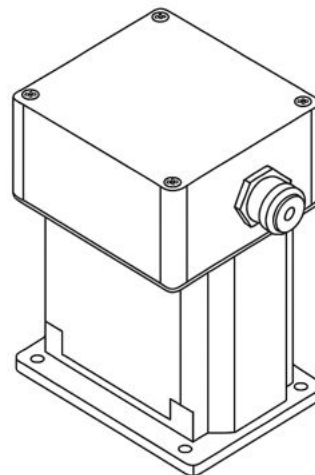
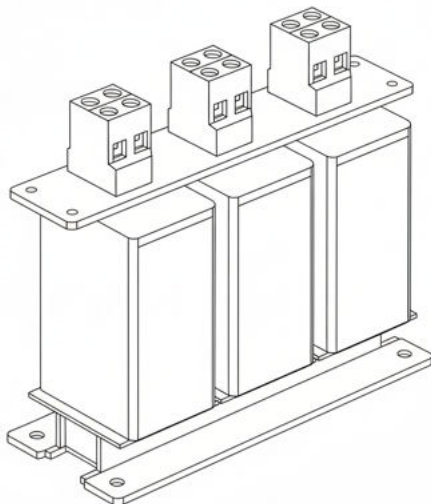


## Output Filters (Chokes) For Optidrive - IP20 & IP66

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Options 82-OPIND-IN





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# 1. Usage & Installation

## 1.1. Important Safety Information

	<p>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.</p>
	<p><b>Electric shock hazard!</b> Disconnect and <b>ISOLATE</b> 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 Directive 2006/42/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.</p>

## 1.2. Introduction

This guide provides information on the selection, installation, and use of output chokes (also known as output reactors or load reactors) when used with Invertek Optidrive variable frequency drives (VFDs).

Output chokes are passive inductive components installed between the VFD output terminals and the motor. They are used to reduce electrical stress on the motor and cabling, particularly in applications with long motor cable lengths or where enhanced motor protection is required.

This guide applies to use with the following Invertek product ranges:

- Optidrive E3
- Optidrive E4
- Optidrive P2
- Optidrive ECO

### 1.3. Why use an Output Choke?

Variable frequency drives use high-speed PWM switching to generate a variable-frequency AC output. When combined with long motor cables, this can result in high reflected voltages and steep voltage rise times ( $dv/dt$ ) at the motor terminals.

Output chokes reduce peak voltage and  $dv/dt$ , helping to protect the motor insulation, cabling, and drive output stage.

Output chokes are recommended in the following cases:

#### 1. Older or Non-Inverter-Rated Motors

If the motor is not specifically rated for inverter operation, or its suitability is unknown. Motors complying with the following standards are generally suitable for direct connection:

- EN/IEC60034-25 Curve A for motors rated up to 500VAC
- Nema MG1 Pt31 for motors rated up to 600V

#### 2. High-capacitance motor cable is used

High-capacitance motor cables increase the capacitive charging current drawn from the VFD output. This can result in higher peak output currents from the drive, increased thermal stress on the drive output stage, nuisance overcurrent or earth-fault trips and reduced service life of the drive.

- Long runs of screened or armoured cable
- Cables with a large conductor surface area
- Cables not specifically designed for VFD applications

An output choke limits the rate of current change ( $di/dt$ ) and reduces capacitive charging effects, helping to protect the drive and improve overall system stability.

#### 3. Long Motor Cable Lengths

If the motor cable length exceeds the maximum limit shown in the relevant product user guide for shielded cable, or 150% of this value for unshielded cable. Using an output choke allows these values to be increased to 200% of the value shown for shielded cable and 300% of the value shown for unshielded cable.

For example:- If the maximum allowed cable length for a given product shown in the user guide is 25m the limits are

	Without Choke	With Choke
Unshielded Cable	37.5 metres	75 metres
Shielded Cable	25 metres	50 metres



#### NOTE

Observe the maximum permitted motor cable length relevant to the EMC category compliance required.

## 1.4. Connection

Output Chokes are designed to be used between a Variable Speed Drive (VSD) and the connected motor. Correct motor cable routing is essential to minimise electrical stress, reduce EMC issues, and ensure reliable operation when using output chokes

- Connect the choke in series with all motor phases (U, V, W)
- Use short, symmetrical cable lengths between VFD and choke
- Maintain correct phase sequence

## 1.5. Earth Bonding

It is essential that the unit is connected to protective earth (PE) via the provided terminal. The unit should also be connected to an earthed metal mounting structure via its four mounting points. For example, securely bolting the choke to an earthed enclosure backplate is usually sufficient.

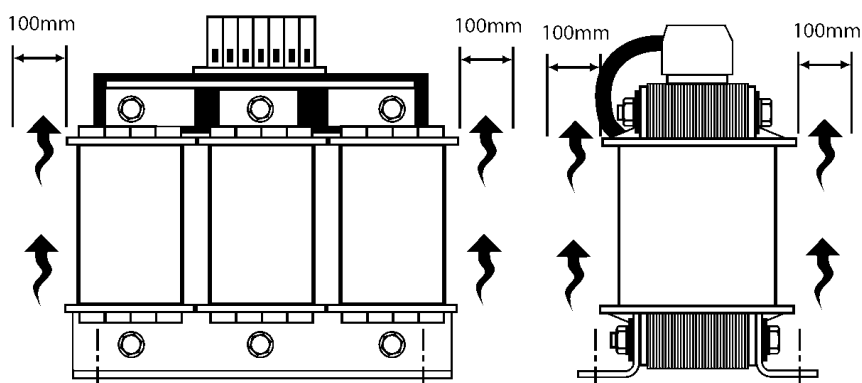
- Do not pass PE conductors through the output choke.
- Ensure Low-impedance earth connections.
- Poor earthing can negate the benefits of an output choke and increase EMC issues.

## 1.6. Mounting Position

Output chokes can operate at temperatures of up to 140 °C. A minimum clearance of 100 mm on all sides must be maintained to ensure adequate cooling.

The unit is intended to be mounted vertically, with its base in the horizontal plane, to allow natural airflow and achieve optimum cooling performance.

Horizontal mounting is possible; however, cooling performance may be reduced and should be assessed for the specific application.



## 1.7. Voltage Drop

When an output choke (load reactor) is fitted between the drive and motor, it introduces a small, current-dependent voltage drop across the choke. This is normally specified by manufacturers as percent impedance (%Z) at rated current and fundamental frequency, rather than as a fixed number of volts.

## 2. Output Choke - Open Type

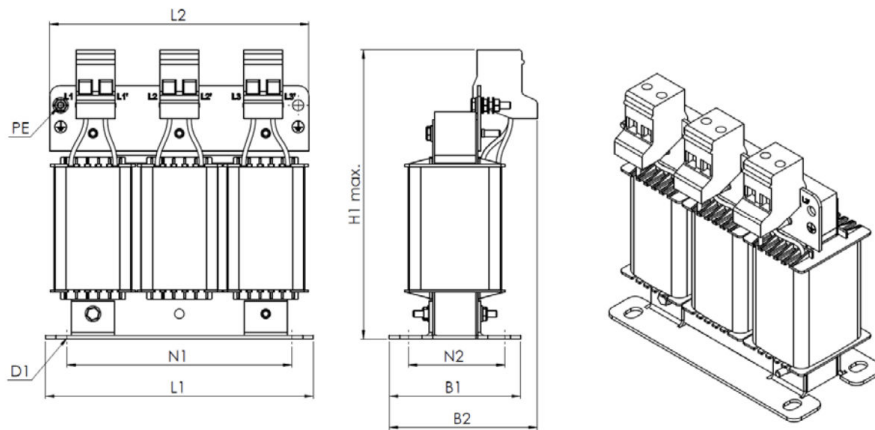
### 2.1. Technical Data

- Nominal voltage:  $U \leq 3 \times 500 \text{ V}$
- Reduction of the voltage rise DV/DT to  $< 200 \text{ V}/\mu\text{s}$
- Rotating field frequency: 0 - 60 Hz
- Clock frequency of the inverter: up to 150 A  $> 4 \text{ kHz}$ , from 150 A  $> 1.5 \text{ kHz}$
- According to: EN 60289 / EN 61558
- Test voltage: L-L 2500 V, AC/50 Hz 60 s;  
L-PE 2500 V, AC/50 Hz 60 s
- Insulation class: T40/F
- Protection rating: IP00
- Climatic categorie: DIN IEC 60068-1
- Overload:  $1.5 \times I_{\text{Rated}}$  1 min/h
- Ambient temperature 40 °C
- Design: Mounted on brackets

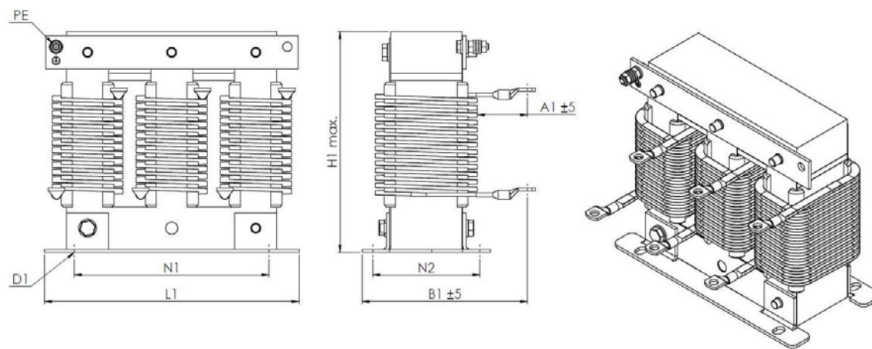
Model Code	Rated Current (A)	Inductance (mH)	Weight (kg)	Losses (W)	Connection Type
OPT-2-M3008-20	8	2.0	2.0	35	Terminal 2.5mm <sup>2</sup> max
OPT-2-M3012-20	12	1.2	2.7	52	Terminal 2.5mm <sup>2</sup> max
OPT-2-M3030-20	30	0.5	4.5	40	Lug 16 mm <sup>2</sup> (M6)
OPT-2-M3075-20	75	0.22	8.0	100	Lug 16 mm <sup>2</sup> (M8)
OPT-2-M3180-00	180	0.33	18	160	Lug 25 mm <sup>2</sup> (M10)
OPT-2-M3300-00	300	0.053	44	380	Lug
OPT-2-M3500-00	500	0.032	63	520	Lug

## 2.2. Dimensions

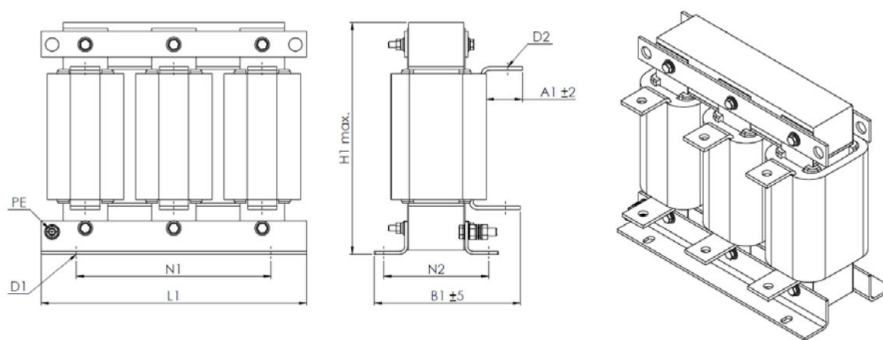
**Figure 1.**



**Figure 2.**



**Figure 3.**



All dimensions are in millimetres (mm).

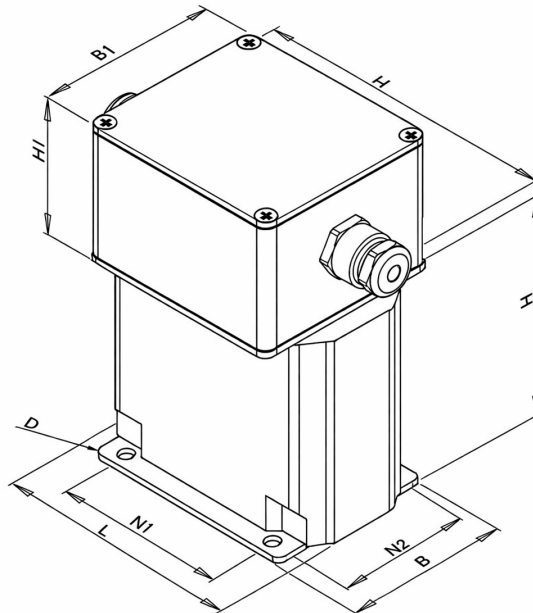
Model Number	L1	L2	B1	B2	H1	N1	N2	D1	Figure
OPT-2-M3008-20	80	96	55	65	110	56	43	5 x 8	1
OPT-2-M3012-20	125	120	71	67	130	100	55	5 x 8	1
OPT-2-M3030-20	155	-	110	-	130	130	54	8 x 12	2
OPT-2-M3075-20	190	-	125	-	160	170	67	8 x 12	2
OPT-2-M3180-00	240	-	155	-	210	185	94	10 x 18	2
OPT-2-M3300-00	360	-	180	-	315	264	137	10 x 18	3
OPT-2-M3500-00	360	-	225	-	315	264	167	10 x 18	3

## 3. Output Choke - Enclosed Type

### 3.1. Technical Data

Model Code	Rated Operating Voltage & Frequency	Rated Current (A)	Inductance (mH)	Weight (kg)	Connection Type
OPT-2-M3008-66	200 - 600VAC 50 - 60Hz	8	2.0	1.7	Terminal 2.5mm <sup>2</sup> max
OPT-2-M3012-66		12	1.2	3.2	Terminal 2.5mm <sup>2</sup> max
OPT-2-M3018-66		30	0.9	3.2	Terminal 10mm <sup>2</sup> max

### 3.2. Dimensions



All dimensions are in millimetres (mm).

Model Number	L	H	B	N1	N2	D	L1	H1	B1
OPT-2-M3008-66	115	85	74	80	60	5.5 x 7	151	60	85
OPT-2-M3012-66	140	110	87	100	70	5.5 x 7	151	60	85
OPT-2-M3018-66	140	110	87	100	70	5.5 x 7	151	60	85



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