

# GP YONVAL

## 40 kW

### GENERAL SPECIFICATIONS

The GP Yonval 40-16 is designed to generate high levels of energy, in accordance with the IEC 61400-2 standards and manufactured with reliable European components.

The variable speed active stall control system maximizes the power production for below rated wind speed and ensures a safe power limitation above rated wind speed.

This three bladed wind turbine is a reliable 40 kW small wind turbine with a high performance.



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|--|------------------------|--------------------------------------|
|  | <b>GP-YONVAL 40-16</b> | Doc. No.<br><b>GS140-16 15.02 EN</b> |
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**Manufacturer** GREEN POWER SARL  
Lieu-dit Yonval  
51330 Possesse  
France

**Model** GP YONVAL 40-16

**Design lifetime** 20 years

**Standards**

40-16 small wind turbine IEC 61400-2

Generator IEC 60034-1

**IEC 61400-2 Wind Conditions**

|   |          |
|---|----------|
| Annual average wind speed at hub height, $V_{ave}$                | 7.5 m/s  |
| Reference wind speed, $V_{ref}$                                   | 37.5 m/s |
| Extreme wind speed, $V_{e50}$                                     | 52.5 m/s |
| Characteristic value of hub-height turbulence intensity, $I_{15}$ | 0.18     |

### General Specifications

|                             |  |
|-----------------------------|--|
| Design class                | III  |
| Nominal power               | 40 kW  |
| Nominal wind speed          | 11 m/s   |
| Cut-in wind speed           | 3.5 m/s  |
| Cut-out wind speed          | 24 m/s   |
| Power regulation            | Active stall – active generator torque control |
| Noise emission @ 11 m/s     | 51 dBA @ 100 m                                 |
| Operating temperature range | -10°C to +40°C                                 |
| Storage temperature range   | -20°C to +50°C                                 |

### Rotor

|                              |                    |
|------------------------------|--------------------|
| Number of blades             | 3                  |
| Configuration                | Upwind             |
| Diameter                     | 16 m               |
| Swept area                   | 200 m <sup>2</sup> |
| Nominal speed                | 50.1 rpm           |
| Normal operation speed range | 29.4 to 54.5 rpm   |
| Maximum speed                | 74 rpm             |

### Gearbox

|              |          |
|--------------|----------|
| Manufacturer | SEW      |
| Type         | 3 stages |
| Rated power  | 45 kW    |
| Ratio        | 1 :29.95 |
| Weight       | 460 kg   |
| Oil capacity | 15.4 l   |

### Generator

|                   |                  |
|-------------------|------------------|
| Manufacturer      | CELMA CANTONI    |
| Type              | Induction        |
| Number of poles   | 4                |
| Rated power       | 45 kW            |
| Rated speed       | 1480 rpm         |
| Rated voltage     | 400 V            |
| Rated current     | 79 A             |
| Frequency         | 50 Hz            |
| Wiring connection | Delta connection |
| Insulation class  | F                |
| Protection rating | IP 55            |
| Weight            | 345 kg           |

### Brake system

|              |                                 |
|--------------|---------------------------------|
| Manufacturer | EMA ELFA                        |
| Type         | Electromagnetic fail safe brake |
| Torque       | 600 Nm                          |
| Voltage      | 180 VDC                         |
| Weight       | 90 kg                           |

### Yaw System

|                  |  |
|------------------|--|
| Manufacturer     | IMO  |
| Type             | Single row slew bearing                    |
| Yawing           | Active                                     |
| Source of signal | Ultrasonic wind speed and direction sensor |
| Speed            | Variable speed for maximum safety          |
| Weight           | 68 kg                                      |

### Yaw Motor

|              |                    |
|--------------|--------------------|
| Manufacturer | TRANSTECNO         |
| Type         | Worm Gear DC Motor |
| Rated power  | 0.6 kW             |
| Voltage      | 24 VDC             |
| Rated speed  | 3000 rpm           |
| Gear Ratio   | 1 :15              |
| Weight       | 7.1 kg             |

### Blades

|              |                               |
|--------------|-------------------------------|
| Blade length | 7.8 m                         |
| Weight       | 160 kg                        |
| Design       | Naca aerofoils – Stall design |
| Material     | Fiberglass – reinforced epoxy |
| Mounting     | Fixed                         |

### Tower

|                      |   |
|----------------------|---|
| Type                 | Hexagonal – Free standing                         |
| Height               | 20, 24 and 30 m (at hub height)                   |
| Number of sections   | - 20 and 24 m : 2 sections<br>- 30 m : 3 sections |
| Safe climbing system | Yes – External – Soll type                        |
| Material             | Galvanised steel                                  |
| Accessories          | - Foundation bolts<br>- Anchor rods foundation    |
| Colour               | Optional  |

**Electrical output specifications**

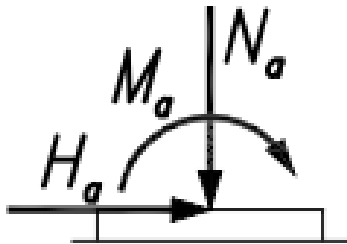
|                        |   |
|------------------------|---|
| Phases                 | 3 phases and neutral  |
| Output voltage         | 400 V ( $\pm 20$ V)   |
| Output current         | 57.8 A ( $\pm 3.1$ A)   |
| Frequency              | 50 Hz (+1 Hz / - 2.5 Hz)                                      |
| Rated output power     | 40 kW   |
| Maximum reactive power | 2.5 kVAR (for active power less than 0.5 kW)                  |
| Power converter        | Yes (integrated into the controller for easy grid-connection) |

**Weights**

|            |  |
|------------|--|
| Nacelle    | 2500 kg (rotor and cables included)  |
| Controller | 250 kg   |
| Tower      | <ul style="list-style-type: none"> <li>- 20 m : 3750 kg</li> <li>- 24 m : 4890 kg</li> <li>- 30 m : 7590 kg</li> </ul> |

**Efforts at the tower base**

|    | 20 m     | 24 m     | 30 m     |
|----|----------|----------|----------|
| Ha | 129 kN   | 150 kN   | 174 kN   |
| Na | 68 kN    | 80 kN    | 105 kN   |
| Ma | 1868 kNm | 2541 kNm | 3389 kNm |



### Safety systems

|                             |  |
|-----------------------------|--|
| First level                 | Aerodynamic stall of blades  |
| Second level                | Active stall power regulation with active generator torque control   |
| Third level                 | Yaw system turn the nacelle out of the wind  |
| Fourth level                | Electromagnetic fail-safe brake  |
| Safety systems activated by | <ul style="list-style-type: none"> <li>- At high wind speed the nacelle is yawed out of the wind</li> <li>- Stall regulated blades</li> <li>- Rotor over speed</li> <li>- Generator over temperature</li> <li>- Generator over current</li> <li>- Power converter radiators over temperature</li> <li>- Grid over voltage</li> <li>- Grid failure</li> <li>- Wind sensor failure</li> <li>- Controller failure</li> <li>- Emergency button pressed</li> <li>- Low temperature into the controller</li> </ul> |

### Controller

|       |  |
|-------|--|
| Model | MMB040-16  |
|       | <ul style="list-style-type: none"> <li>- Intelligent controller with integrated power converter</li> <li>- RS 485 for remote monitoring and control</li> <li>- User-friendly touch screen control</li> </ul> |

The GP YONVAL 40-16 controller with its integrated power convert provides a simple “plug and play” connection to the grid, providing clean power at a low cost.

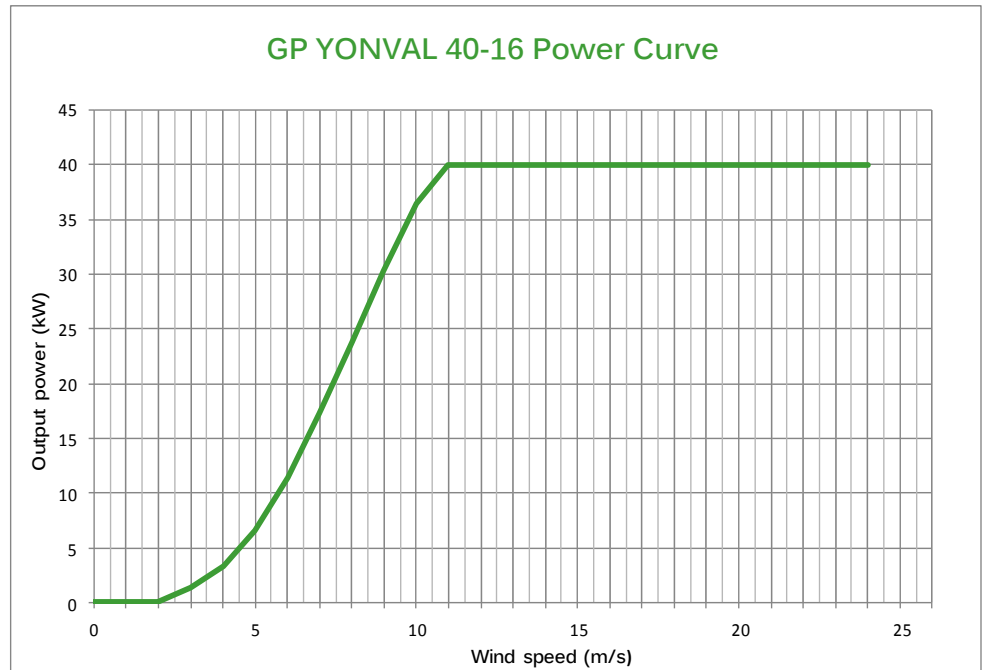
### Wind Sensor

|                         |                        |
|-------------------------|------------------------|
| Manufacturer            | Gill Instruments       |
| Type                    | Ultrasonic             |
| Protection class        | IP66                   |
| Accuracy wind speed     | ± 2% @ 12 m/s          |
| Accuracy wind direction | ± 2% @ 12 m/s          |
| Response time           | 0.25 s                 |
| External material       | Luran – Corrosion free |



## Power curve

| Wind Speed<br>[m/s] | Output Power<br>[kW] |
|---------------------|----------------------|
| 1                   | 0                    |
| 2                   | 0                    |
| 3                   | 1,41                 |
| 4                   | 3,35                 |
| 5                   | 6,54                 |
| 6                   | 11,34                |
| 7                   | 17,29                |
| 8                   | 23,79                |
| 9                   | 30,35                |
| 10                  | 36,44                |
| 11                  | 40                   |
| 12                  | 40                   |
| 13                  | 40                   |
| 14                  | 40                   |
| 15                  | 40                   |
| 16                  | 40                   |
| 17                  | 40                   |
| 18                  | 40                   |
| 19                  | 40                   |
| 20                  | 40                   |
| 21                  | 40                   |
| 22                  | 40                   |
| 23                  | 40                   |
| 24                  | 40                   |



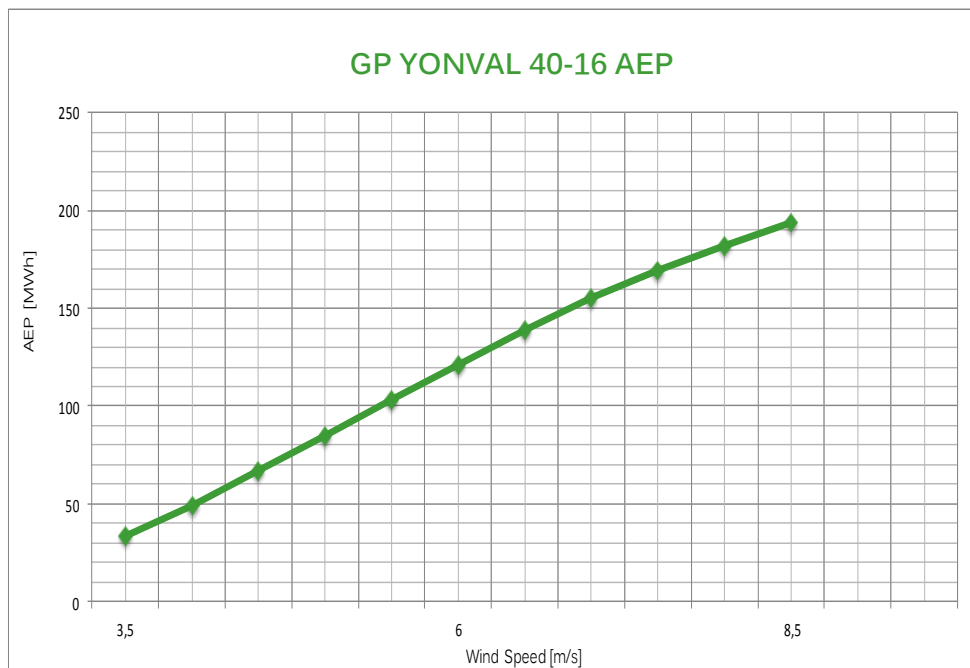
The power curve figures assume an elevation at sea level, a temperature of 15°C, an air density of 1.225 kg/m<sup>3</sup> and a constant air flow.

Wind speed at hub height.



## Annual Energy Production

| Wind Speed<br>[m/s] | AEP<br>[MWh] |
|---------------------|--------------|
| 3.5                 | 34           |
| 4                   | 49           |
| 4.5                 | 67           |
| 5                   | 85           |
| 5.5                 | 103          |
| 6                   | 121          |
| 6.5                 | 139          |
| 7                   | 155          |
| 7.5                 | 169          |
| 8                   | 182          |
| 8.5                 | 194          |



The annual energy production of a Wind Turbine cannot be predicted with certainty, as it depends on many factors like the location, the site wind resource, the hub height and many other factors. Any estimation given by us will not constitute any form of warranty.

The AEP is based on standard atmospheric conditions, average wind speed at hub height, a Weibull distribution  $k=2$  and 100% availability.

Specifications in this technical brochure may be modified without prior notice.

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