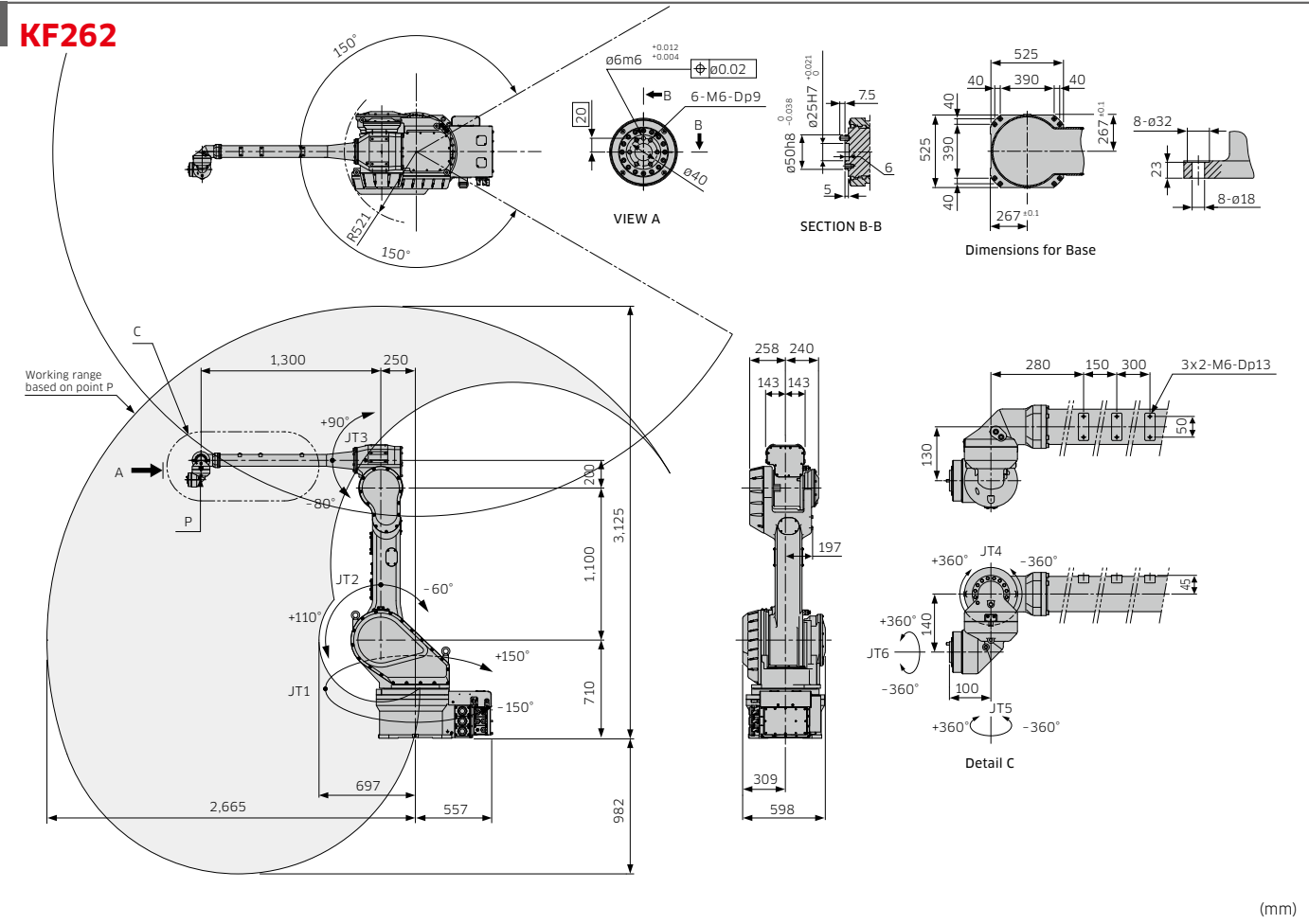
*10 : Combination of pressurized type and intrinsically safety type (f2G4 / ExIIB T4)

Variation of Wrists

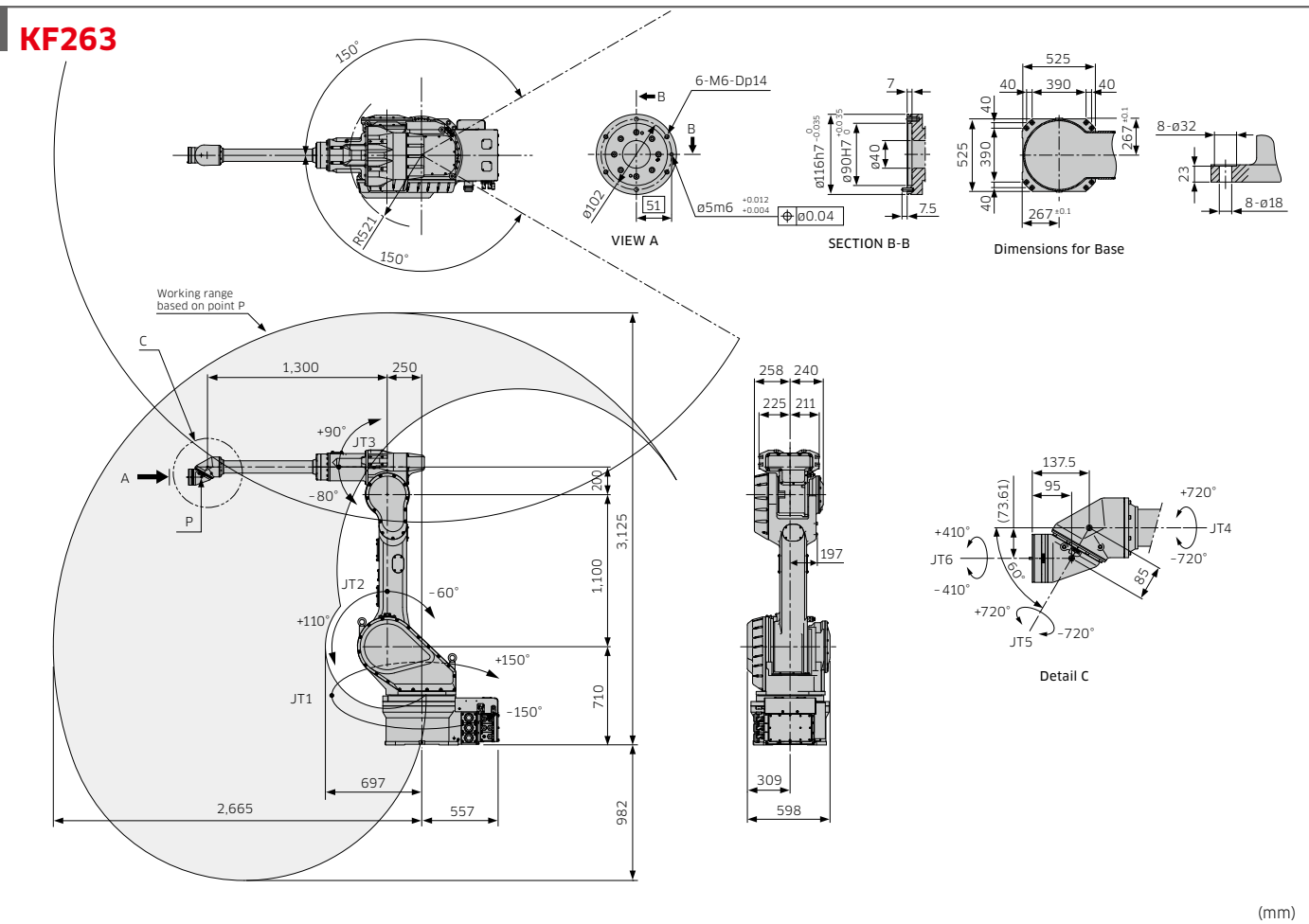




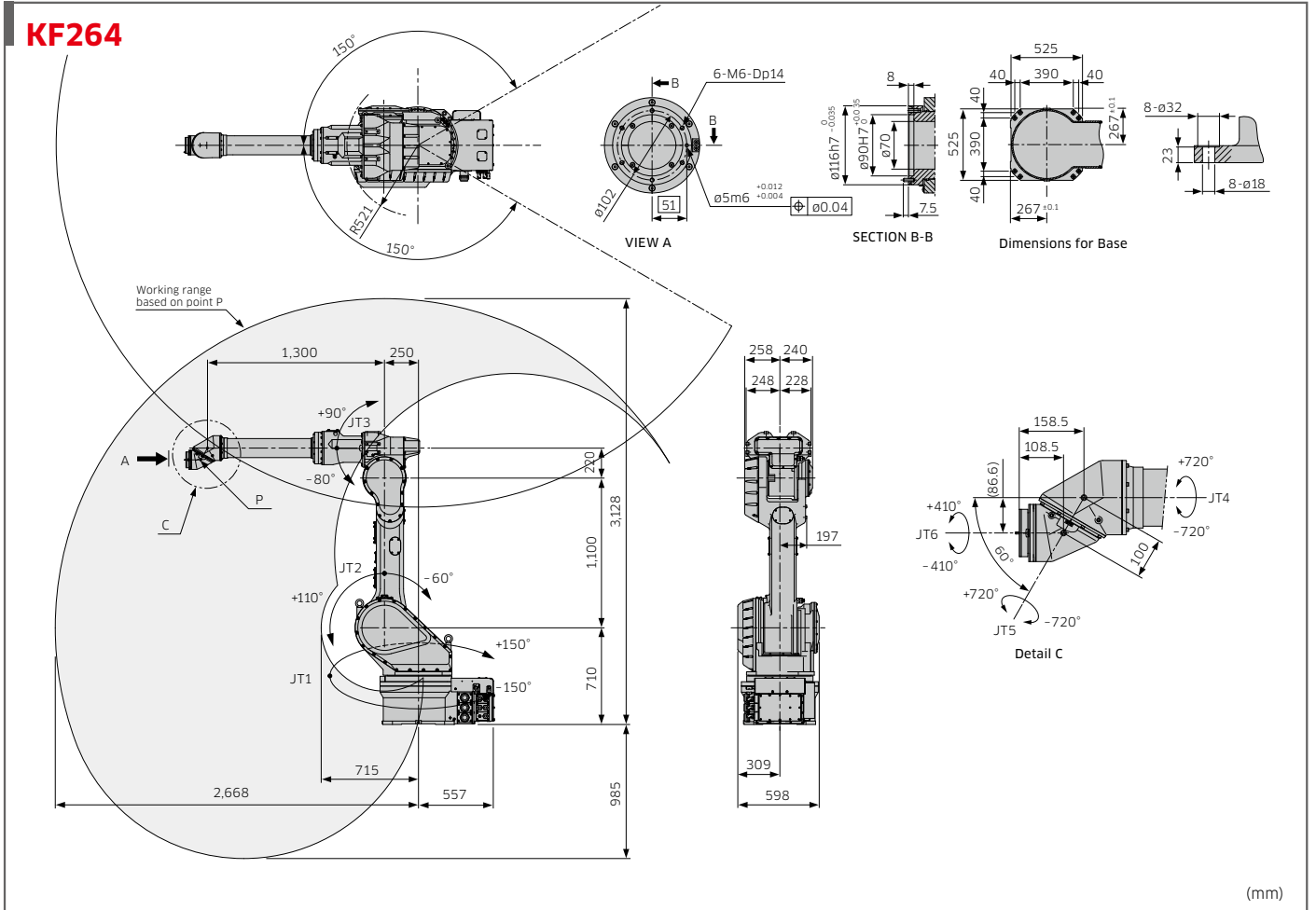
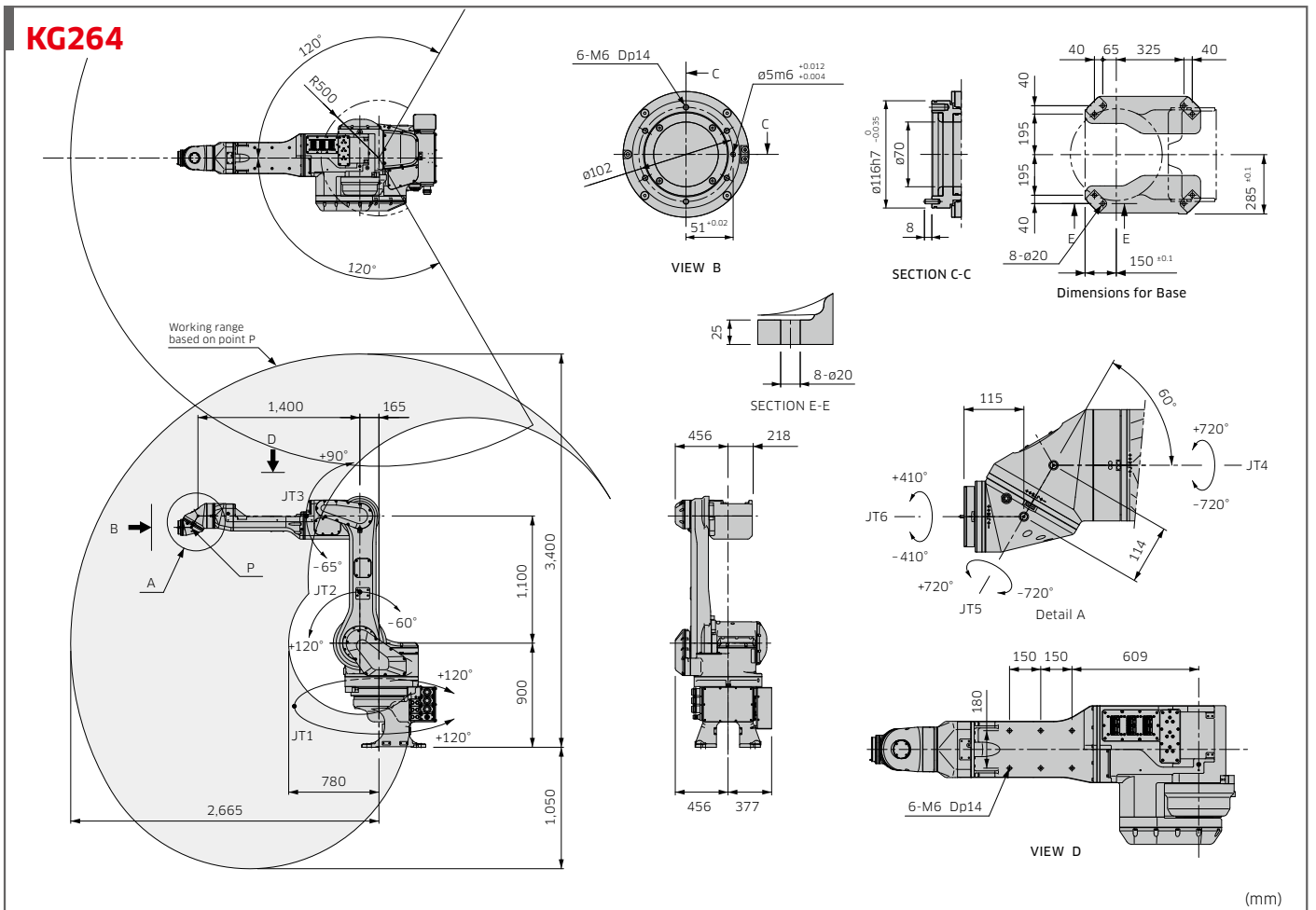
KF262



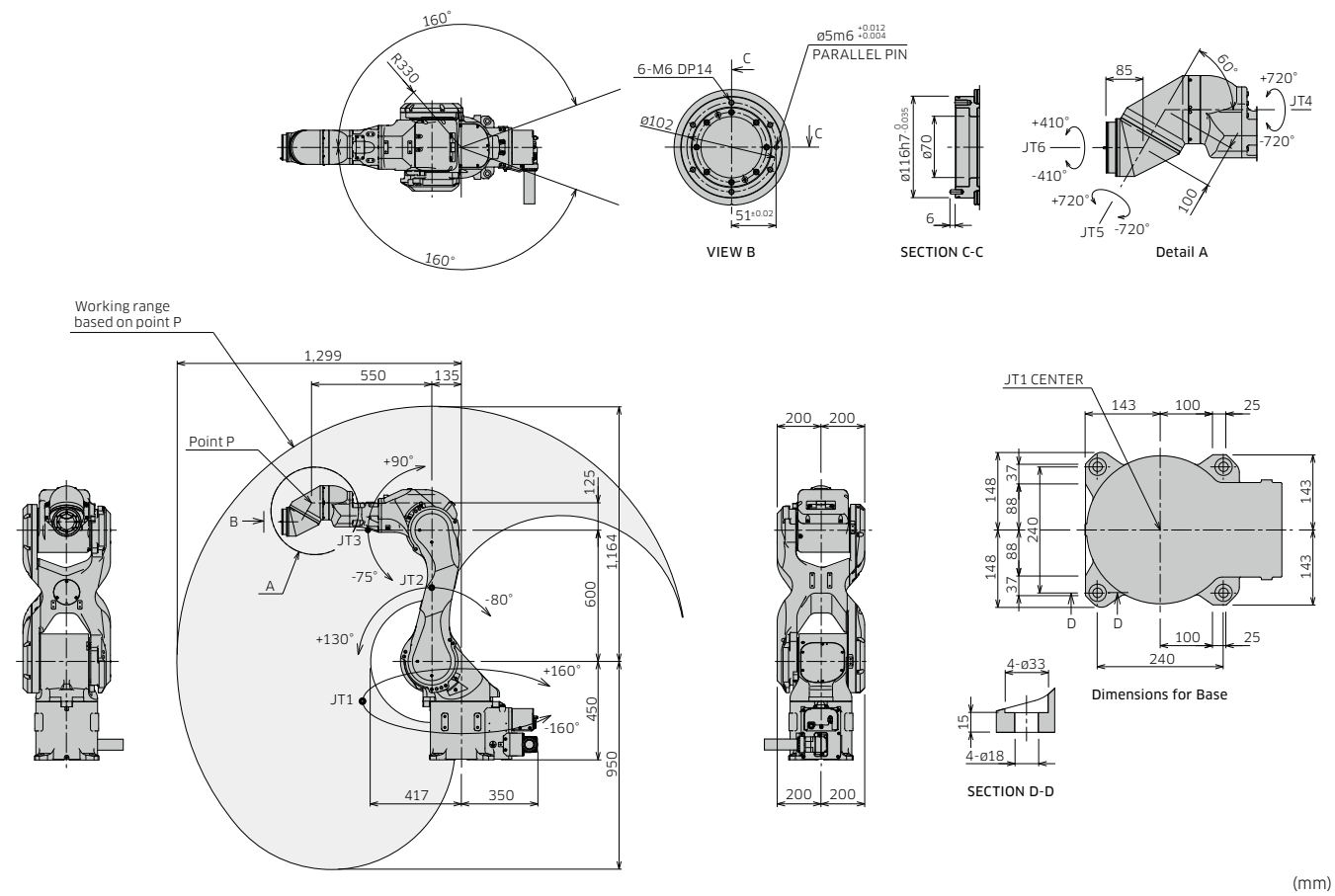
KF263



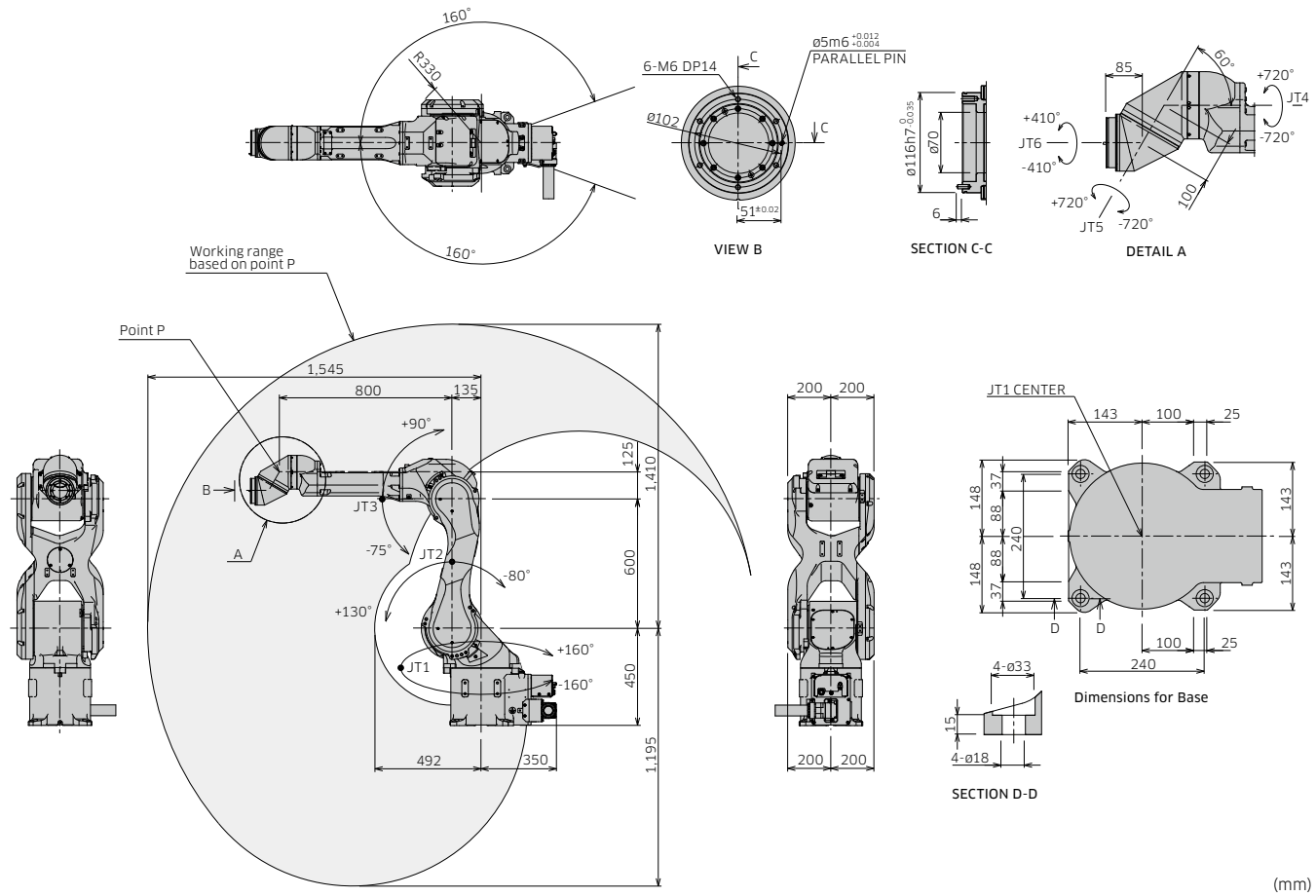
KF264

**KG264**

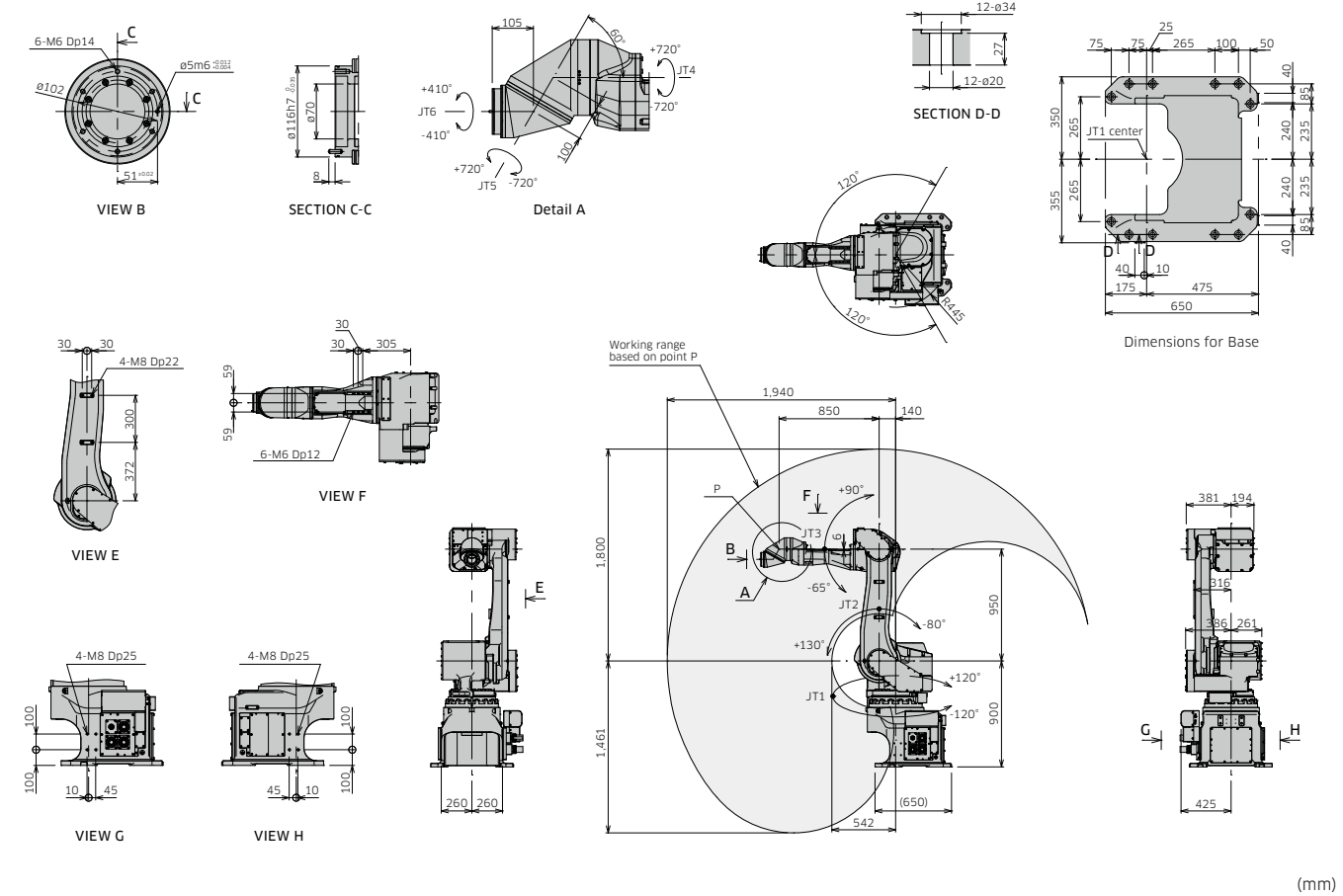
KJ125



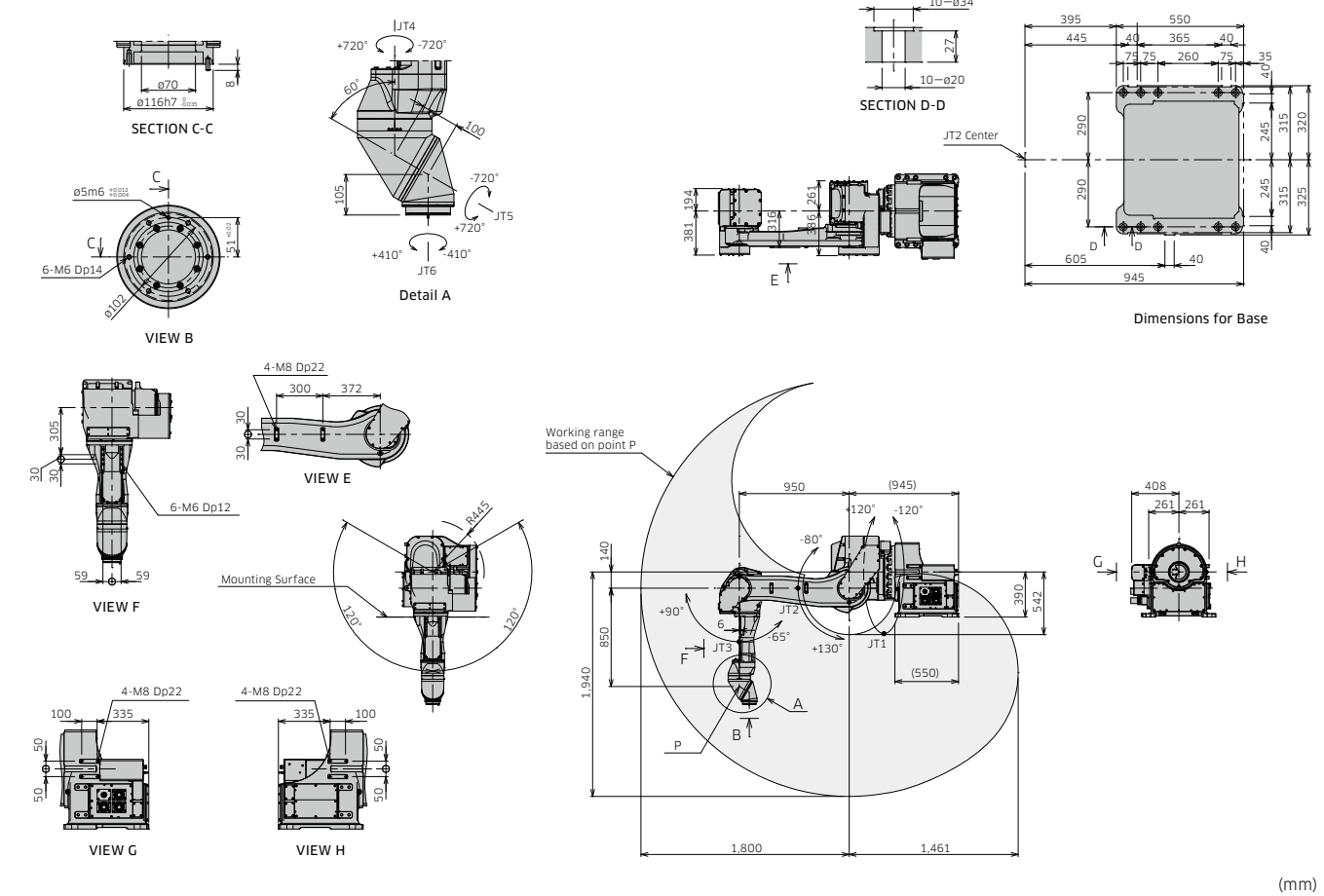
KJ155



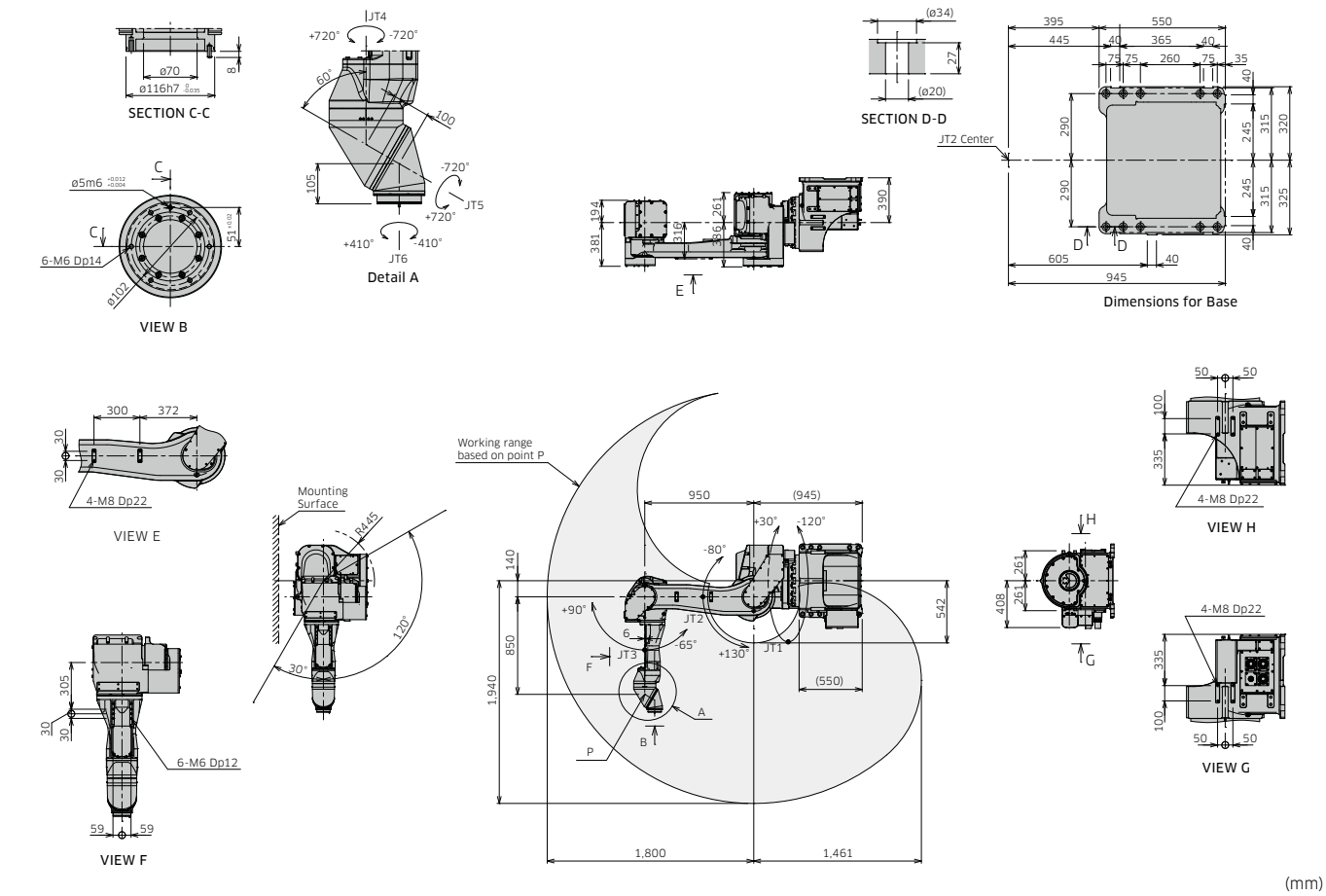
KJ194 (Floor)



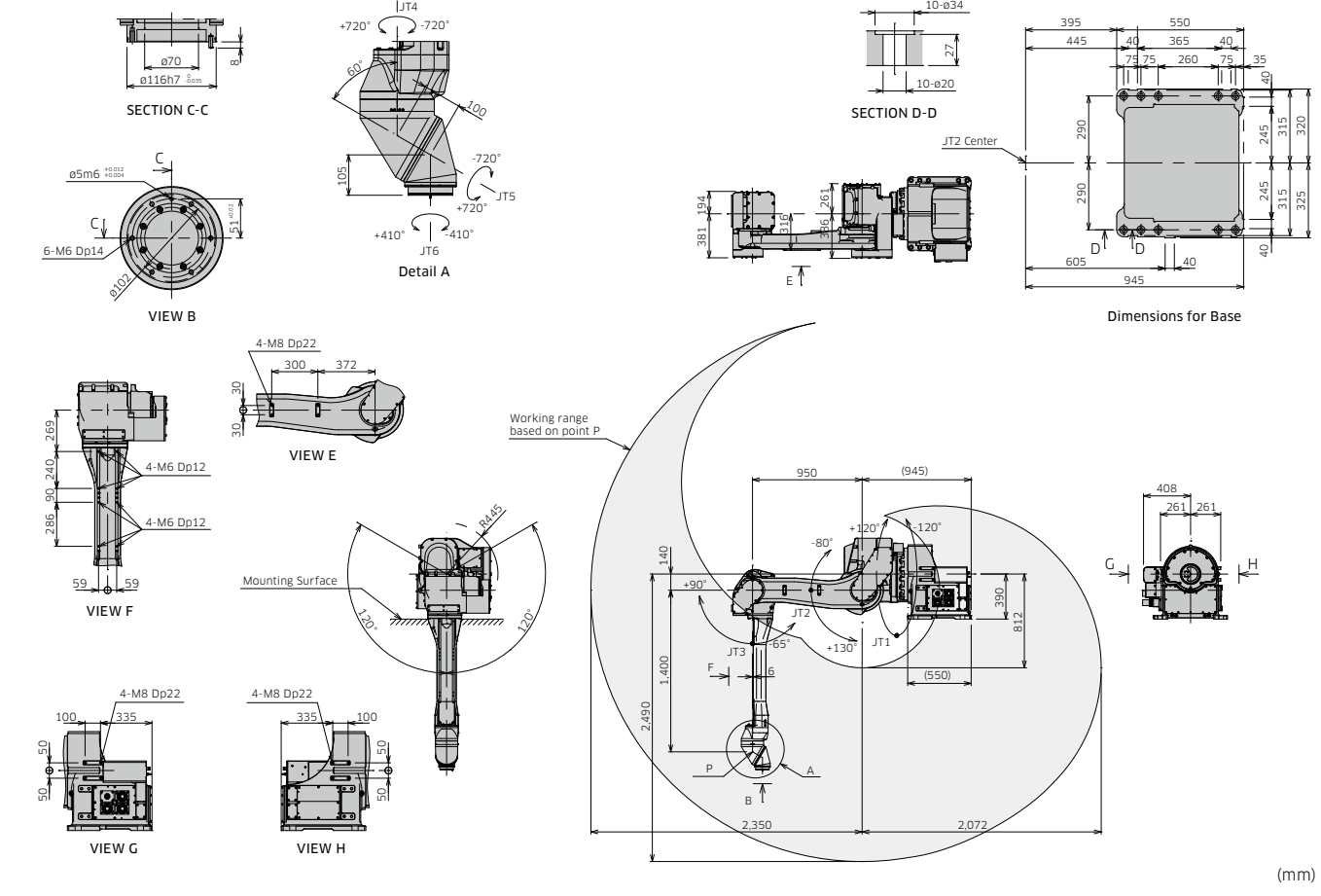
KJ194 (Shelf)



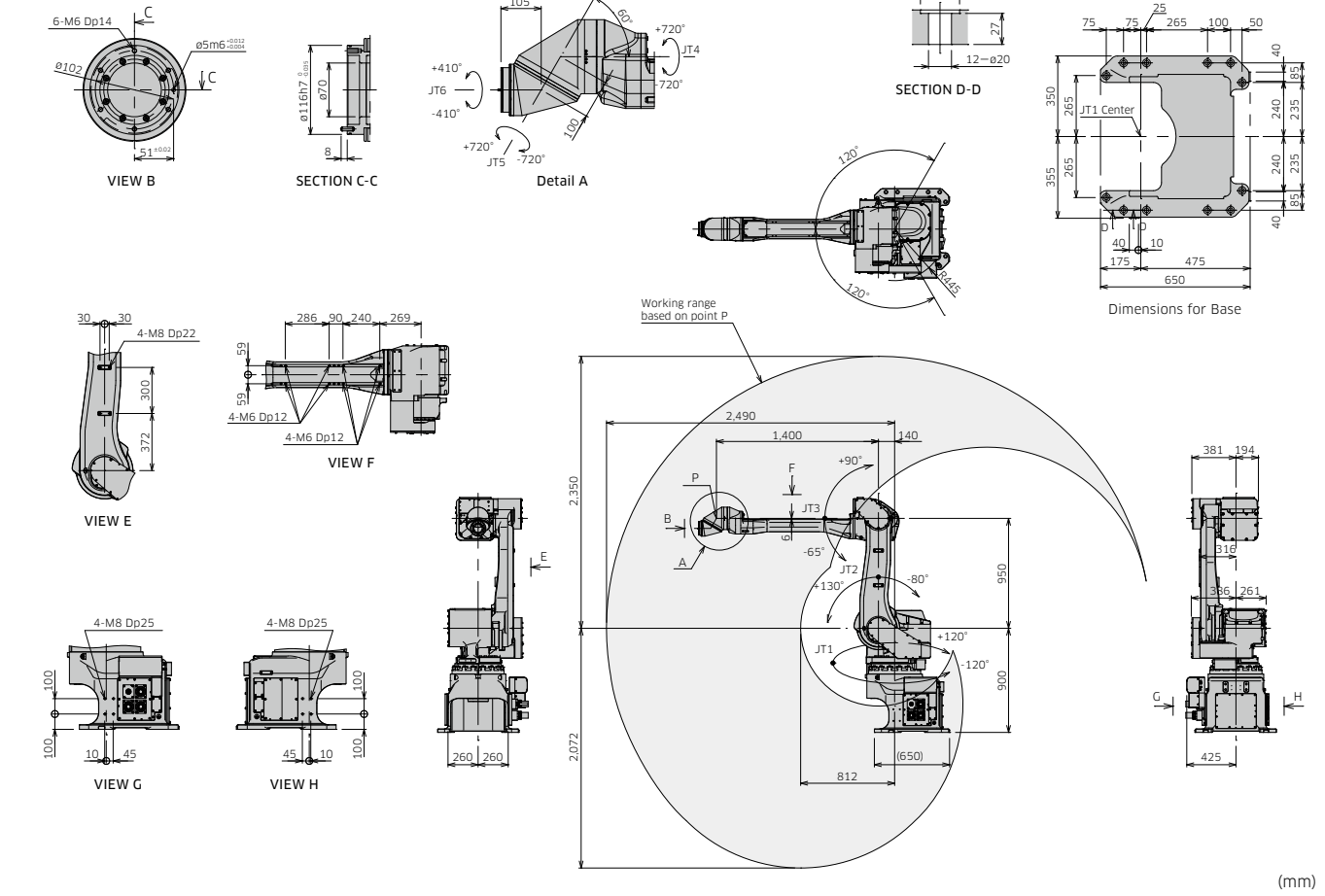
KJ194 (Wall)



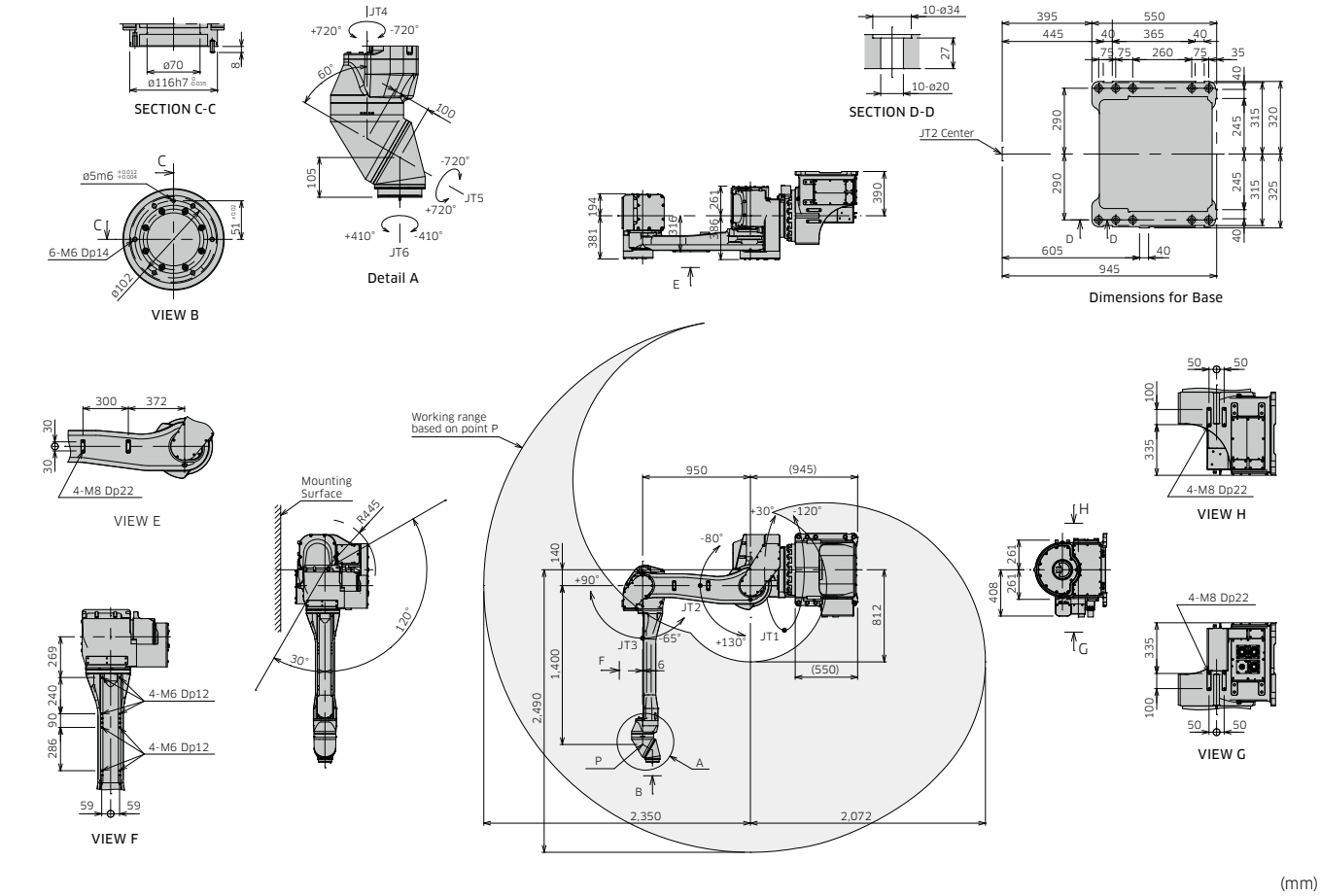
KJ244 (Shelf)



KJ244 (Floor)

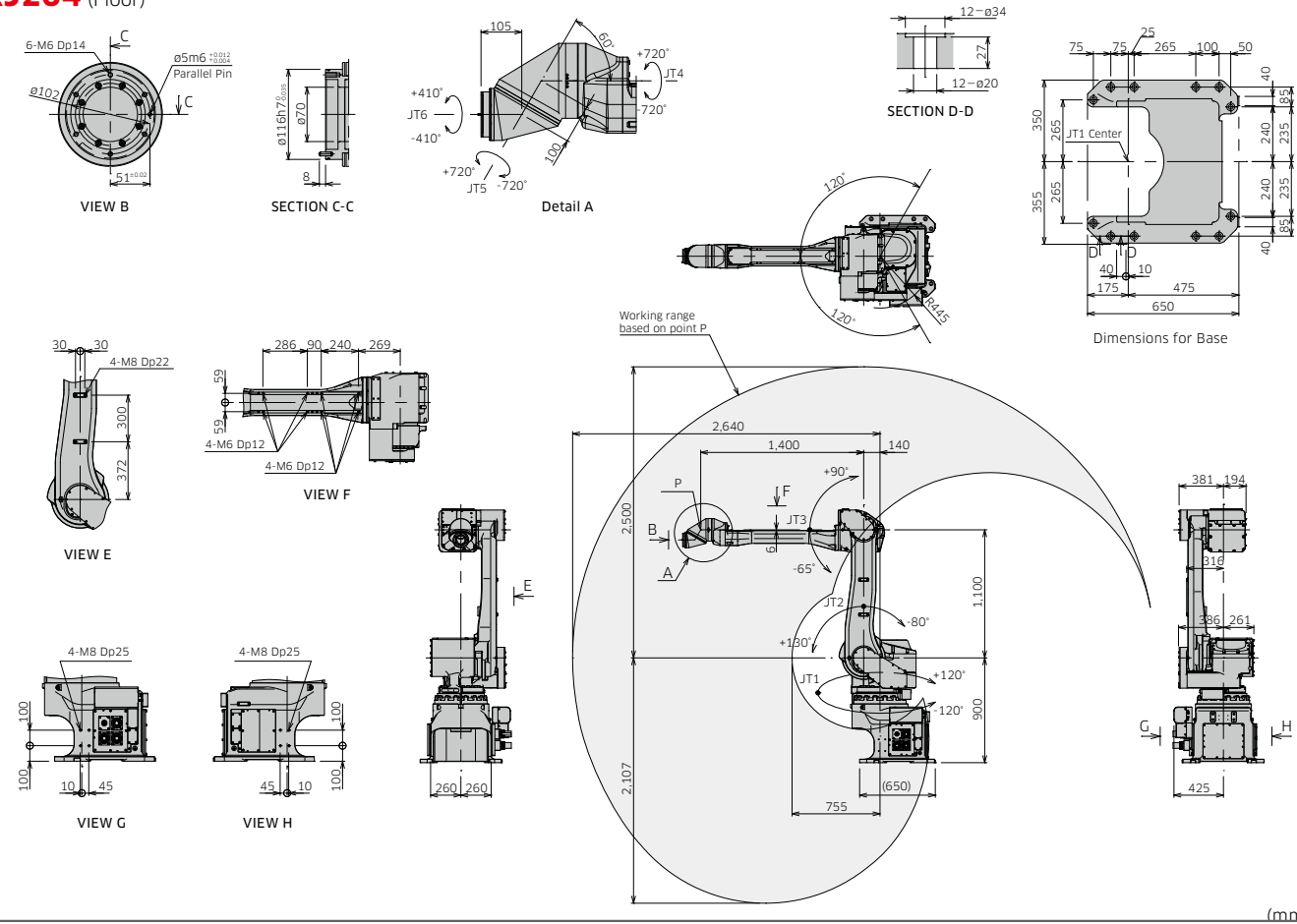


KJ244 (Wall)



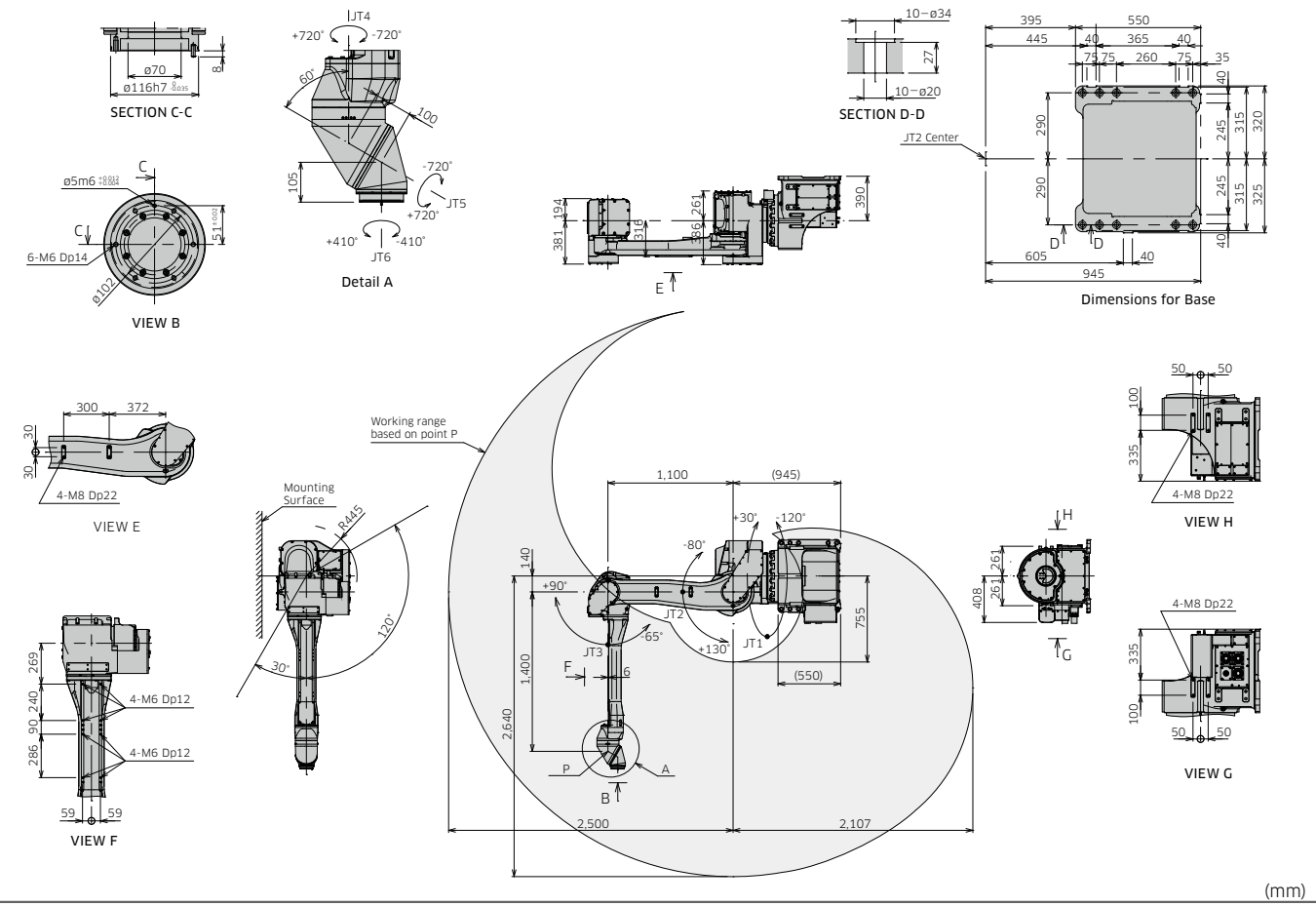
Motion Range & Dimensions

KJ264 (Floor)



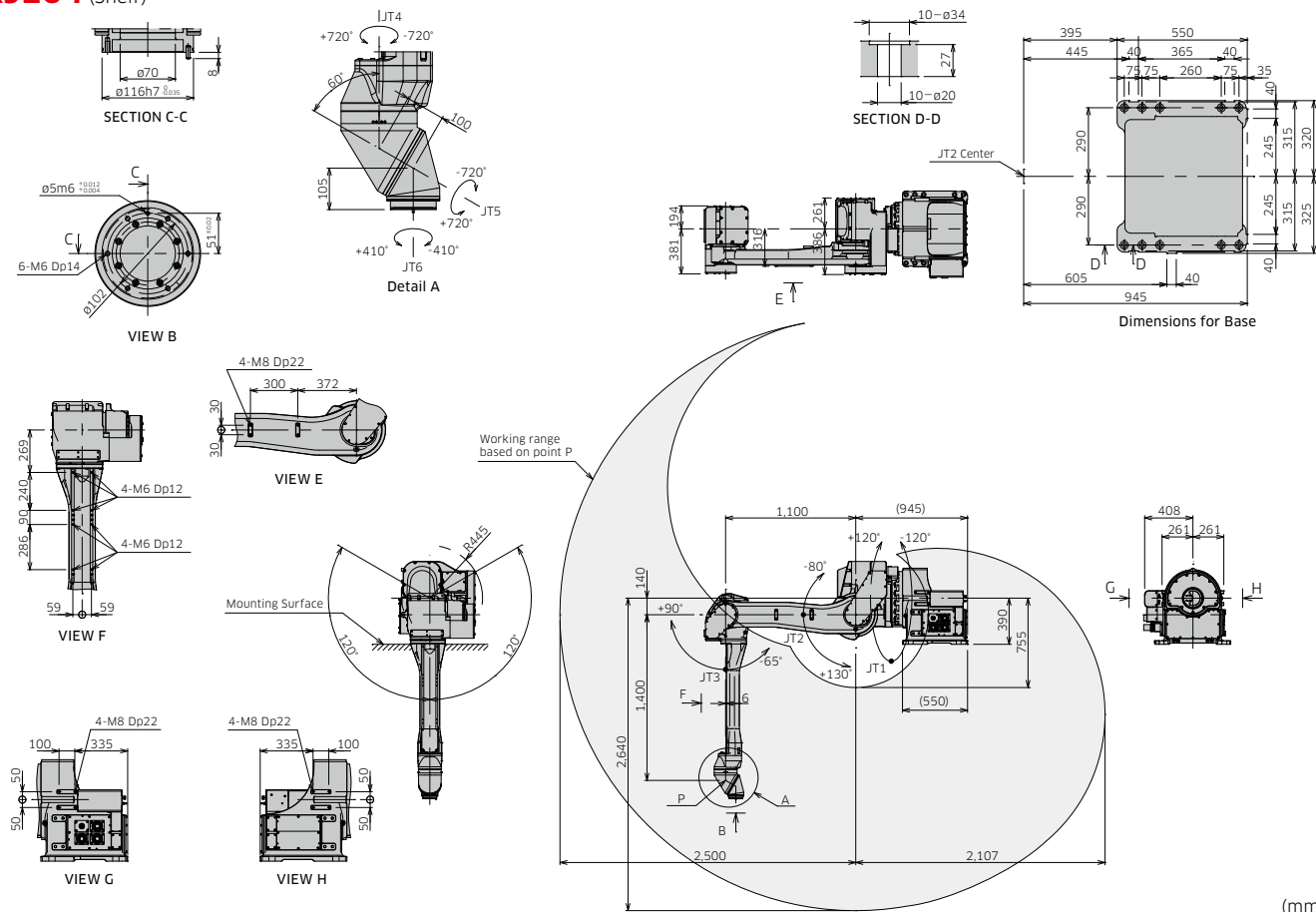
_____ (mm)

KJ264 (Wall)



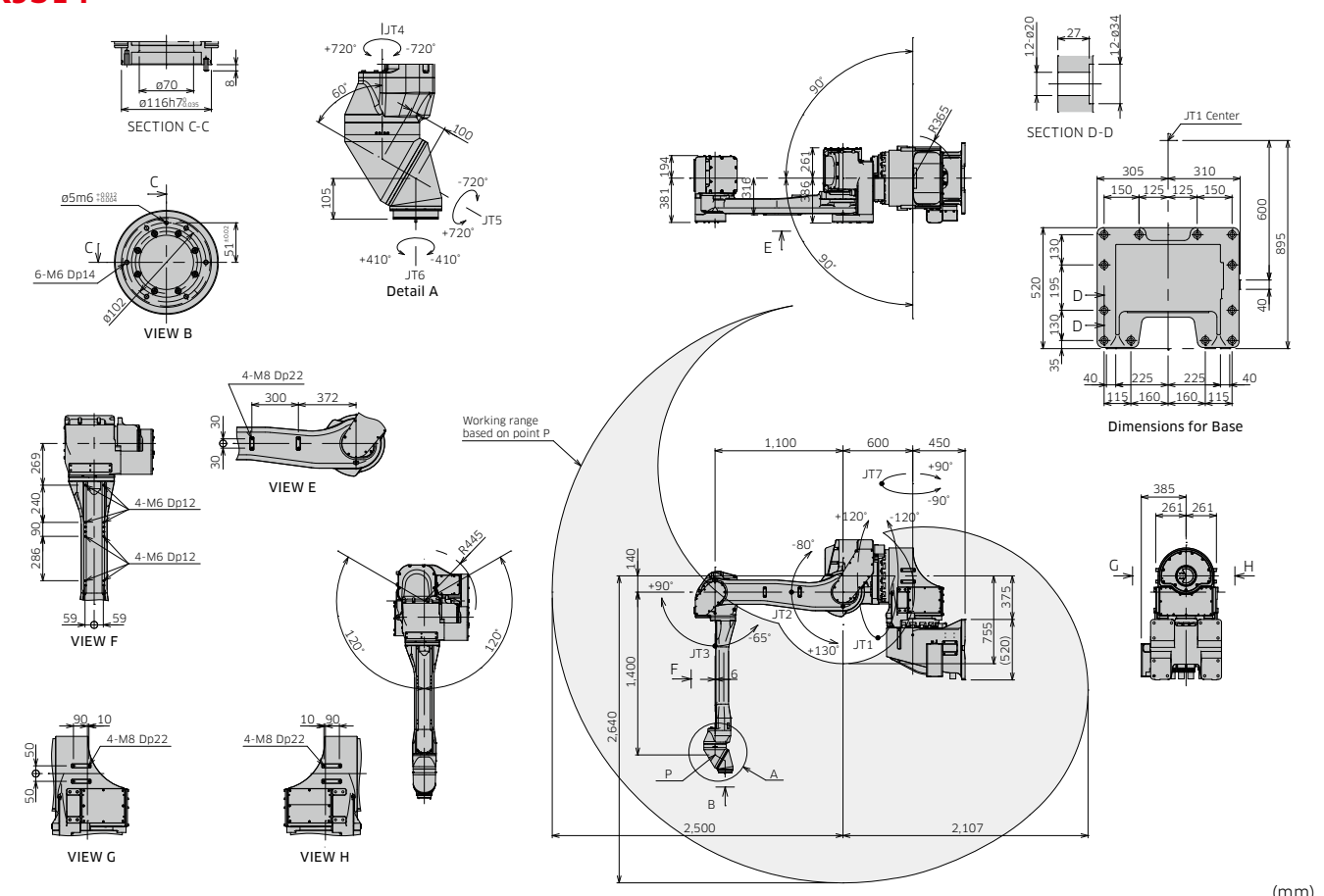
mm)

KJ264 (Shelf)



(mm)

KJ314



mm)

E series

The E-controller, delivering unprecedented quality with a compact size, was developed to respond to the requirements of our customers. Kawasaki's past achievements and experience have led to the development of the most technically advanced controller available. This industry-leading design provides improved performance and easy operation that surpasses all expectations.

Features

Compact

We have reduced the controller's foot print and overall volume to make high-density layouts easy to achieve.

Explosion-proof teach pendant

The explosion-proof color LCD with its large touch panel allows users to teach, edit, and monitor information such as current position and I/O signals in the explosion-proof area. The interface panel can be customized to meet user preferences, while the backlit screen is easy to read in dark locations.

User-friendly operation system

The operating system has now fully matured into a more user-friendly design. The operator can switch on the motors and activate the cycle start all from the teach pendant, providing more convenient system control. Two information screens can be displayed simultaneously to provide access to different types of information (for example, positional and signal information).

Painting unit control functions (option)

By controlling the CCV, the electro-pneumatic regulator, and the rotation of the discharge control gear pump from the robot controller's CPU board, this low cost, flexible system is compatible with a range of painting devices. You can also set up painting conditions and conduct discharge rate calibration on the teach pendant screen.

Using the latest technologies

The enhanced CPU capacity has resulted in more accurate trajectory control, faster program execution, and quicker saving and loading of files, as well as other advantages. In addition the memory has been expanded to provide greater program storage capacity, while a USB port is also provided as standard for connecting external storage devices.

Easier maintenance

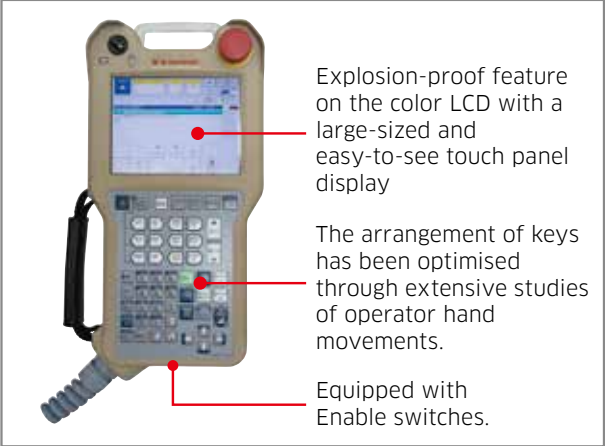
With modular components and fewer cables, Kawasaki has developed a controller that is compact, and easy to maintain. A host of maintenance functions are available, including the DIAG function for self-diagnostics, a maintenance support function that can handle not only hardware errors but also application errors, a Web server that allows remote diagnostics, and more.

Highly expandable

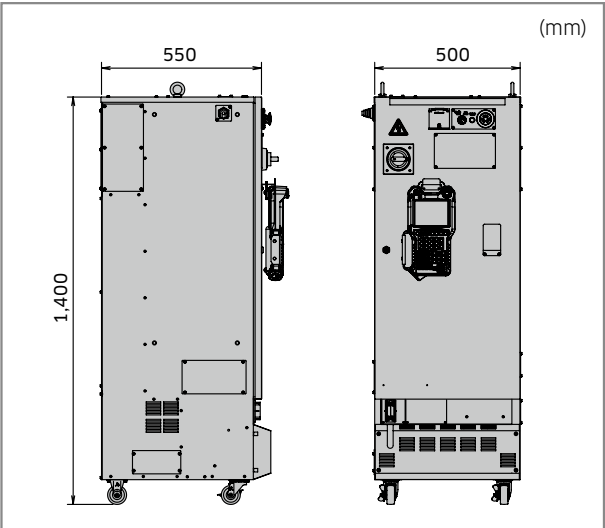
By installing an additional amplifier, and adding workpiece transfer devices (tombow, shuttle, turntable, etc.), travel unit and gear pump, etc., the system can accept up to three external axes. The system is compatible with a large number of field buses for controlling peripheral devices. Combination with software sequencer function (KLogic), which can be edited on the teach pendant, allows easy structuring of a highly sophisticated system.



Explosion-proof teach pendant



External view & dimensions

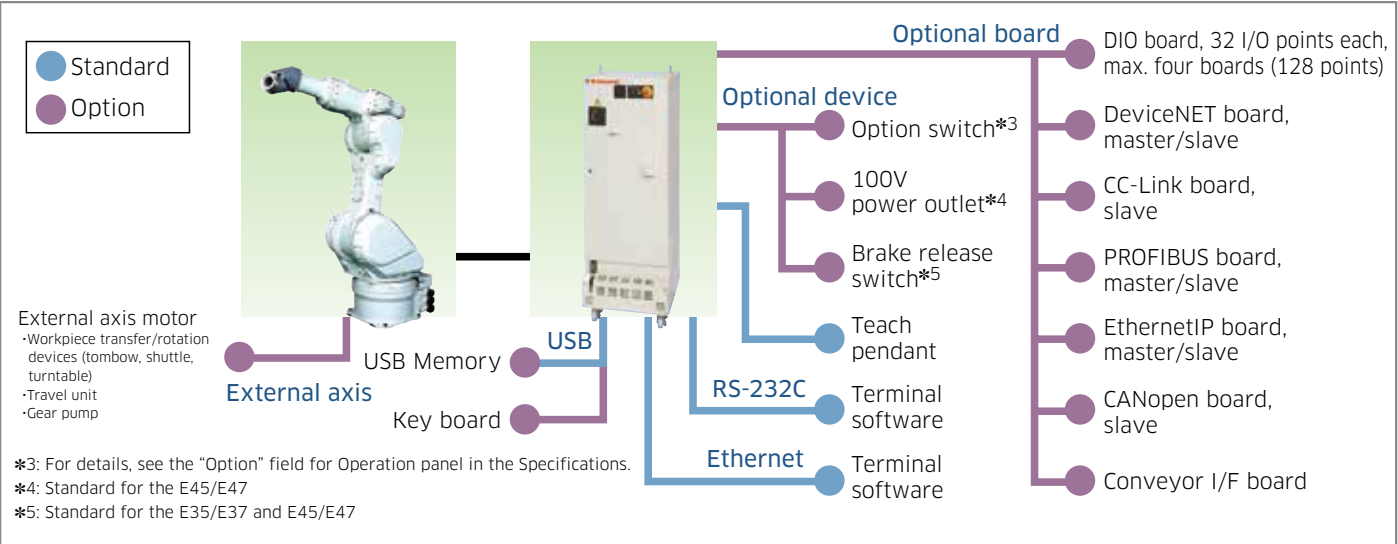


Specifications

		Standard		Option
America		E35	E37	
Europe		E45	E47	
Japan & Asia		E25	E27	
Dimensions (mm)		W500×D550×H1,400		-
Construction		Enclosed structure/Indirect cooling system		-
Controlled axes		6		Max. 9
Memory capacity (MB)		8		-
I/O signals	External operation	Motor power Off, Hold		-
	Input (Channels)	32		Max. 128
	Output (Channels)	32		Max. 128
Cable length	Robot-controller (m)	3 inside the booth, 3 outside the booth		Extendable up to 40
	Teach pendant (m)	10		Extendable up to 30
Mass (kg)		120 (E25/E27), 170 (E35/E37, E45/E47)		-
Power requirements	E35/E37	AC440-480V±10%, 60 Hz, 3ø 7.3 kVA (E35)/5.1 kVA (E37) *1 Protective ground, leakage current: 10 mA at maximum		-
	E45/E47	AC380-415V±10%, 50/60 Hz, 3ø 7.3 kVA (E45)/5.1 kVA (E47) *1 Protective ground, leakage current: 10 mA at maximum		-
	E25/E27	AC200-220V±10%, 50/60 Hz, 3ø 10 kVA (E25)/5.6 kVA (E27) *1 Class-D ground (standard for robots), leakage current: 100 mA at maximum Class-A ground (for intrinsic explosion-proof safety circuits)		-
Installation environment	Ambient temperature (°C)	0 - 45		-
	Relative humidity (%)	35 - 85 (No dew, nor frost allowed)		-
Teach pendant		TFT color LCD display with touch-panel, E-Stop switch, teach lock switch, Enable switch		-
Operation panel		E-stop switch, teach/repeat switch *2, control power light (Cycle start, motor-on, hold/run, and error rest are activated from the teach pendant.)		Cycle start switch, Motor on switch, Hold/Run switch, Error lamp, Error reset switch.
External memory		-		USB Memory
External interface		USB, Ethernet (100BASE-TX), RS232C		-

*1: Power requirements ensure maximum operation of a robot, not those required for normal operations.
*2: The E45/E47 comes with three switches to change between teach/teach 100%/repeat, as standard equipment.

System configuration diagram

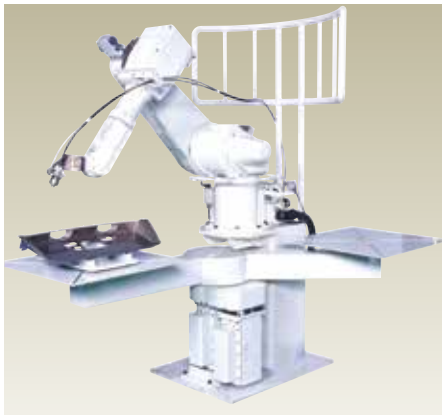


Our robot is available in a “package cell” allowing production to commence almost instantly.

If you need to get your painting system operational quickly, Kawasaki painting package cells are available. These package cells arrive as a compact, ready-to-use units that can be easily installed in a limited space, allowing you to begin the painting process immediately.



Servo shuttle + KF193



Servo twister + KF121

Peripheral Equipment

High quality, efficient spray painting can be achieved by combining high performance workpiece transfer and rotation devices, paint spray control systems of advanced technology and highly developed paint spray robots and atomizers. Kawasaki’s various types of peripheral equipment provide ideal paint spray facilities.

Package Cells

To meet customer needs, we offer packaged cells that come in various sizes and configurations, these cells are named, servo twister, servo tombow, servo shuttle, servo spinner, servo turntable and servo wing.

Painting unit control panel (air panel)

The painting unit control panel allows control of the changes to the discharge rate, atomizing air and air patterns to meet complex work applications. Functions such as automatic color change and automatic washing for each specified cycle could be incorporated to suit the customers needs.

Robot travel unit

Robot travel unit synchronizes with robot motion by additional servo drives, thus allowing the painting process to take place on a moving component. Robot travel units can be used during the painting of automobiles, construction machinery, and septic tanks.

“KOSMOS” line control software

In painting processes where two or more robots are in operation, the KOSMOS line control panel provides real time status information and access to production management information.

Line monitoring function

The LCD screen lets you observe the status of the entire system such as work-piece type, color, coating robot and peripheral unit operation, painting conditions, system errors etc.

Data setting function

The graphical interface of the touch panel allows the setting and changing of the coating requirements and coating unit control panel.

- Paint flow rate, atomizing air pressure, pattern air pressure and the other painting requirement settings.
- Time chart setting for color change, gun cleaning etc.
- Program number setting for each work-piece type and color.
- CCV number setting for each color

Statistical functions

Available data for production management include, production statistics, error statistics, paint consumption, etc.



Painting unit control panel



Line control panel

Package cell

Small sized painting applications

Servo Tombow

Space saving and easy-to-install

1. Smooth movement

Servo motion control provides smooth movement to eliminate work slippage.

2. Higher painting quality

For small cubical boxes (electronic appliances such as TV cabinets, etc.), the spray gun can be oriented to each surface at a right angle. The distance between the gun and the surface can also be adjusted simply by entering a value. These features enable easy operation and enhance the painting quality.

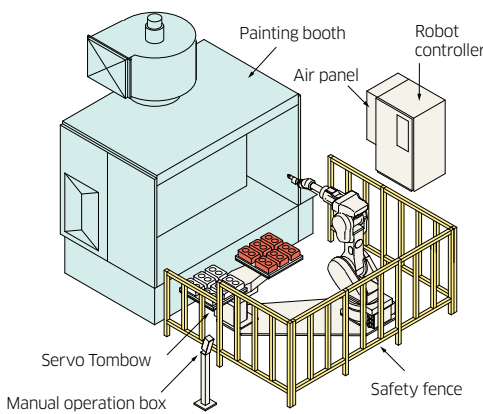
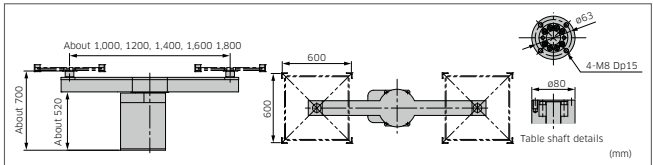
3. Synchronous operation with the robot

The Servo Tombow’s table rotation is synchronized with the robot movements, assuring a uniform paint finish for cylindrical shaped components such as hot plates, wooden trays, automobile hubs etc. The Tombow table offers 360 degrees of rotation.

4. Preventing paint mist accumulation

To reduce the problem of paint mist accumulation, workpieces can be positioned above a water tank when spraying.

External View and Dimensions



Specifications

	Standard	Heavy load carrying
Table load	20 kg x 2 Table	40 kg x 2 Table
No. of control axes	Robot 6+Servo tombow 2	
Control method	Servo control	
Teaching playback method	PTP teaching+CP control	
Position detection method	Absolute encoder	
Arm	Diameter (mm)	1,000, 1,200, 1,400, 1,600, 1,800
	Operation angle (°)	180
	Indexing time (sec)	2.0/180°
Table	Operation angle	Infinite revolution
	Indexing angle (°)	90-deg and arbitrary angle
	Indexing time (sec)	0.8/90°
Table	Uninterrupted rotary speed (rpm)	Max. 90
	Rotary direction	Normal/reverse rotation
Explosion protection	Air pressurized explosion protection and intrinsically safe. Explosion-proof composite type (Exib II BT4 / Exib II BT4)	
Mass (kg)	Approx. 140 - 160	
Color	Munsell 10GY9/1 equivalent	

Note : The standard arm lengths are 1,000 mm, 1,200 mm, 1,400 mm, 1,600 mm and 1,800 mm.
The work loading table and loading fixtures to be prepared by the purchaser.

Small sized painting applications

Servo Tombow - R

Enhanced space efficiency

1. Space efficient

The paint robot is installed at the center of the Servo Tombow painting system, thereby achieving greater space efficiency.

2. Adaptability to different painting conditions

The tables and arm can be positioned and speed-controlled with a high level of precision. The tables can also be continuously rotated and fixed at any desired angle, making it possible to select the best painting method for the workpiece.

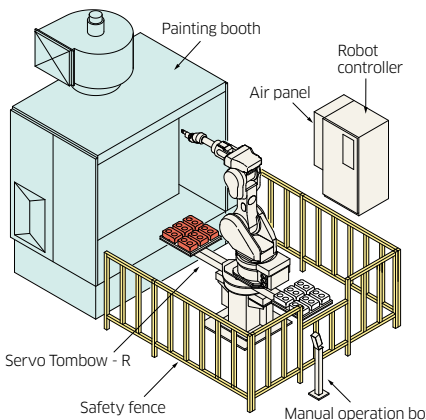
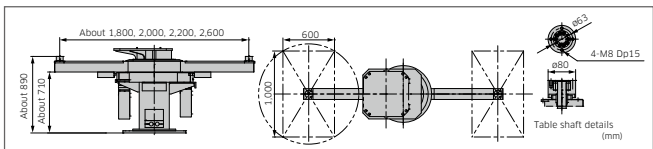
3. Enhanced paint quality

There are few obstacles surrounding the tables, allowing the paint robot to freely change its posture. The lack of obstacles also means that the airflow inside the booth does not become too turbulent. These advantages lead to an improved level of paint quality.

4. Ideal for automated transportation equipment

This system attaches and removes workpieces behind the paint robot. As a result, this system can be easily combined with automated transportation equipment that uses conveyors or delivery robots.

External View and Dimensions



Specifications

	Standard	Heavy load carrying
Table load	20 kg x 2 Table	40 kg x 2 Table
No. of control axes	Robot 6+Servo tombow 2	
Control method	Servo control	
Teaching playback method	PTP teaching+CP control	
Position detection method	Absolute encoder	
Arm	Diameter (mm)	1,800, 2,000, 2,200, 2,600
	Operation angle (°)	180
	Indexing time (sec)	4/180°
Table	Operation angle	Infinite revolution
	Indexing angle (°)	90-deg and arbitrary angle
	Indexing time (sec)	1.0/90°
Table	Uninterrupted rotary speed (rpm)	Max. 120
	Rotary direction	Normal/reverse rotation
Explosion protection	Air pressurized explosion protection and intrinsically safe. Explosion-proof composite type (Exib II BT4 / Exib II BT4)	
Mass (kg)	Approx. 550-690 (excluding the manipulator base)	
Color	Munsell 10GY9/1 equivalent	

Note : A set of work loading tables and loading fixtures are necessary.
Install the Manipulator KF121 onto a tombow-R with an arm length of 1,800 mm or 2,000 mm.
Install the Manipulator KF192/193/194 onto a tombow-R with an arm length of 2,200 mm or 2,600 mm.

Medium sized work-piece painting cell

Servo Wing

The installation space for “Table Painting” was made even smaller.

1. Space Saving

While suitable for workpieces of a larger size than in the Servo Shuttle, the installation space is made smaller. Because the left and right workpieces are closer together, loading and unloading work is reduced.

2. Even Small-sized Robots Cope with Large Work-pieces.

Because there is one painting position, the distance between the workpiece and the robot becomes closer, making the robot possibly smaller than that in Servo Shuttle.

3. Less teaching work

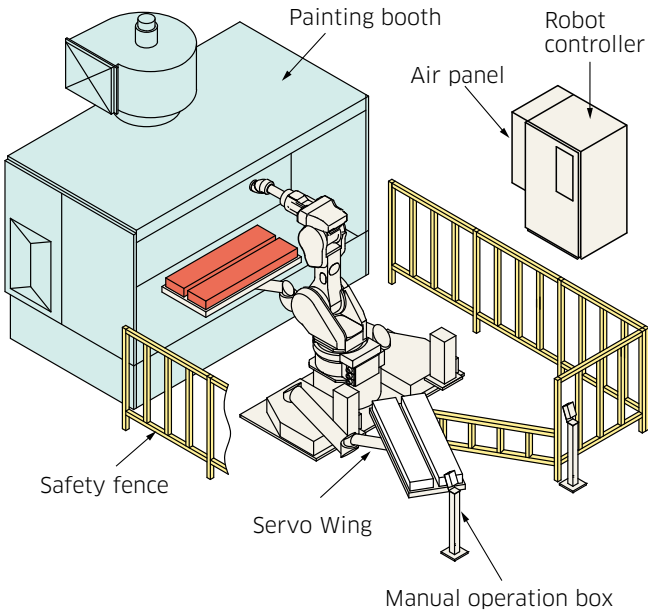
Because the left and right arms can be set for the same painting positions (one position), a single program can be used, thus making the teaching time shorter.

4. Preventing paint mist accumulation

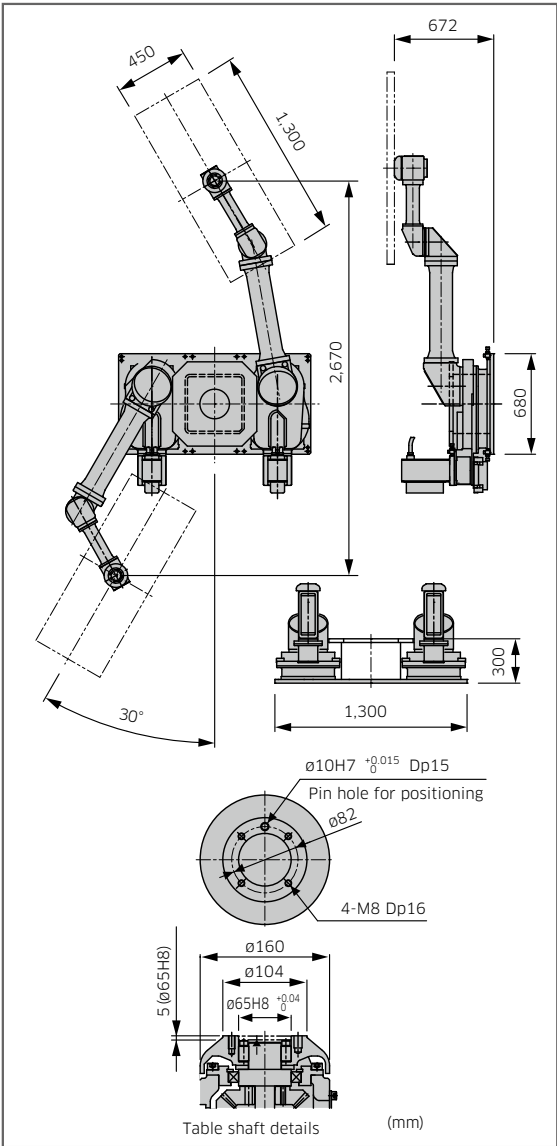
Because the arms are slim with no fixed rails, painting can be conducted above the water, reducing soiling of the booth. In addition, the airflow turbulence inside the paint booth can be minimized.

5. Short Construction Period

This device is delivered pre-assembled. So, it can be installed in as little as one day and you can start production immediately.



External View and Dimensions



Specifications

		Standard
Table load	30 kg x 2 Table	
No. of control axes	Robot 6+Servo wing 2	
Control method	Servo control	
Teaching playback method	PTP teaching + CP control	
Position detection method	Absolute encoder	
Arm	Stroke (mm)	2,670
	Indexing time (sec)	3.2
Table	Operation angle	Infinite revolution
	Indexing angle (°)	90-deg and arbitrary angle
	Indexing time (sec)	1.2/90°
	Uninterrupted rotary speed (rpm)	Max. 90
Rotary direction		Normal/reverse rotation
Intermediate stop function	The intermediate stop function and multiple coating control function are available.	
Explosion protection	Air pressurized explosion protection and intrinsically safe. Explosion-proof composite type (Expib II BT4 / Exib II BT4)	
Mass (kg)	970	
Color	Munsell 10GY9/1 equivalent	

Note: The arm index time indicates the time of arm movement from the intermediate stop position to the painting position.
The arm index time varies depending on the intermediate stop position.

Medium sized work-piece painting cell

Servo Spinner

A new dimension in “line coating”

1. Flexible component placement

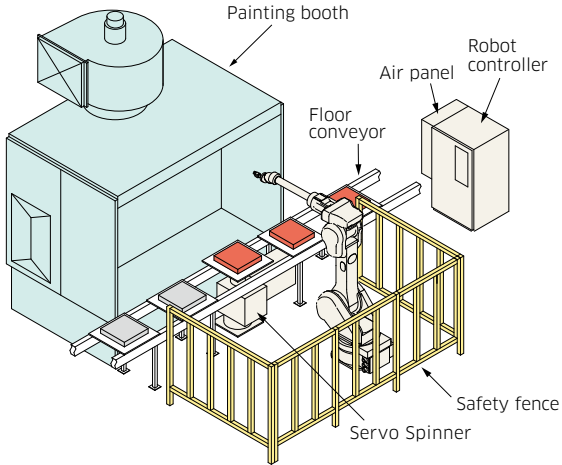
Choose the optimum painting posture for the workpiece, and reduce contamination of the paint booth.

2. Uninterrupted painting

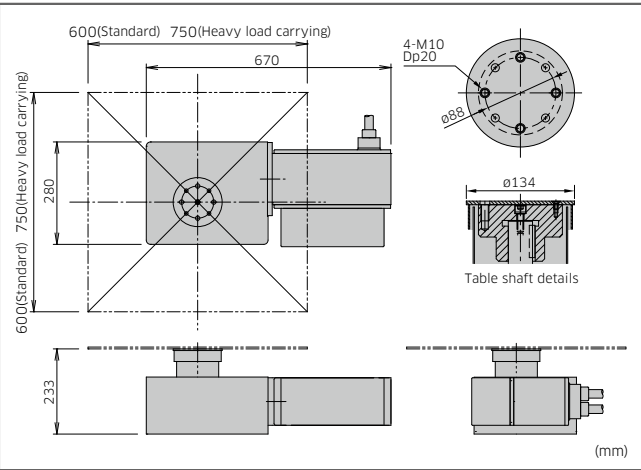
Painting can be performed with the table rotating, thus minimizing the robot's wait time.

Specifications

		Standard	Heavy load carrying
Table load (kg)		20	60
No. of control axes		Robot 6+Servo Spinner 1	
Control method		Servo control	
Teaching playback method		PTP teaching+CP control	
Position detection method		Absolute encoder	
Table	Operation angle	Infinite revolution	
	Indexing angle (°)	90-deg and arbitrary angle	
	Indexing time (sec)	0.8/90°	1.1/90°
	Uninterrupted rotary speed (rpm)	Max. 90	Max. 45
	Rotary direction	Normal/reverse rotation	
Explosion protection		Air pressurized explosion protection and intrinsically safe. Explosion-proof composite type (Expib II BT4 / Exib II BT4)	
Mass (kg)		60	
Color		Munsell 10GY9/1 equivalent	



External View and Dimensions



Large sized work-piece painting cell

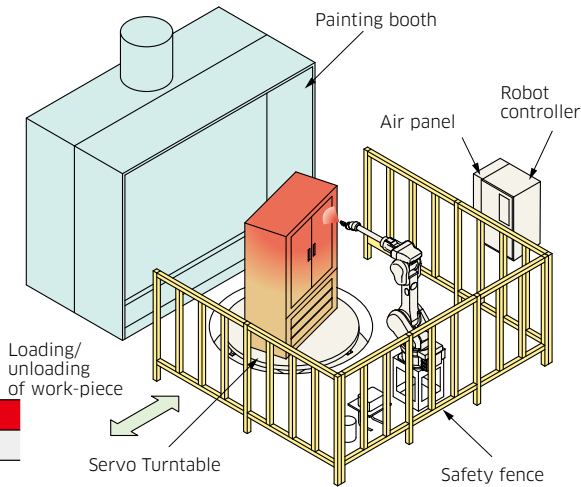
Servo Turntable

Complete surface painting is possible with uninterrupted turntable rotation

1. The integrated control of the robot and table allows any painting position to be achieved according to the work shape.
2. The system can be applied to various types of painting such as synchronous control, arbitrary-angle indexing, paint spraying with continuous rotation of the table.

Specifications

		Standard	Heavy load carrying
Table load (kg)		Max. 500	Max. 1,000
No. of control axes		Robot 6+Servo Turntable 1	
Control method		Servo control	
Teaching playback method		PTP teaching+CP control	
Position detection method		Absolute encoder	
Table	Operation angle	Infinite revolution	
	Indexing angle (°)	90-deg and arbitrary angle	
	Indexing time (sec)	2.5/90°	5/90°
	Uninterrupted rotary speed (rpm)	Max. 10	Max. 5
	Rotary direction	Normal/reverse rotation	
Explosion protection		Air pressurized explosion protection and intrinsically safe. Explosion-proof composite type (Expib II BT4 / Exib II BT4)	
Mass (kg)		180 (without table jig)	
Table diameter (mm)		up to ø2,000	
Color		Munsell 10GY9/1 equivalent	
Foot switch function (Option)		Uninterrupted normal rotation, rotation stop	Uninterrupted rotation, 45-deg., 90-deg., 180-deg., indexing (changeable indexing angle), rotation stop



External View and Dimensions

