



# External EMC Filters User Guide

## Using EMC Filters

Most electronic equipment will generate electrical noise, small unwanted disturbances which may be conducted back onto the mains power supply. All Invertek products are designed to minimise this noise transfer, and offer high levels of Electro Magnetic Compatibility. Where required, additional EMC Filters may be added to further reduce the level of noise transferred back to the mains power supply, reducing the risk of other equipment being affected.

In general, most modern electronic devices have a high level of immunity to electro-magnetic noise, and thereby in many cases additional filters are not required, however where highly sensitive equipment is used, or a reduction in the electrical noise is required, these EMC filters can be fitted in line with the Optidrive to reduce the conducted noise emission.

## Important Safety Information

This option is specifically designed to be used with the Optidrive variable speed drive product range and is intended for professional incorporation into complete equipment or systems. If installed incorrectly it may present a safety hazard. The Optidrive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control mechanical plant that may cause injury. Close attention is required to system design and electrical installation to avoid hazards in either normal operation or in the event of equipment malfunction. Optidrives and the Options should be installed only by qualified electrical persons and in accordance with local and national regulations and codes of practice.

**Electric shock hazard!** Disconnect and **ISOLATE** the Optidrive before attempting any work on it. High voltages are present at the terminals and within the drive for up to 10 minutes after disconnection of the electrical supply.

Where the electrical supply to the drive is through a plug and socket connector, do not disconnect until 10 minutes have elapsed after turning off the supply.

It is the responsibility of the installer to ensure that the equipment or system into which the product is incorporated complies with the EMC legislation of the country of use. Within the European Union, equipment into which this product is incorporated must comply with 2004/108/EC, Electromagnetic Compatibility.

Within the European Union, all machinery in which this product is used must comply with the Directive 98/37/EC, Safety of Machinery. In particular, the equipment should comply with EN60204-1.

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation.

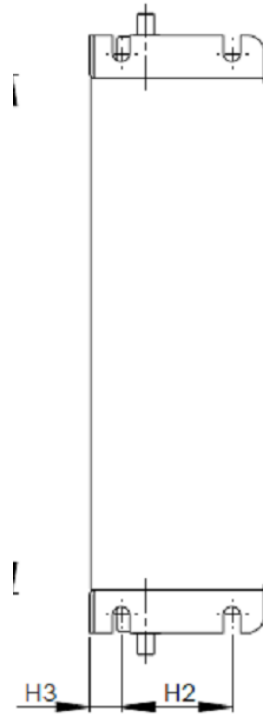
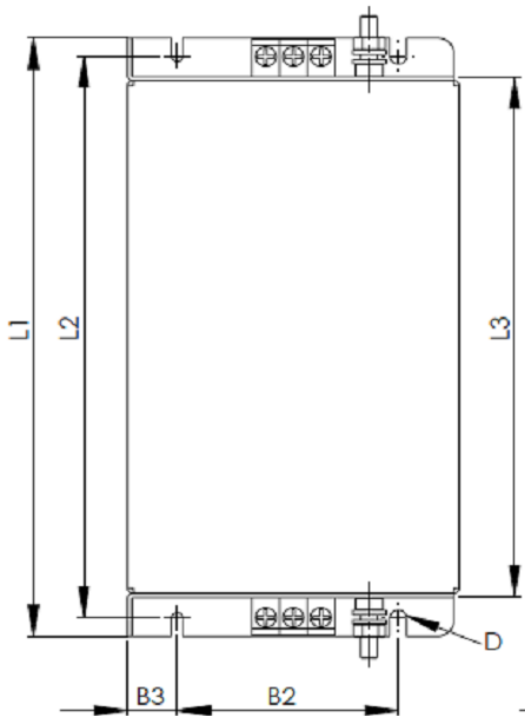
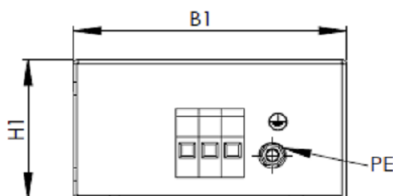
The contents of this User Guide are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous improvement, the manufacturer reserves the right to change the specification of the product or its performance or the contents of the User Guide without notice.

## Dimensions – Panel Mount – Single Phase

| Part Number    | Optidrive Size | PE Connection | L1 (mm) | L2 (mm) | L3 (mm) | B1 (mm) | B2 (mm) | B3 (mm) | H1 (mm) | H2 (mm) | H3 (mm) | D (mm) | Rated Amps | Weight (kg) |
|----------------|----------------|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|------------|-------------|
| OPT-2-E1010-20 | 1              | 2 x M6        | 180     | 166     | 150     | 70      | 45      | 12.5    | 65      | 40      | 12.5    | 6.2    | 10         | 1.5         |
| OPT-2-E1025-20 | 2              | 2 x M6        | 250     | 236     | 220     | 70      | 45      | 12.5    | 65      | 40      | 12.5    | 6.2    | 25         | 2.8         |

## Dimensions – Panel Mount – Three Phase – Frame Sizes 1 - 3

| Part Number    | Optidrive Size | PE Connection | L1 (mm) | L2 (mm) | L3 (mm) | B1 (mm) | B2 (mm) | B3 (mm) | H1 (mm) | H2 (mm) | H3 (mm) | D (mm) | Rated Amps | Weight (kg) |
|----------------|----------------|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|------------|-------------|
| OPT-2-E3006-20 | 1              | 2.5           | 210     | 196     | 180     | 85      | 55      | 15      | 60      | 40      | 10      | 6.2    | 6          | 2.7         |
| OPT-2-E3016-20 | 2              | 2.5           | 230     | 216     | 200     | 120     | 80      | 20      | 65      | 40      | 12.5    | 6.2    | 16         | 2.7         |
| OPT-2-E3025-20 | 3              | 2.5           | 230     | 216     | 200     | 120     | 80      | 20      | 65      | 40      | 12.5    | 6.2    | 25         | 2.7         |

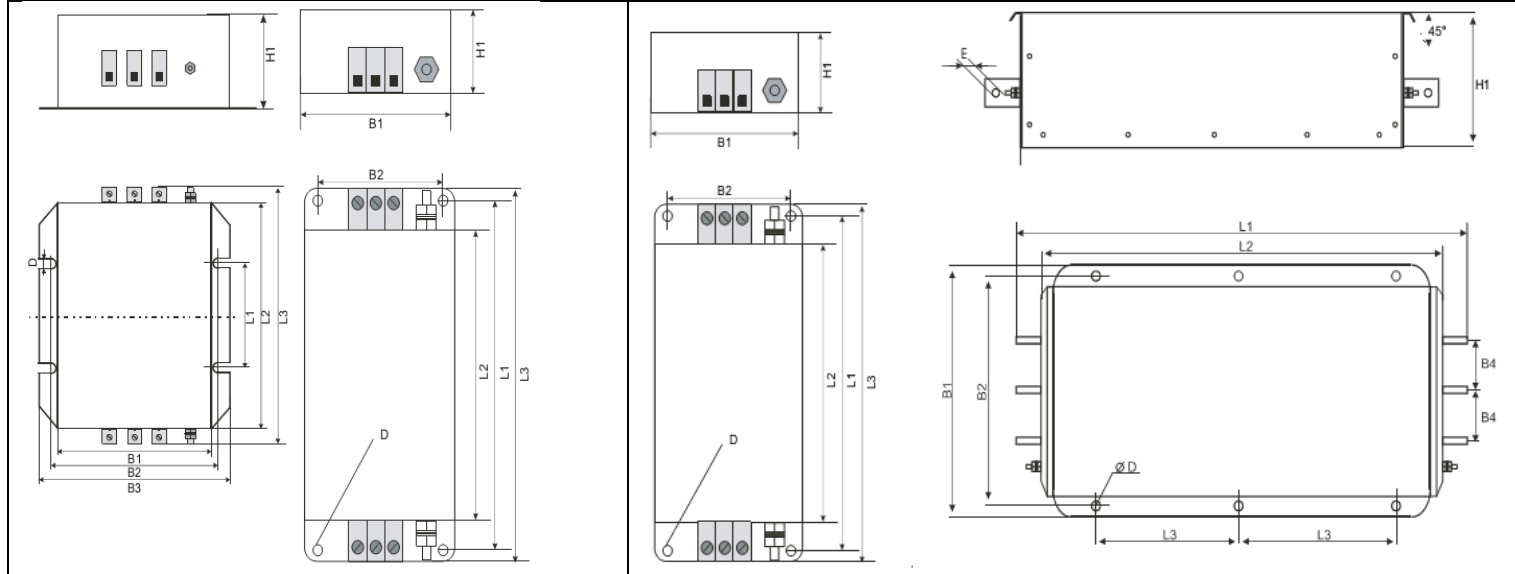


**Dimensions – Panel Mount – Three Phase – Frame Sizes 4 - 7**

| Part Number    | Optidrive Size | PE Connection | L1 (mm) | L2 (mm) | L3 (mm) | B1 (mm) | B2 (mm) | B3 (mm) | H1 (mm) | D (mm) | Rated Amps |
|----------------|----------------|---------------|---------|---------|---------|---------|---------|---------|---------|--------|------------|
| OPT-2-E3050-20 | 4              | 2 x M6        | 115     | 200     | 240     | 120     | 136     | 150     | 65      | 6.5    | 50         |
| OPT-2-E3080-20 | 5              | 2 x M10       | 373     | 350     | 400     | 170     | 130     | -       | 65      | 6.5    | 80         |
| OPT-2-E3180-20 | 6              | 2 x M10       | 470     | 360     | 510     | 180     | 156     | -       | 115     | 9      | 180        |
| OPT-2-E3300-00 | 7              | 2 x M10       | 660     | 530     | 700     | 260     | 220     | -       | 130     | 9      | 300        |
| OPT-2-E3500-00 | 8              | 2 x M12       | 390     | 306     | -       | 260     | 235     | -       | 135     | 11     | 500        |

**Size 4 - 6**

**Size 7 - 8**

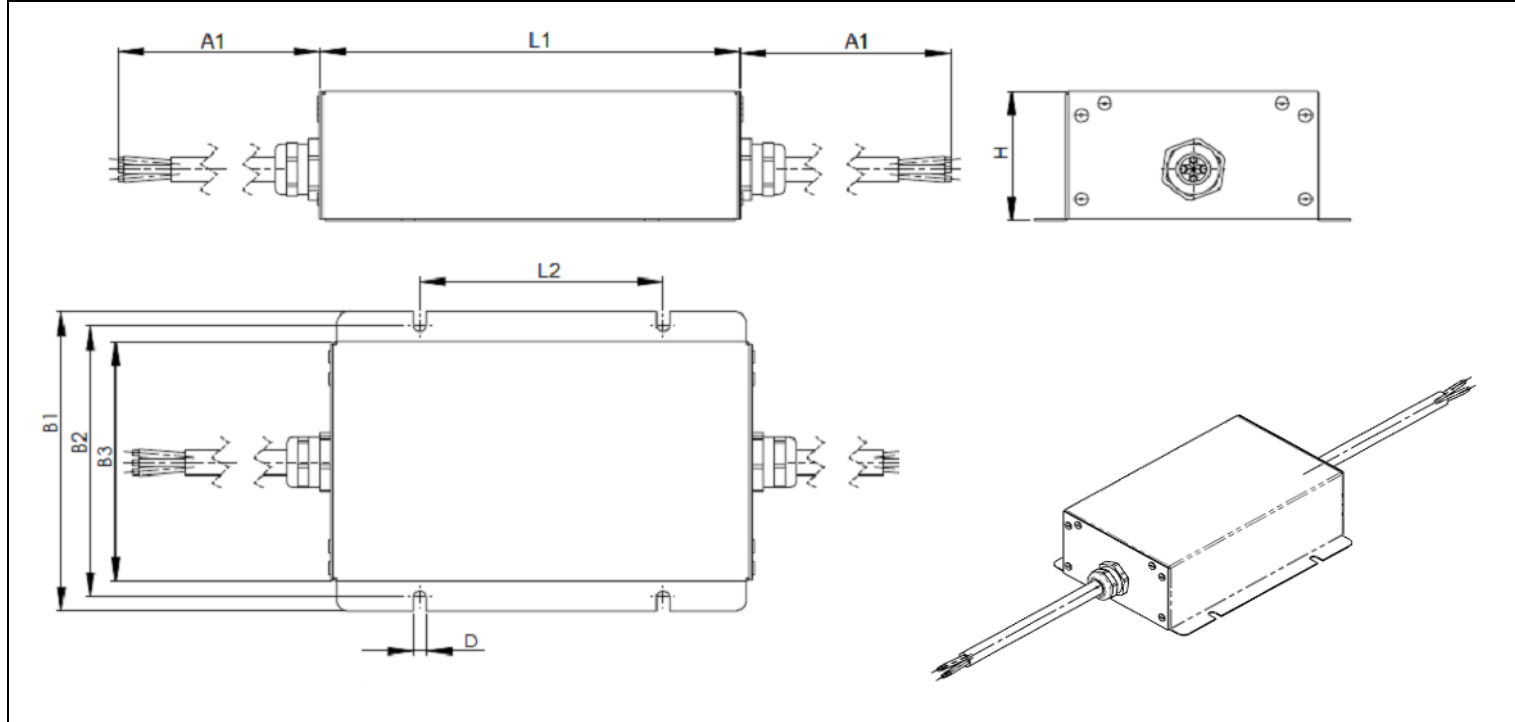


**Dimensions – Enclosed – Single Phase**

| Part Number    | Optidrive Size | PE Connection | L1 (mm) | L2 (mm) | L3 (mm) | B1 (mm) | B2 (mm) | B3 (mm) | H (mm) | D (mm) | A1 (mm) | Rated Amps | Weight (kg) |
|----------------|----------------|---------------|---------|---------|---------|---------|---------|---------|--------|--------|---------|------------|-------------|
| OPT-2-E1010-66 | 1              | 2 x M6        | 180     | 166     | 150     | 70      | 45      | 12.5    | 65     | 6.2    | 500     | 10         | 1.5         |
| OPT-2-E1025-66 | 2              | 2 x M6        | 250     | 236     | 220     | 70      | 45      | 12.5    | 65     | 6.2    | 500     | 25         | 2.8         |

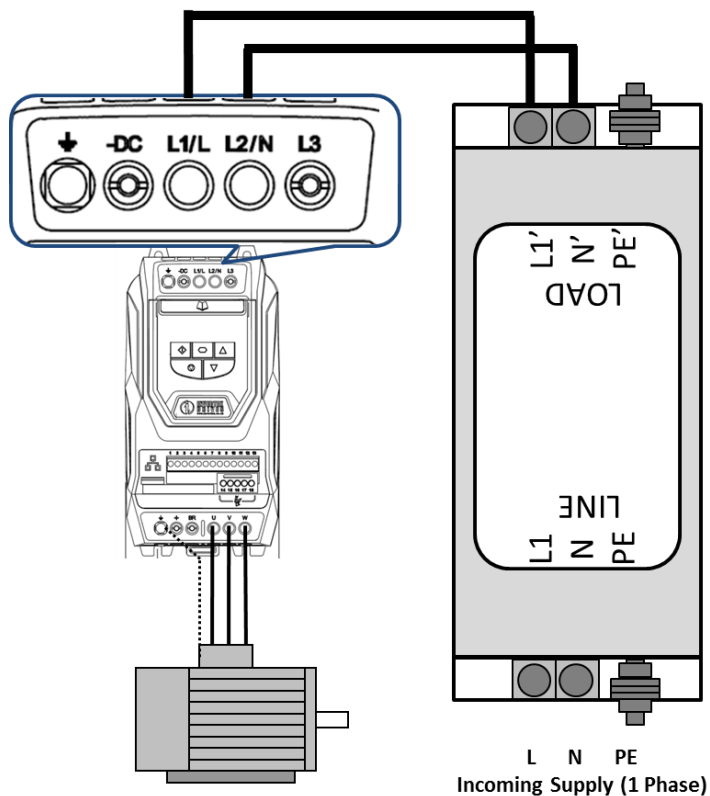
**Dimensions – Enclosed – Three Phase**

| Part Number    | Optidrive Size | PE Connection | L1 (mm) | L2 (mm) | L3 (mm) | B1 (mm) | B2 (mm) | B3 (mm) | H (mm) | D (mm) | A1 (mm) | Rated Amps | Weight (kg) |
|----------------|----------------|---------------|---------|---------|---------|---------|---------|---------|--------|--------|---------|------------|-------------|
| OPT-2-E3006-66 | 1              | 2.5           | 210     | 196     | 180     | 85      | 55      | 15      | 60     | 6.2    | 500     | 6          | 2.7         |
| OPT-2-E3016-66 | 2              | 2.5           | 230     | 216     | 200     | 120     | 80      | 20      | 65     | 6.2    | 500     | 16         | 2.7         |
| OPT-2-E3025-66 | 3              | 2.5           | 200     | 115     | -       | 150     | 136     | 120     | 65     | 6.2    | 500     | 25         | 2.7         |

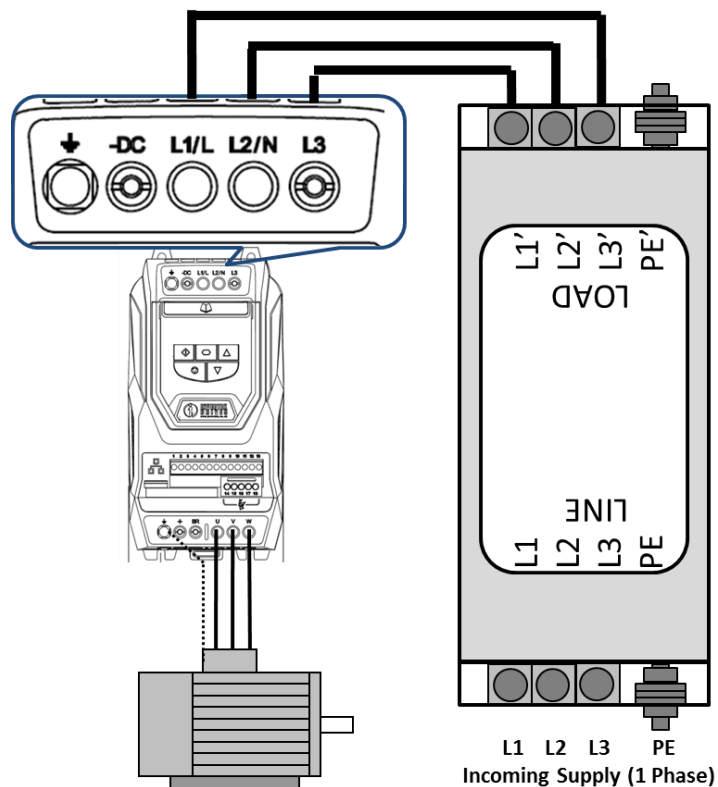


## Installation Schematic Diagram

### Single Phase Supply Installation



### 3 Phase Supply Installation



## Installation

To ensure best possible EMC performance, correct installation and connection of the Optidrive, EMC Filter and motor is essential. The following points highlight some of the requirements where particular attention should be paid.

- The EMC Filter **MUST** be Grounded. Connection to ground through the largest surface area possible is recommended for best performance, which can be achieved by mounting the EMC filter directly to an unpainted control panel backplate. Where this is not possible, use the ground studs provided to ensure a good connection, preferably using a flat earth braid to ensure good operation at high frequency.
- Connect the LINE side of the EMC Filter to the incoming AC supply
- Observe the correct connection orientation
  - For Single Phase Filters
    - L1 = Live Connection
    - N = Neutral Connection
    - PE = Ground / Earth connection
  - For Three Phase Filters
    - L1, L2, L3 = Incoming Live connection, the phase sequence is unimportant
    - PE = Ground / Earth connection
- Connect the LOAD side of the filter to the drive incoming power connection terminals
- A shielded type motor cable must be used, with the shield connected to ground at both ends
- 360° EMC Cable glands should be used where the cable exists the control cabinet, and where the cable enters the motor

| Electrical Specification – Single Phase |                |       | Electrical Specification – Three Phase |                |         |
|---|----------------|-------|--|----------------|---------|
| Voltage Range                           | 200 – 250 VAC  |       | Voltage Range                          | 380 – 480 VAC  |         |
| Frequency Range                         | 48 – 62Hz      |       | Frequency Range                        | 48 – 62Hz      |         |
| Leakage Current                         | OPT-2-E1010-00 | < 5mA | Leakage Current                        | OPT-2-E3006-00 | < 10mA  |
|   | OPT-2-E1025-00 | < 5mA |  | OPT-2-E3016-00 | < 35mA  |
|   |                |       |  | OPT-2-E3025-00 | < 35mA  |
|   |                |       |  | OPT-2-E3050-20 | < 180mA |
|   |                |       |  | OPT-2-E3080-20 | < 200mA |
|   |                |       |  | OPT-2-E3180-20 | < 220mA |
|   |                |       |  | OPT-2-E3300-00 | < 260mA |
|   |                |       |  | OPT-2-E3500-00 | < 100mA |

### Drive & Filter Compatibility

The following table shows the EMC filter to be used with each respective drive rating.

#### 1 Phase Input, 230 Volt AC Supply, Drive fitted with internal EMC Filter

| Frame Size | kW   | HP  | EMC Filter Model Code | Optidrive E2 | Optidrive P2 | Optidrive Eco | Optidrive Elevator |
|------------|------|-----|-----------------------|--------------|--------------|---------------|--------------------|
| 1          | 0.37 | 0.5 | OPT-2-E1010-xx        | ✓            | ✓            | ✓             |                    |
|            | 0.75 | 1   | OPT-2-E1025-xx        | ✓            | ✓            | ✓             |                    |
|            | 1.5  | 2   | OPT-2-E1025-xx        | ✓            | ✓            | ✓             |                    |
| 2          | 1.5  | 2   | OPT-2-E1025-xx        | ✓            | ✓            | ✓             |                    |
|            | 2.2  | 3   | OPT-2-E1025-xx        | ✓            | ✓            | ✓             |                    |

#### 3 Phase Input, 400 Volt AC Supply, Drive fitted with internal EMC Filter

| Frame Size | kW   | HP  | EMC Filter Model Code | Optidrive E2 | Optidrive P2 | Optidrive Eco | Optidrive Elevator |
|------------|------|-----|-----------------------|--------------|--------------|---------------|--------------------|
| 1          | 0.75 | 1   | OPT-2-E3006-xx        | ✓            |              |               |                    |
|            | 1.5  | 2   | OPT-2-E3006-xx        | ✓            |              |               |                    |
| 2          | 1.5  | 2   | OPT-2-E3006-xx        | ✓            | ✓            | ✓             | ✓                  |
|            | 2.2  | 3   | OPT-2-E3016-xx        | ✓            | ✓            | ✓             | ✓                  |
|            | 4    | 5   | OPT-2-E3016-xx        | ✓            | ✓            | ✓             | ✓                  |
| 3          | 5.5  | 7.5 | OPT-2-E3016-xx        | ✓            | ✓            | ✓             | ✓                  |
|            | 7.5  | 10  | OPT-2-E3025-xx        | ✓            | ✓            | ✓             | ✓                  |
|            | 11   | 15  | OPT-2-E3025-xx        | ✓            | ✓            | ✓             | ✓                  |
| 4          | 11   | 15  | OPT-2-E3025-xx        |              | ✓            | ✓             | ✓                  |
|            | 15   | 20  | OPT-2-E3050-20        |              | ✓            | ✓             | ✓                  |
|            | 18.5 | 25  | OPT-2-E3050-20        |              | ✓            | ✓             | ✓                  |
|            | 22   | 30  | OPT-2-E3050-20        |              | ✓            | ✓             | ✓                  |
| 5          | 30   | 40  | OPT-2-E3080-20        |              | ✓            | ✓             | ✓                  |
|            | 37   | 50  | OPT-2-E3080-20        |              | ✓            | ✓             | ✓                  |
|            | 45   | 60  | OPT-2-E3180-20        |              |              | ✓             |                    |
| 6          | 45   | 60  | OPT-2-E3180-20        |              | ✓            |               |                    |
|            | 55   | 75  | OPT-2-E3180-20        |              | ✓            | ✓             |                    |
|            | 75   | 100 | OPT-2-E3180-20        |              | ✓            | ✓             |                    |
|            | 90   | 120 | OPT-2-E3180-20        |              | ✓            | ✓             |                    |
| 7          | 110  | 150 | OPT-2-E3300-00        |              | ✓            | ✓             |                    |
|            | 132  | 175 | OPT-2-E3300-00        |              | ✓            | ✓             |                    |
|            | 160  | 250 | OPT-2-E3300-00        |              | ✓            | ✓             |                    |
| 8          | 200  | 300 | OPT-2-E3500-00        |              | ✓            | ✓             |                    |
|            | 250  | 350 | OPT-2-E3500-00        |              | ✓            | ✓             |                    |



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