$R_{db1} = 0.9V_d^2/P_b = 9.05$ ohms

This calculation is the result of **Step 3** and determines the maximum ohmic value of the Dynamic Brake Resistor. Note that a choice of $V_d = 750$ Volts DC was made based on the premise that the drive is rated at 460 Volts.

The most cost-effective combination of Dynamic Brake Modules chosen in **Step 4** is one 1336-MOD-KB050 and one 1336-MOD-KB010 operated in parallel. This results in an equivalent Dynamic Brake Resistance of 8.76 ohms.

By comparison, a KB050 paralleled with a KB005 results in an equivalent Dynamic Brake Resistance of 9.57 ohms, which is greater than the maximum allowable value of 9.05 ohms. If two KB050 Dynamic Brake Modules are paralleled, the equivalent resistance would be 5.25 ohms, which will satisfy the resistance criteria set by **Step 3**, but is not cost effective.

$$P_{av} = \frac{(t_3 - t_2)}{t_4} \times \frac{P_b}{2}\left(\frac{\omega_b + \omega_o}{\omega_b}\right) = 2.8 \text{ kW}$$

This is the result of calculating the average power dissipation as outlined in **Step 5**. Verify that the sum of the power ratings of the Dynamic Brake Resistors chosen in **Step 4** is greater than the value calculated in **Step 5**.

$AL = 100 \times P_{av}/P_{db} = 32\%$

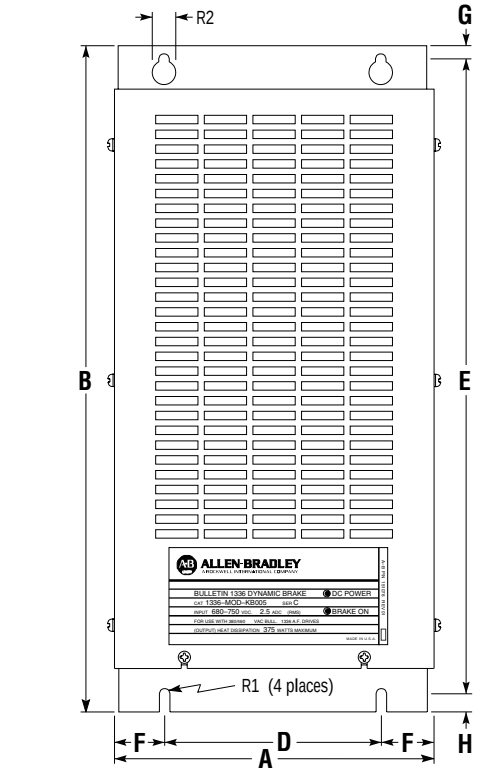
This is the result of the calculation outlined in **Step 6** and is less than 100%.

Draw AL as a dotted line on Figure 4.

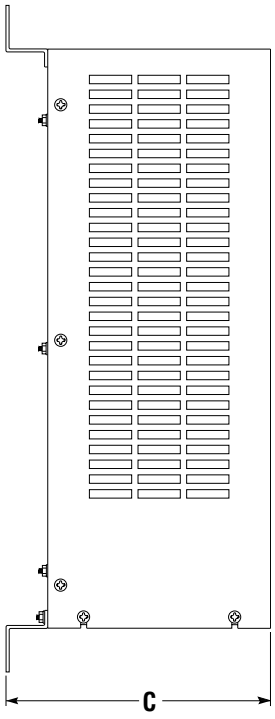
$PL = 100 \times P_b/P_{db} = 617\%$

This is the result of the calculation outlined in **Step 7** and should always be greater than 100%.

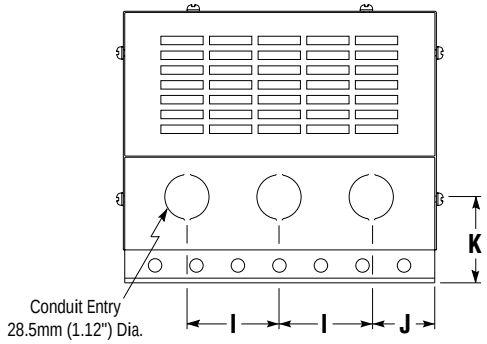
KA005-KA010, KB005-KB010 and KC005-KC010 Dimensions, Weights and Conduit Entry Locations



(Front)



(Side)



(Bottom)

Dimensions and Weights in Millimeters (Inches) and Kilograms (Pounds)

Option Code	A	B	C	D	E	F	G	H	I	J	K	R1 Dia.	R2 Dia.	Weight
KA005-KA010 KB005-KB010 KC005-KC010	193.5 (7.62)	441.4 (17.38)	174.5 (6.87)	133.4 (5.25)	425.4 (16.75)	30.0 (1.18)	6.4 (0.25)	9.7 (0.38)	50.8 (2.00)	46.0 (1.81)	50.8 (16.75)	7.1 (0.28)	14.3 (0.56)	6.8 (15.00)

Specifications

Braking Torque	100% torque for 20 seconds (typical).
Duty Cycle	20% (typical).
Input Power	DC power supplied from DC Bus. Customer supplied 115V AC, 1∅, 50/60 Hz required for KB050 & KC050 brake operation. Enable Signal: 50 mA Fan Power: 600 mA
Optional Brake Fault Contact	(1) N.O. contact, TTL compatible, closed when 115V AC is applied, open when a brake fault or loss of power occurs. Customer supplied 115V AC, 50 mA required for KA005, KB005, KC005, KA010, KB010 & KC010 optional brake fault contact monitoring. UL/CSA Rating: 0.6 Amps, 125VAC. 0.6 Amps, 110VAC. 2.0 Amps, 30VAC. Initial Contact Resistance: 50mΩ maximum.
Temperature	-10°C to 50°C (14°F to 122°F).
Humidity	5% to 95% non-condensing.
Atmosphere	NEMA Type 1 — Cannot be used in atmospheres having corrosive or hazardous dust, vapor or gas.
Altitude Derating	1,000 meters (3,300 feet) maximum without derating.
Enclosure Type	KA005, KB005, KC005 — IP20 (NEMA Type 1) KA010, KB010, KC010 — IP20 (NEMA Type 1) KB050, KC050 — IP00 (Open)

Installation Requirements

ATTENTION: Electric Shock can cause injury or death. Remove all power before working on this product.

For all Dynamic Brake ratings, DC brake power is supplied from the drive DC Bus. In addition:

1. Dynamic Brakes KB050 and KC050 have fans and an enable circuit that requires a 115V AC user power supply.
2. Optional brake fault contact monitoring also requires a 115V AC user power supply. For KB050 and KC050 brakes, the same AC power supply may be used.

Hazards of electrical shock exist if accidental contact is made with parts carrying bus voltage. A bus charged indicator on the brake enclosures provides visual indication that bus voltage is present. Before proceeding with any installation or troubleshooting activity, allow at least one minute after input power has been removed for the bus circuit to discharge. Bus voltage should be verified by using a voltmeter to measure the voltage between the +DC and -DC terminals on the drive power terminal block. Do not attempt any servicing until bus charged indicating lights have extinguished and bus voltage has diminished to zero volts.

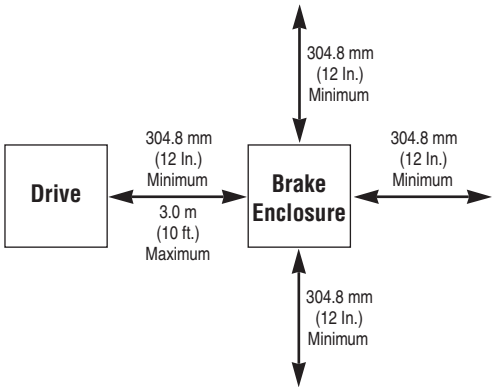
Mounting Requirements

Dynamic brake enclosures must only be installed in the vertical position. Select a location using the guidelines below and information provided in the Recommended Brake Configurations section.

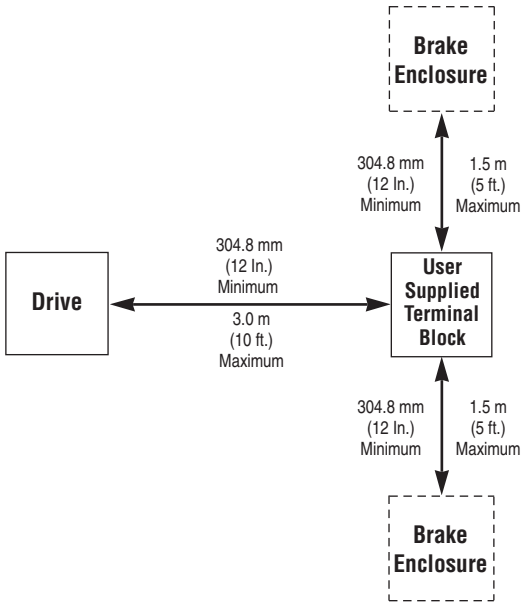
- Each dynamic brake enclosure must be mounted outside of any other enclosure or cabinet and exposed to unrestricted circulating air for proper heat dissipation. Allow a minimum of 304.8 mm (12 in.) between brake enclosures and all other enclosure or cabinets including the drive.
- Each enclosure must be mounted in an area where the environment does not exceed the values listed in the specification section of this publication.
- If only one dynamic brake enclosure is required, the enclosure must be mounted within 3.0 m (10 ft.) of the drive.
- If more than one KB050 or KC050 brake enclosure is required, a separate user supplied terminal block must be mounted within 3.0 m (10 ft.) of the drive. Allow a maximum distance of 1.5 m (5 ft.) between each brake enclosure and the terminal block.
- If more than one KA005-KA010, KB005-KB010 or KC005-KC010 brake enclosure is required, the first enclosure must be mounted within 3.0 m (10 ft.) of the drive. Allow a maximum distance of 1.5 m (5 ft.) between each remaining brake enclosure.
- Separate conduit must be provided for the control connections between multiple brake enclosures.
- Separate conduit must be provided for the DC power connections between brake enclosures, the terminal block (if required) and the drive. For AC power connection and conduit requirements, refer to your 1336, 1336VT, 1336 PLUS II, or 1336 FORCE User Manual.

IMPORTANT: The National Electrical Codes (NEC) and local regulations govern the installation and wiring of the Heavy Duty Dynamic Brake. DC power wiring, AC power wiring, control wiring and conduit must be sized and installed in accordance with these codes and the information supplied on the following pages.

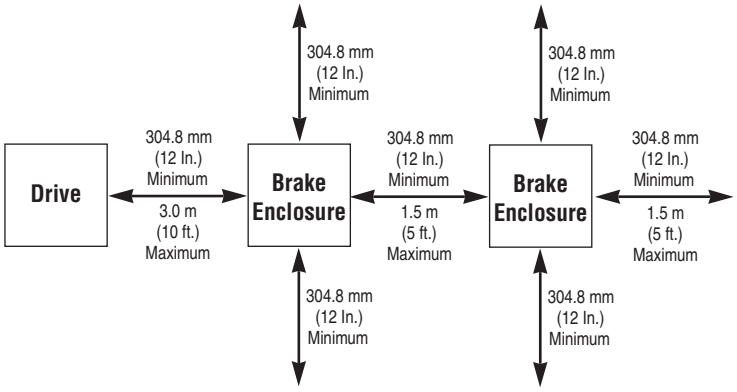
Recommended Brake Configurations



Single Brake Enclosure



KA050, KB050 and KC050
Multiple Brake Enclosures



KA005-KA010, KB005-KB010 and KC005-KC010
Multiple Brake Enclosures

Brake Fault Contact Monitoring

For all brake ratings a fault contact has been provided to provide a remote output signal to an Allen-Bradley 1336-MOD-L3, L6 or PLC. Should a brake fuse fail, the brake thermostat trip (or for KB050 & KC050 units the brake enable signal be lost), the brake fault contact will open. Interconnection wiring for remote brake monitoring is provided in the **Wiring Schemes**.

Brake Fuses

All dynamic brakes are internally fused to protect brake components. When replacing brake fuses, use only the type and size specified below.

Dynamic Brake	Fuse	Type	Rating
KA005	F1	A50P10 or Equivalent	10A, 500V
KB005	F1	A60Q or Equivalent	5A, 600V
KC005	F1	FWP-5 or Equivalent	5A, 700V
KA010	F1	A50P20 or Equivalent	20A, 500V
KB010	F1	A60Q or Equivalent	10A, 600V
KC010	F1	FWP-10 or Equivalent	10A, 700V
KB050	F1 & F2	A70QS35 or Equivalent	35A, 700V
KC050	F1 & F2	A70QS35 or Equivalent	35A, 700V

Brake Module Jumper Settings

For the **Recommended Brake Configurations** shown on the previous page as well as the interconnection diagrams shown on the following pages, there can be only one master brake to control dynamic braking. When multiple brakes are used, only one brake can serve as the master brake to control the remaining slave brakes.

KA005-KA010
KB005-KB010
KC005-KC010

Slave/Master Jumper Set to Master

KB050
KC050

Master Brake Module Jumper Settings

For the master brake, leave slave/master jumper W1 factory set to master — Between jumper positions 2 & 3.

KA005-KA010
KB005-KB010
KC005-KC010

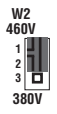
Slave/Master Jumper Set to Slave

KB050
KC050

Slave Brake Module Jumper Settings

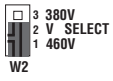
In each slave enclosure, reset jumper W1 to slave — Between jumper positions 1 & 2

KB005-KB010



Input Voltage Jumper Set to 460V

KB050

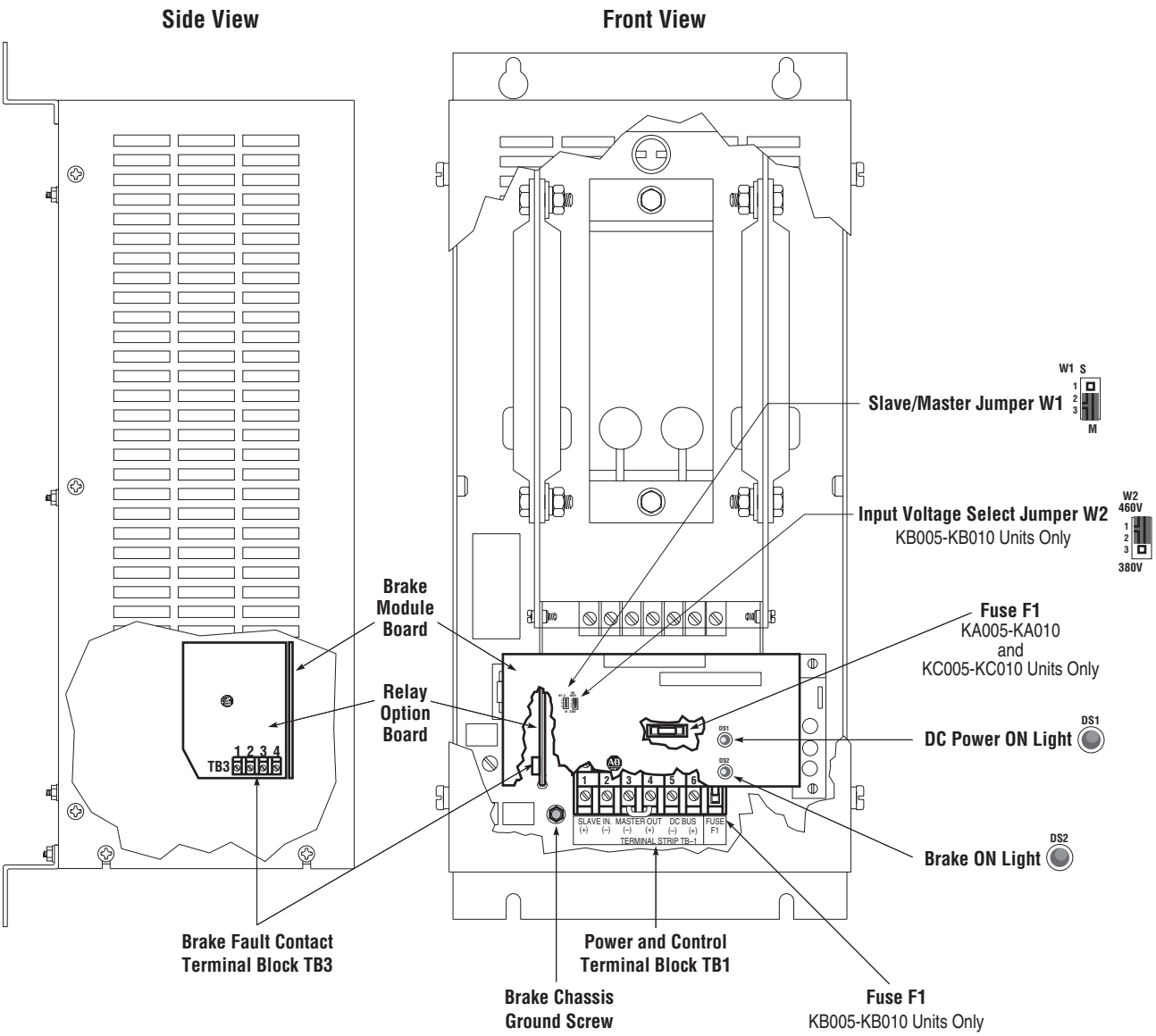


Input Voltage Jumper Settings

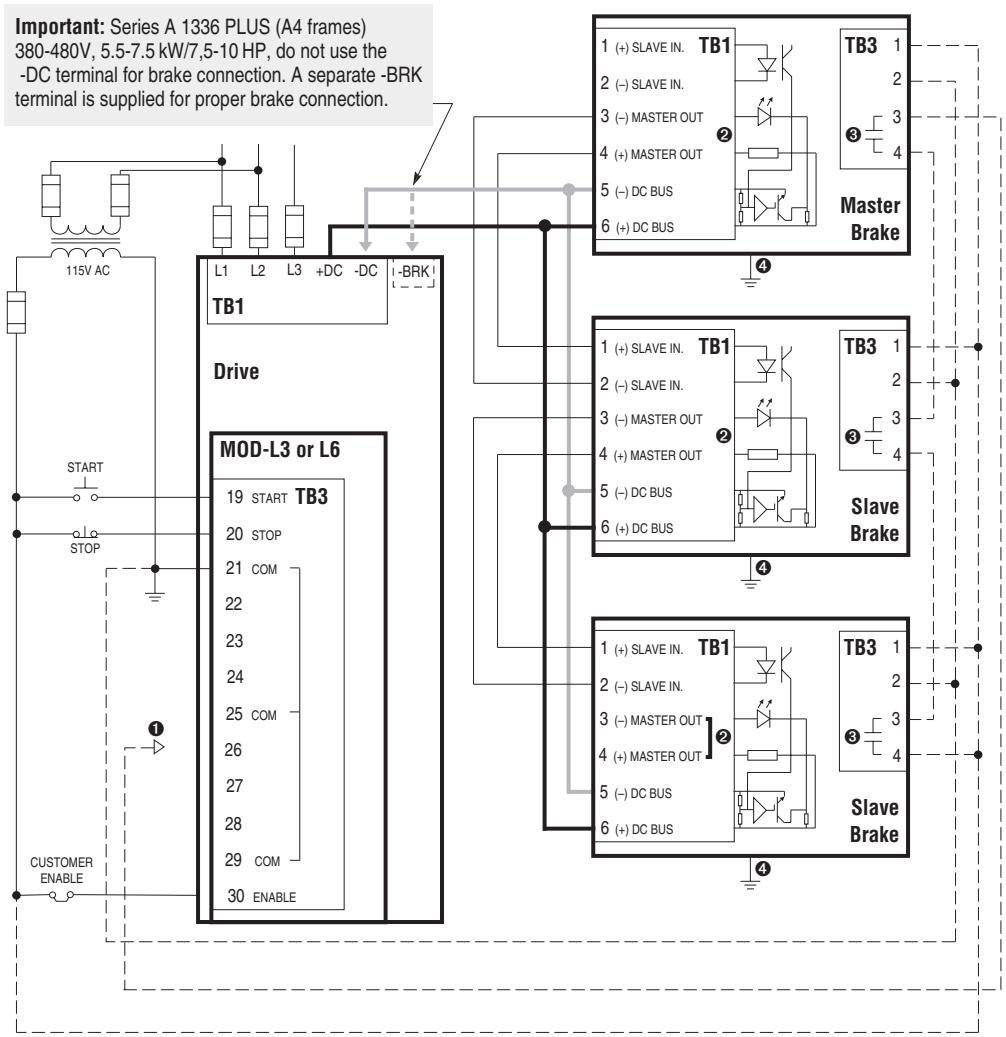
For KB brakes, remember to set jumper W2 in all enclosures to correspond to the nominal drive input voltage. Setting the jumper between positions 1 & 2 will select an input voltage of 415/460 volts. Setting the jumper between positions 2 & 3 will select an input voltage of 380 volts.

KA and KC brakes do not have input voltage jumpers.

KA005-KA010, KB005-KB010 and KC005-KC010 Terminal Block, Fuse and Jumper Locations



KA005-KA010, KB005-KB010 and KC005-KC010 Wiring Scheme



Brake Power Wiring

Brake Power Wiring

All DC Brake Power Wiring must be twisted pair and run in conduit separate from Control Wiring.
Minimum required DC Brake Power Wiring sizes are listed in **tables 1b**, **2b** and **3b**.

Control Wiring

All Control Wiring must be twisted pair and run in conduit separate from DC Brake Power Wiring.
Interconnection Control Wiring between the brake terminals must be twisted pair, 1 mm^2 (18 AWG) minimum.

Optional Brake Fault Contact Wiring

A separate 115V AC power supply is required if the brake fault contacts are to be monitored.
Refer to your 1336, 1336VT, 1336 PLUS, or 1336 FORCE User Manual for wire selection and installation details.

❶ Connect to AUX at TB3 — Terminal 24 for L6 Option — Terminal 28 for L3 Option.

❷ The MASTER OUT terminals are factory jumpered and must remain jumpered for single brake applications.
For multiple brake applications, remove the jumpers in all but the last enclosure.

❸ Contact is shown in a de-energized state. Contact is closed when 115V AC power is applied to TB3 and pilot relay is energized.
Loss of power or a brake malfunction will open contact.

❹ Connect the brake frame to earth ground. Refer to the connected drive's User Manual for grounding instructions.

DC Power Wiring Tables

Required Minimum DC Power Wiring Sizes in mm^2 and (AWG)

Table 1b — DC Brake Power Wiring for 200-240V AC Drives

for drive rating	with	Drive – Auxiliary Term Block wire size	Drive – Master or Auxiliary Term Block - Master wire size	Master – Slave wire size	Slave – Slave wire size
AQF05-AQF50	(1) KA005	—	6 (10)	—	—
A007-A010	(1) KA010	—	6 (10)	—	—
A015	(1) KA005 + (1) KA010	—	6 (10)	6 (10)	—
A020	(2) KA010	—	6 (10)	6 (10)	—

Table 2b — DC Brake Power Wiring for 380-480V AC Drives

for drive rating	with	Drive – Auxiliary Term Block wire size	Drive – Master or Auxiliary Term Block - Master wire size	Master – Slave wire size	Slave – Slave wire size
BRF05-BRF50 B003-B005	(1) KB005	—	4 (12)	—	—
B007-B010	(1) KB010	—	4 (12)	—	—
B015	(1) KB005 + (1) KB010	—	4 (12)	4 (12)	—
B020	(2) KB010	—	4 (12)	4 (12)	—
BX040 BX060 B040-B060	(1) KB050	—	6 (10)	—	—
B075-B100	(2) KB050	16 (6)	6 (10)	—	—

Table 3b — DC Brake Power Wiring for 500-600V AC Drives

for drive rating	with	Drive – Auxiliary Term Block wire size	Drive – Master or Auxiliary Term Block - Master wire size	Master – Slave wire size	Slave – Slave wire size
C003-C005	(1) KC005	—	4 (12)	—	—
C007-C010	(1) KC010	—	4 (12)	—	—
C015	(1) KC005 + (1) KC010	—	4 (12)	4 (12)	—
C020	(2) KC010	—	4 (12)	4 (12)	—
C040-C060	(1) KC050	—	6 (10)	—	—
C075-C100	(2) KC050	16 (6)	6 (10)	—	—