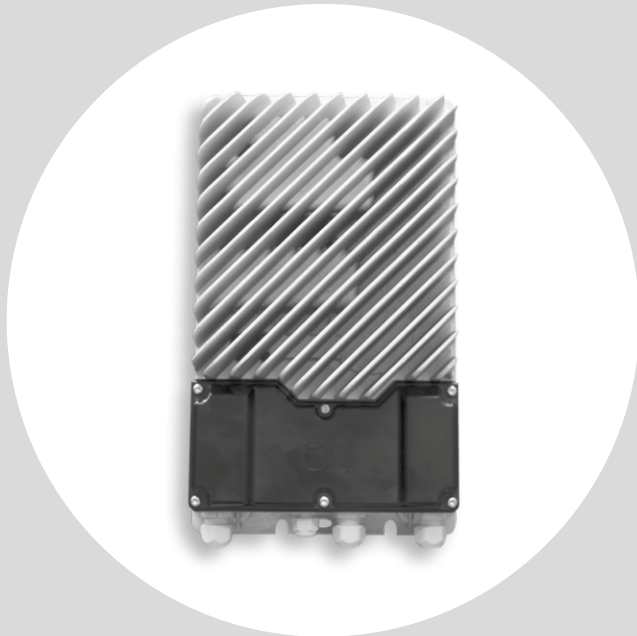


## OJ Drives®



### OJ-DVULH Ultra Low Harmonic

- 3-phase active PFC
- Rated power THD(i) < 1.5%
- 10-100% power THD(i) < 3%
- Power factor > 0.99
- Efficiency > 96%
- cULus Recognised

## Your compact solution to harmonic distortion

The OJ DV Ultra Low Harmonic drive lets you reduce harmonic distortion with an easy-to-install, compact solution.

The 3-phase active frontend incorporated into the drive housing eliminates the need for additional filters and cables, enabling you to create fully finished, factory-tested units that offer minimal harmonic distortion. Of course, these Ultra Low Harmonic drives comply with the strictest regulations and recommendations.

#### **The drive you know. With distortion mitigation.**

The tried-and-tested DV design has been adapted and enlarged to incorporate an active frontend. We've maintained the same connection and option module compartment, ensuring that your installation process is as easy as ever.

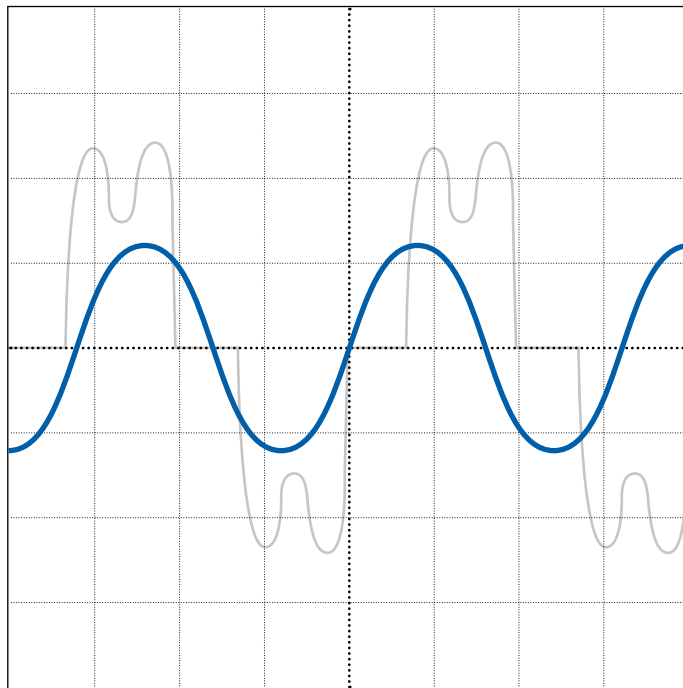
We've kept it very compact, too: compared to the standard DV drive, the Ultra Low Harmonic drive is just 8 cm longer and has slightly taller cooling ribs. All in all, its total size is just 25% larger in terms of volume (cm<sup>3</sup>) – while eliminating the need for separate filters.

#### **Keeps sensitive equipment safe**

OJ DV Ultra Low Harmonic is your ideal choice of drive for commercial HVAC applications with sensitive electronic equipment such as computers, telecommunications networks and lighting. It fully meets the increasing demand for harmonic distortion protection at e.g. data centres, airports and hospitals – and of course, the unit complies with the strictest legal requirements. We created this to keep you, your business and your customers safe.

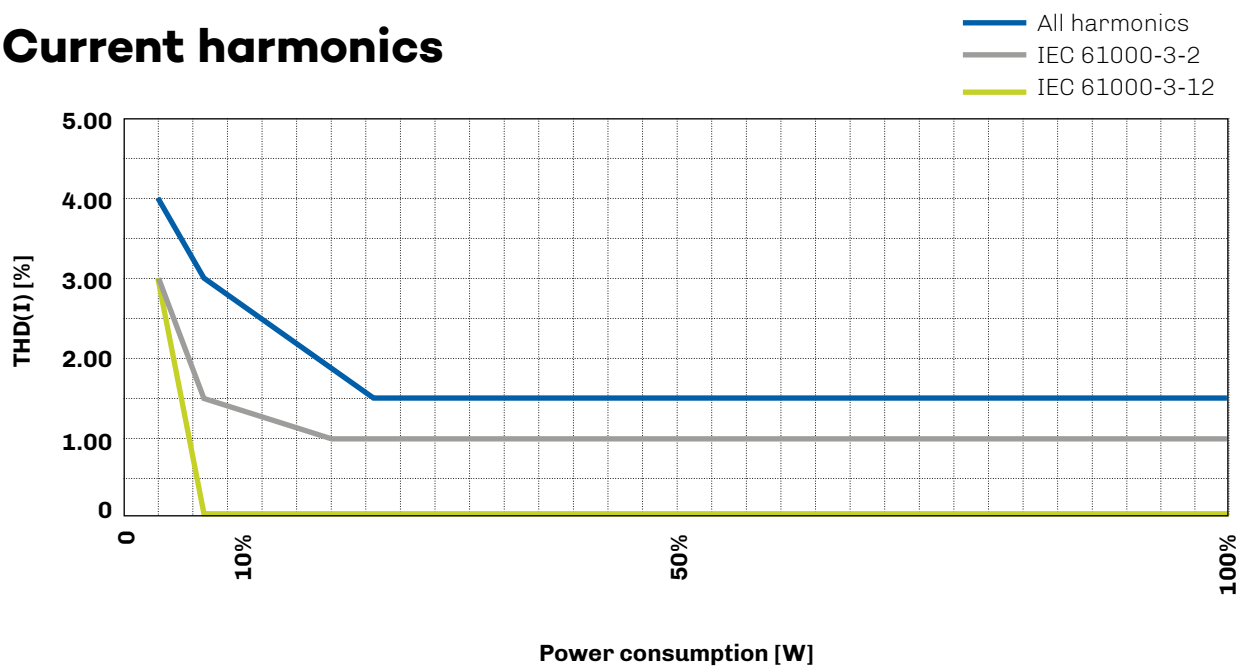
## 3-phase active PFC

### Current waveform with "Active PFC"



- Current waveform with "Active PFC"
- Current waveform without "Active PFC"

### Current harmonics



# The challenges with harmonic distortion

## Harmonic distortion: a growing issue

EU regulations requiring the usage of IE3 and IE4 motors have increased the need for drives to control the speed of such motors. This has certain consequences.

## Short bursts cause distortions

Drives greatly help save energy, which is great for the climate, but they have the drawback of increasing harmonic disturbances by introducing harmonic currents directly into the grid.

Harmonic current is a non-sinusoidal current flow created by the input stage of the drive. To drive the motor at the desired speed and torque, the power required by the motor is transferred in a short burst, resulting in a high-peak current. Depending on the design of the drive, the level of harmonic distortion typically ranges from 35% up to 100%.

Installing larger amounts of drives in commercial HVAC applications might lead to problems if the drives are connected to the same supply grid as sensitive electronic equipment – which is often the case. The OJ Ultra Low Harmonic drive is designed to help you avoid such problems.

## How drives affect grid quality

Three different values determine a drive's effect on the grid quality – and the OJ Ultra Low Harmonic drive makes a huge difference:

### • Power factor:

The power factor (PF) parameter is affected by the level of harmonic distortion as well as by the phase angle between current and voltage. It is defined as the ratio of the active power and the apparent power values. Essentially, it measures how efficiently the product is using power. And the right drive helps.

### • THDi:

The Total Harmonic Distortion of Current (THDi) indicates the amount of current distortion. The value is defined as the ratio (in %) as a result of dividing the rms sum value of the harmonic currents with the value of the fundamental frequency. A ULH drive will greatly reduce this figure.

### • TDD:

The parameter known as Total Demand Distortion (TDD) is widely used in North America. The TDD is measured at the point of common coupling, PCC. In contrast to the THDi, the TDD is the ratio of the measured harmonic current to the full-load fundamental current at system level, typically average values over a 15 or 30-minute measuring period. It too will be improved by a compact ULH drive, eliminating the need for external solutions.

## Improving grid quality with active power factor control

The OJ-DV ULH drive is fitted with an active frontend: a 3-phase 'Active Power Factor Control'. Here, the pulsed input current is converted into a sinusoidal current drawn from the grid. Additional advantages of the 3-phase active PFC function include shifting the angle of the current curve so that it is in phase with the voltage. Your grid – and the equipment powered by it – is efficiently protected against distortion.

The values achieved by means of 3-phase Active PFC exceed the strictest requirements.

At rated power, a power factor higher than 0.99 is achieved. The THD(I) at rated power is typically less than 1.5%, and the values stay below 3% even when the rated output is down to 10%.

## OJ Drives

The OJ Ultra Low Harmonic drive is designed to not only comply with the strictest regulations, but exceed them. It complies with:

- IEC 61000-3-2, Class A
- IEC 61000-3-12
- IEEE 519, special applications



## Your benefits

- A new drive that not only conserves motor energy for the good of the climate, but also reduces harmonic distortion and promotes grid quality
- Same drive topology – more variants
- Same mounting and installation as the standard DV – plug and play
- Fan units for strict harmonic demands can be fully assembled and tested on your factory production line as standard fan units
- You no longer need to dimension and install additional external filters and cables
- Straightforward dimensioning of electrical equipment in the system (cables, fuses, switches and transformers)
- Enables you to deliver fan units that comply with the strictest technical connection requirements of grid operators
- All your drive needs covered by a single supplier – ensures maximum ease and compatibility.



# OJ-DVULH

## Ultra Low Harmonic

		OJ-DVULH-3040	OJ-DVULH-3055	OJ-DVULH-3075
Enclosure			H4x	
Power size		4.0	5.5	7.5
Horsepower		5.4	7.4	10.0
Efficiency	%		> 96% IE2	
<b>Power supply</b>				
Voltage	VAC	3 x 380 - 480 VAC 50/60 Hz +/-10%		
Supply current at max. load at nominal supply voltage (400V/480V)	A	8.7/7.0	11.7/9.6	16/13.1
Power factor (cos-phi) at max. load			> 0.99	
<b>Motor output</b>				
Nominal motor power (on shaft) *2	kW	4.0	5.5	7.5
Frequency	Hz	PM motor: 0-400		
Max. output voltage	Vrms	3 x Vin		
Max. output current	Arms	10A	12A	17A
<b>Protection</b>				
Max. fuse	A	10.0	12.0	19.0
Short circuit capacity	A	3500	3500	5000
FLA	A	10.0	12.0	16.4
Motor output		Short-circuit protected between phases		
Motor		Protected by current limit		
Overload protection		Current and temperature overload protection		
<b>Environment</b>				
Operating temperature	°C	-40°C to +50°C		
Starting temperature	°C	-40°C to +50°C		
Storage temperature	°C	-40°C to +50°C		
Dimensions	mm	220 x 374 x 108 mm		
Protection rating		IP 65/Type 4x		
Enclosure material		Aluminium		
Front cover		Plastic		
Weight	kg	7.0 kg		
Humidity	% rh	10-95% rh, non-condensing		
Surface		Corrosion resistant to EN/ISO 12944-2:1998 Category C4		
Air flow / cooling		Turbulent air speed of min. 3 m/s to achieve max. output power at max. ambient temperature. Turbulent air speed below 3m/s and higher ambient temperature might lead to reduced output power. (3 m/s turbulent air speed is equivalent to 6.5 m/s laminar air speed)		
<b>Interfaces</b>				
Modbus RTU		RS485 (baud rate: 9.6, 19.2, 38.4, 56.7, 115.2 Kbaud)		
BACnet MS/TP		Baud rate: 9600, 19200, 38400, 57600, 115200 kbs MAC: 0 - 127, MAX Master: 1 - 127, Device object ID: 0 - 4194302		
Digital communication	Slave	2 x RJ12 & 2 x spring terminals		
Digital communication	Master	1 x RJ12 connection		
Analogue In1		0-10 V DC, 100% @ 9.5 V DC +/-2%		
Analogue Out1		+10 VDC		
Digital In1		Start/stop with internal pull-up		
Digital In2		Alarm reset		
Digital Out1		Tacho: 1 pulse/revolution   Alarm/running signal		
Green LED		Flashing: Active communication		
Red LED		Constantly lit: Critical alarm - stop motor		
<b>Features</b>				
Technology		Sinusoidal back-EMF signal controlled via FOC (Field Oriented Control)		
Flying start		Yes, < 30% of max. speed		
Ramp-up time	sec.	15-300		
Ramp-down time	sec.	15-300		
Alarm		Yes		
Alarm reset		Via digital input, MODBUS or powering down for more than 60 seconds		
Fan stop	sec.	The braking system stops the fan as quickly as possible. Braking time will depend on the inertia of the fan		
Service data log		Operating hours, alarms, loads, software version, max. temp., max. motor voltage, max. motor current, max. ripple voltage, max. ripple current		
Software updating		Yes, via serial interface		
Motor parameters		Preprogrammed by OJ or on-site configuration		
Fire mode		Nominal power for 1 hour at 70°C ambient temperature		
Field weakening		Yes		
Short-circuit protection		Yes		
Integrated EMC filters		Yes		
Harmonic distortion	THD(i)	Full load: < 1.5% / 10-100% load: < 3%		
<b>Approvals</b>				
EMC		EN/BS 61800-3 (C1 & C2) (First and second environment)		
SAFETY		EN/BS 61800-5-1 / UL 61800-5-1		
Product standard		EN/BS 61800 Part 2		
North America		UL -61800-5-1 / CS22.2.174		
RoHS Directive		Yes		
Product approvals		 / 		

Note: Data are valid at: nominal supply voltage, +25°C and sufficient air flow

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