

# QYI164A

## THREE-PHASE SYNCHRONOUS GENERATOR WINDING QY311 Datasheet for 4 poles -50Hz @ 1500rpm/ 60Hz @ 1800rpm

|  |  |                                  |                   |     |
|--|--|----------------------------------|-------------------|-----|
| Ambient Temperature                            | 40 °C  | Method of Cooling                | Air cooling       |     |
| Temperature Rise                               | 125 °C   | Direction of Rotation            | Clockwise         |     |
| Insulation Class                               | H  | Maximum Over-speed               | 2250r/min         |     |
| Power Factor                                   | 0.8  | Degree of Protection / Enclosure | IP23              |     |
| Excitation                                     | Brushless  | Altitude                         | 1000m             |     |
| Winding Pitch                                  | 2/3  | Stator winding                   | DLL               |     |
| Pole   | 4  | Number of Terminal               | 12                |     |
| Duty   | S1- Continuous                                     | Rotor                            | With damping cage |     |
| Waveform                                       | TIF<50   |                                  | THF<2%            |     |
| Waveform distortion                            | BS EN 61000-6-2&BS EN 61000-6-4,VDE 0875G,VDE0874N |                                  |                   |     |
| Radio interference                             | Noload<1.5%,Non-distorting balanced linear load<5% |                                  |                   |     |
| AVR MODEL AVR                                  | Standard   | Selection                        |                   | PMG |
|  | SX460  | AS440                            | KRS440            |     |
| Voltage Regulation - in steady state condition | ±1.0   | ±1.0                             | ±1.0              |     |
| Short Circuit Current Capacity                 | Control does not sustain a short circuit current   |                                  |                   |     |

### Electrical Characteristic

| Frequency  | Hz   | 50      |         |         |         | 60      |         |         |         |
|--|------|---------|---------|---------|---------|---------|---------|---------|---------|
|  |      | 380/220 | 400/231 | 415/240 | 440/254 | 416/240 | 440/254 | 460/266 | 480/277 |
| Voltage ( series star ) <b>Y</b>                 | V    | 380/220 | 400/231 | 415/240 | 440/254 | 416/240 | 440/254 | 460/266 | 480/277 |
| Voltage ( parallel star ) <b>YY</b>              | V    | 190/110 | 200/115 | 208/120 | 220/127 | 208/120 | 220/127 | 230/133 | 240/138 |
| Voltage ( series delta ) <b>Δ</b>                | V    | 220     | 230     | 240     | 254     | 240     | 254     | 266     | 277     |
| Rated power at Class H (125 °C) temperature rise | kVA  | 8.1     | 8.1     | 8.1     | 6.2     | 9.6     | 10.2    | 10.2    | 10.2    |
|  | kW   | 6.5     | 6.5     | 6.5     | 5.0     | 7.7     | 8.2     | 8.2     | 8.2     |
| Efficiency at Class H (P.F.=0.8)                 | 4/4% | 75.3    | 76      | 76.5    | 77.1    | 75.8    | 75.9    | 76.4    | 77      |
|  | 3/4% | 78.5    | 79      | 79      | 79.2    | 78.7    | 78.8    | 79      | 79.5    |
|  | 2/4% | 80      | 80      | 79.9    | 79.8    | 79.7    | 79.9    | 79.9    | 79.9    |
| Efficiency at Class H (P.F.=1.0)                 | 4/4% | 80.1    | 81      | 81.3    | 82      | 80.1    | 80.2    | 81      | 81.5    |
|  | 3/4% | 83      | 83.2    | 83.5    | 84      | 82.8    | 83      | 83.2    | 83.7    |
|  | 2/4% | 84      | 84.1    | 84.1    | 84      | 83.8    | 84      | 84      | 84      |

### Reactances (%) at Class H

|   |                  | 1.994  | 1.8    | 1.672  | 1.944  | 2.367  | 2.248  | 2.057  | 1.889  |
|---|------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Direct axis synchronous reactance unsaturated     | X <sub>d</sub>   | 1.994  | 1.8    | 1.672  | 1.944  | 2.367  | 2.248  | 2.057  | 1.889  |
| Direct axis transient reactance saturated         | X' <sub>d</sub>  | 0.204  | 0.184  | 0.171  | 0.199  | 0.242  | 0.23   | 0.21   | 0.193  |
| Direct axis subtransient reactance saturated      | X'' <sub>d</sub> | 0.127  | 0.115  | 0.107  | 0.124  | 0.152  | 0.144  | 0.132  | 0.121  |
| Quadrature axis synchronous reactance unsaturated | X <sub>q</sub>   | 0.992  | 0.895  | 0.831  | 0.967  | 1.177  | 1.117  | 1.022  | 0.939  |
| Quadrature axis subtransient reactance saturated  | X'' <sub>q</sub> | 0.229  | 0.207  | 0.192  | 0.223  | 0.272  | 0.258  | 0.236  | 0.217  |
| Leakage reactance                                 | X <sub>l</sub>   | 0.08   | 0.072  | 0.067  | 0.078  | 0.095  | 0.09   | 0.083  | 0.076  |
| Negative sequence reactance saturated             | X <sub>2</sub>   | 0.191  | 0.172  | 0.16   | 0.186  | 0.226  | 0.215  | 0.197  | 0.181  |
| Zero sequence reactance unsaturated               | X <sub>0</sub>   | 0.086  | 0.078  | 0.072  | 0.064  | 0.103  | 0.098  | 0.089  | 0.082  |
| Short-circuit ratio                               | K <sub>cc</sub>  | 0.5015 | 0.5556 | 0.5981 | 0.5144 | 0.4225 | 0.4448 | 0.4861 | 0.5294 |

|  |                     |                               |      |      |      |                              |      |     |      |
|--|---------------------|-------------------------------|------|------|------|------------------------------|------|-----|------|
| Short-circuit transient time constant (sec.) | T' <sub>d</sub>     | 0.012                         |      |      |      |                              |      |     |      |
| Subtransient time constant (sec.)            | T'' <sub>d</sub>    | 0.003                         |      |      |      |                              |      |     |      |
| Open circuit time constant (sec.)            | T' <sub>do</sub>    | 0.2                           |      |      |      |                              |      |     |      |
| Armature time constant (sec.)                | T <sub>a</sub>      | 0.004                         |      |      |      |                              |      |     |      |
| Stator Winding Resistance (20°C)             | ohm                 | 1.62                          |      |      |      |                              |      |     |      |
| Rotor Winding Resistance (20°C)              | ohm                 | 0.44                          |      |      |      |                              |      |     |      |
| Exciter Stator Resistance (20°C)             | ohm                 | 19                            |      |      |      |                              |      |     |      |
| Exciter Rotor Phase resistance               | ohm                 | 0.13                          |      |      |      |                              |      |     |      |
| No load excitation current                   | i <sub>o</sub> (A)  | 0.55                          | 0.6  | 0.63 | 0.63 | 0.54                         | 0.56 | 0.6 | 0.62 |
| Full load excitation current                 | i <sub>c</sub> (A)  | 1.9                           | 1.85 | 1.9  | 1.9  | 1.85                         | 1.85 | 1.9 | 1.9  |
| Cooling air requirement                      | m <sup>3</sup> /sec | 0.071m <sup>3</sup> /s 150cfm |      |      |      | 0.09m <sup>3</sup> /s 191cfm |      |     |      |

### Mechanical Characteristic

| Configuration                       | Single Bearing         | Double Bearing         |
|-------------------------------------|------------------------|------------------------|
| Type of Construction                | B2-SAE                 | IM B34                 |
| Total Weight - kgs                  | 86                     | 90                     |
| Weight wound stator - kgs           | 21                     | 21                     |
| Weight wound rotor - kgs            | 23.6                   | 24.2                   |
| Inertia (J) [kgm <sup>2</sup> ]     | 0.0923kgm <sup>2</sup> | 0.0923kgm <sup>3</sup> |
| Drive end bearing / Lubrication     |                        | BALL.6309-2RS(ISO)     |
| Non-drive end bearing / Lubrication | BALL.6306-2RS(ISO)     | BALL.6306-3RS(ISO)     |
| Packing crate size (cm)             | 49X45X58               | 58X45X57               |

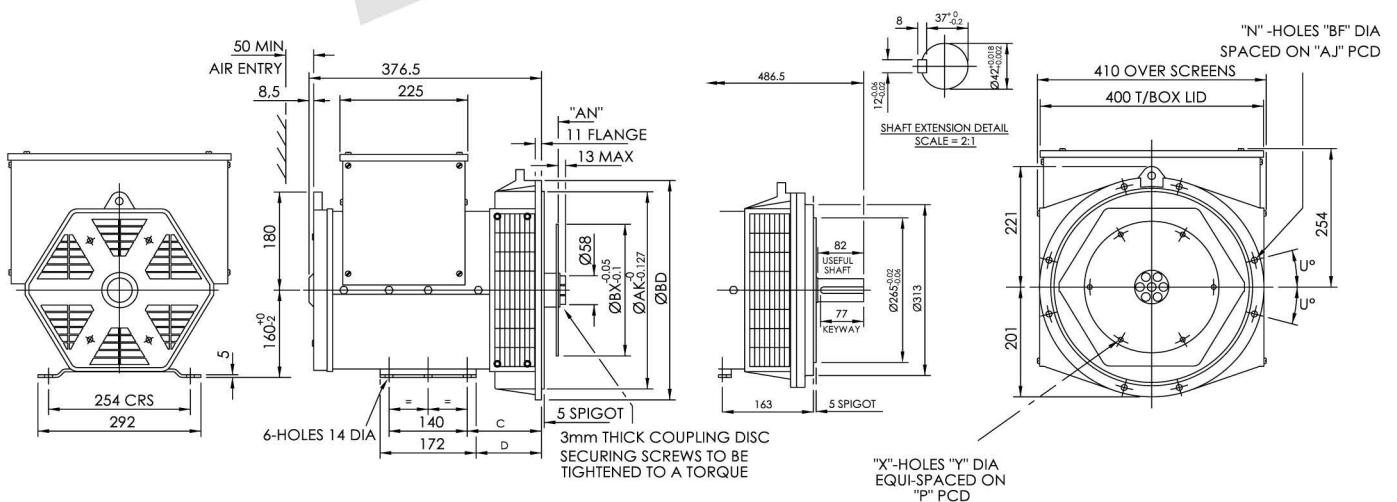
# QYI164A

## Winding 311 / 0.8 Power Factor

### RATINGS

| Class - Temp Rise |                   | Cont. F - 105/40°C |      |      |      | Cont. H - 125/40°C |      |      |      | Standby - 150/40°C |     |     |     | Standby - 163/27°C |     |     |     |
|-------------------|-------------------|--------------------|------|------|------|--------------------|------|------|------|--------------------|-----|-----|-----|--------------------|-----|-----|-----|
| <b>50 Hz</b>      | Series Star (V)   | 380                | 400  | 415  | 440  | 380                | 400  | 415  | 440  | 380                | 400 | 415 | 440 | 380                | 400 | 415 | 440 |
|                   | Parallel Star (V) | 190                | 200  | 208  | 220  | 190                | 200  | 208  | 220  | 190                | 200 | 208 | 220 | 190                | 200 | 208 | 220 |
|                   | Series Delta (V)  | 220                | 230  | 240  | 254  | 220                | 230  | 240  | 254  | 220                | 230 | 240 | 254 | 220                | 230 | 240 | 254 |
|                   | kVA               | 7.5                | 7.5  | 7.5  | 5.7  | 8.1                | 8.1  | 8.1  | 6.2  | N/A                | N/A |     |     |                    |     |     |     |
| kW                | 6.0               | 6.0                | 6.0  | 4.6  | 6.5  | 6.5                | 6.5  | 5.0  |      |                    |     |     |     |                    |     |     |     |
| Efficiency (%)    | 76.5              | 77.2               | 77.5 | 78.0 | 75.5 | 76.2               | 76.6 | 77.2 |      |                    |     |     |     |                    |     |     |     |
| kW Input          | 7.8               | 7.8                | 7.7  | 7.7  | 8.6  | 8.5                | 8.5  | 8.4  |      |                    |     |     |     |                    |     |     |     |
| <b>60 Hz</b>      | Series Star (V)   | 416                | 440  | 460  | 480  | 416                | 440  | 460  | 480  | 416                | 440 | 460 | 480 | 416                | 440 | 460 | 480 |
|                   | Parallel Star (V) | 208                | 220  | 230  | 240  | 208                | 220  | 230  | 240  | 208                | 220 | 230 | 240 | 208                | 220 | 230 | 240 |
|                   | Delta (V)         | 240                | 254  | 266  | 277  | 240                | 254  | 266  | 277  | 240                | 254 | 266 | 277 | 240                | 254 | 266 | 277 |
|                   | kVA               | 8.9                | 9.4  | 9.4  | 9.4  | 9.6                | 10.2 | 10.2 | 10.2 | N/A                | N/A |     |     |                    |     |     |     |
| kW                | 7.1               | 7.5                | 7.5  | 7.5  | 7.7  | 8.2                | 8.2  | 8.2  |      |                    |     |     |     |                    |     |     |     |
| Efficiency (%)    | 76.7              | 76.9               | 77.4 | 77.9 | 75.7 | 75.8               | 76.4 | 77.0 |      |                    |     |     |     |                    |     |     |     |
| kW Input          | 9.3               | 9.8                | 9.7  | 9.7  | 10.1 | 10.8               | 10.7 | 10.6 |      |                    |     |     |     |                    |     |     |     |

### DIMENSIONS



| FLANGE(mm) |     |        |        |      |    |    |     |     |
|------------|-----|--------|--------|------|----|----|-----|-----|
|            | BD  | AK     | AJ     | U°   | BF | n  | C   | D   |
| SAE5       | 356 | 314.32 | 333.38 | 22.5 | 11 | 8  | 133 | 117 |
| SAE4       | 402 | 361.95 | 381    | 15   | 11 | 8  | 133 | 117 |
| SAE3       | 451 | 409.58 | 428.62 | 15   | 11 | 8  | 145 | 129 |
| SAE2       | 489 | 447.68 | 466.72 | 15   | 11 | 12 | 172 | 156 |

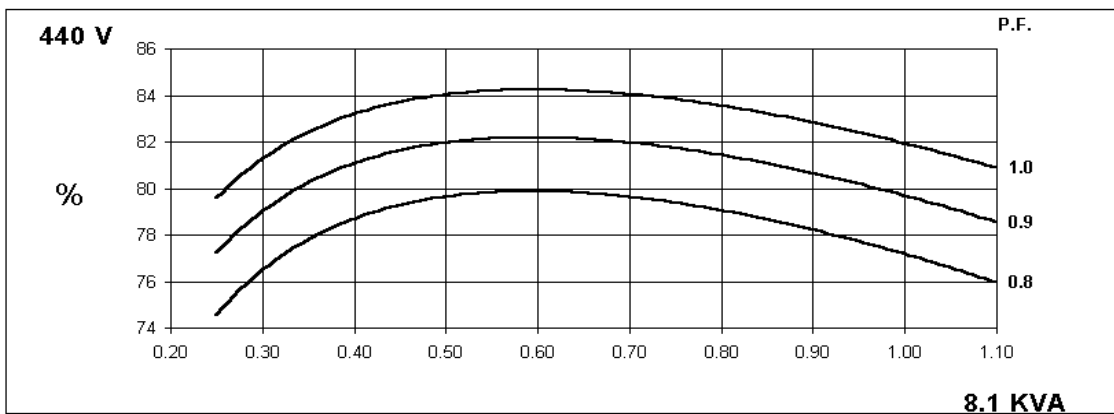
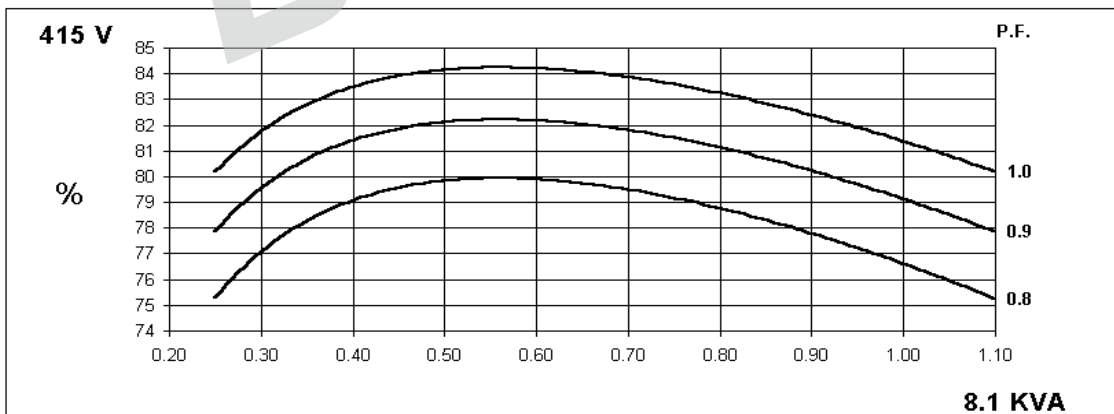
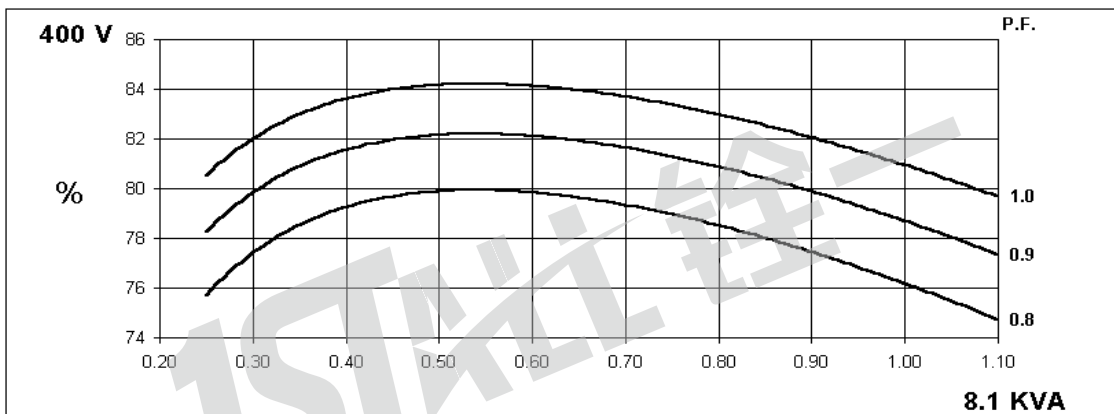
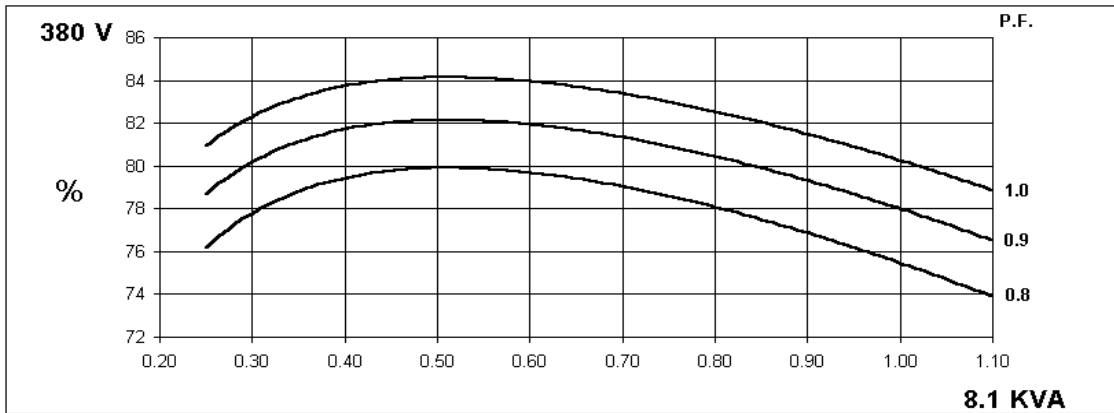
| COUPLING DISC |        |        |   |    |      |
|---------------|--------|--------|---|----|------|
| SAE           | BX     | P      | X | Y  | AN   |
| 11.5          | 352.42 | 333.38 | 8 | 11 | 39.6 |
| 10            | 314.32 | 295.28 | 8 | 11 | 53.8 |
| 8             | 263.52 | 244.48 | 6 | 11 | 62   |
| 7.5           | 241.3  | 222.25 | 8 | 9  | 30.2 |
| 6.5           | 215.9  | 200.02 | 6 | 9  | 30.2 |

|         |            |      |         |     |           |
|---------|------------|------|---------|-----|-----------|
| QYI 164 |            |      |         | 1:1 | QT002Z030 |
|         |            |      |         | A2  |           |
|         |            |      |         | mm  |           |
| VER     | MOD        | DRW  | Date    |     |           |
| Design  | APP        | Date | 2018.01 |     |           |
| CHK     | GB/T1804-m |      |         |     |           |

**50  
Hz**

**QYI164A**  
Winding 311

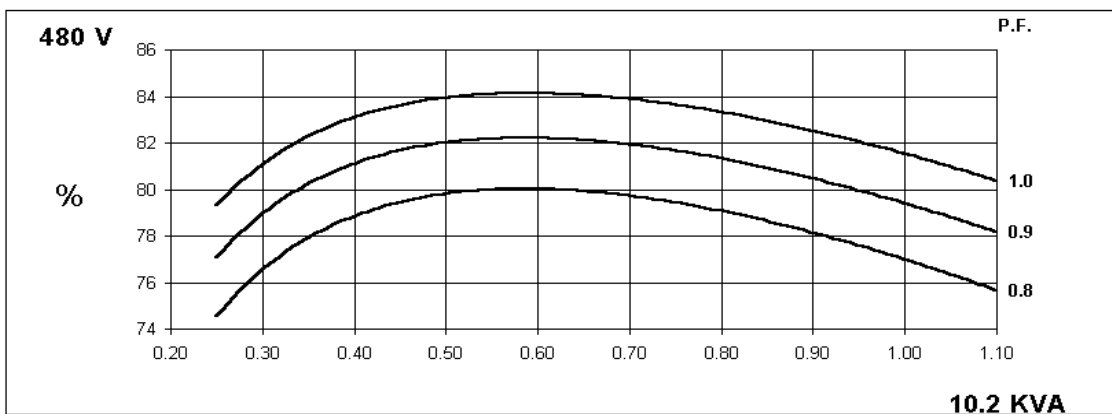
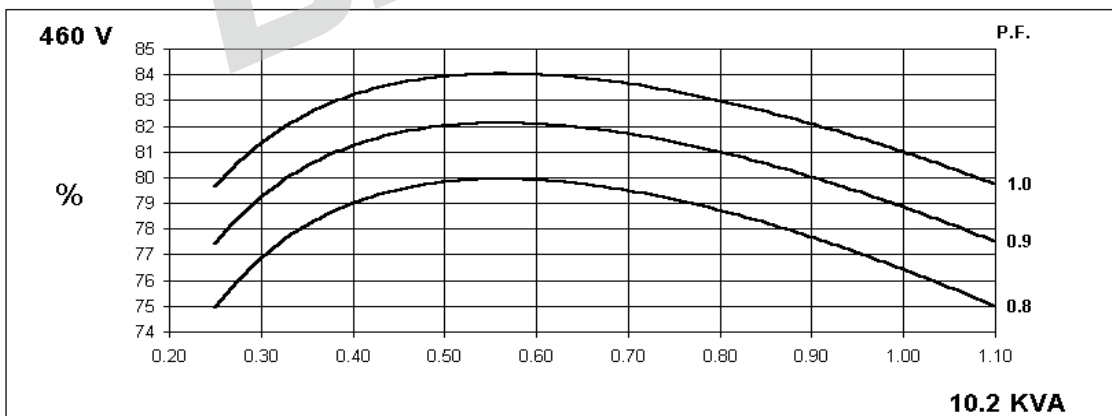
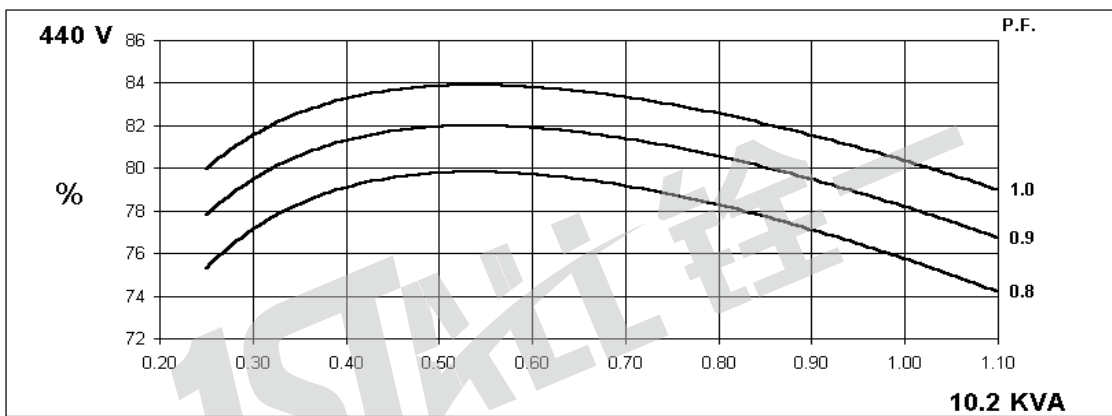
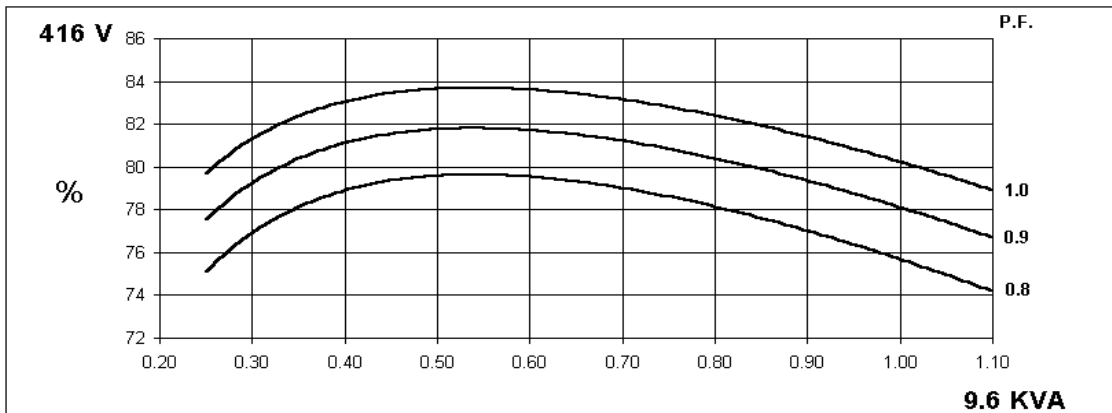
**THREE PHASE EFFICIENCY CURVES**



**QY1164A**  
**Winding 311**

**60**  
**Hz**

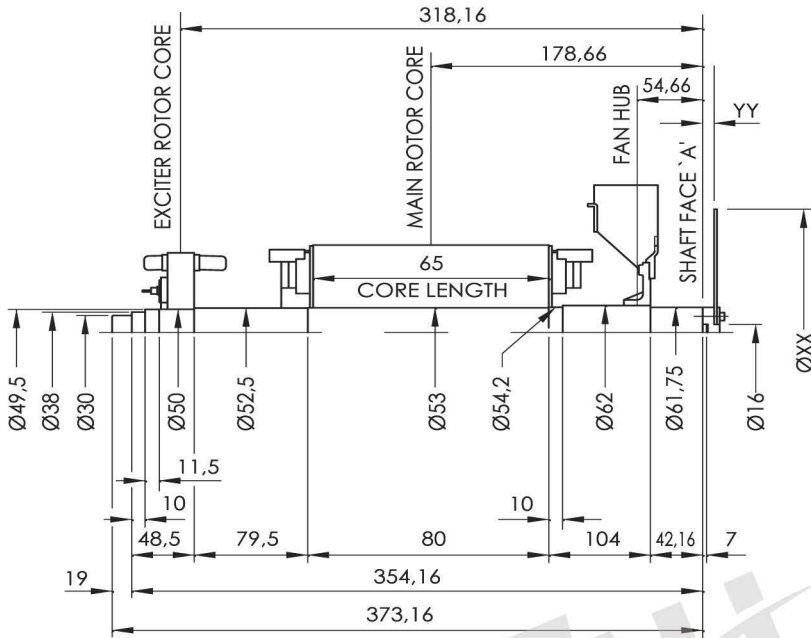
**THREE PHASE EFFICIENCY CURVES**



# QYI164A

## Winding 311

### INERTIA

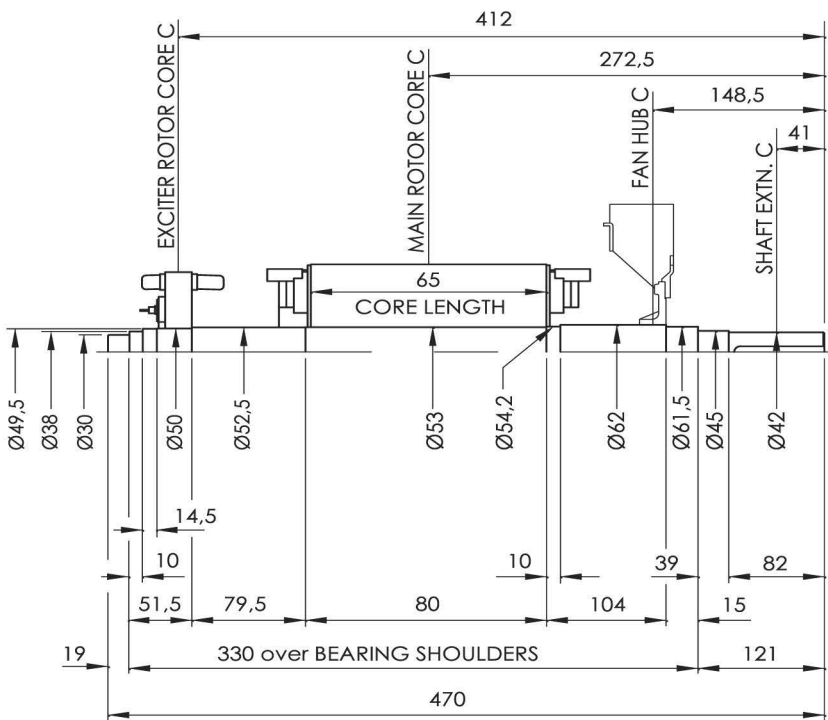


| COMPONENT  | Wt kg  | J kgm <sup>2</sup> |
|------------|--------|--------------------|
| EX. ROTOR  | 4,300  | 0,0170             |
| MAIN ROTOR | 13,670 | 0,0664             |
| FAN        | 0,744  | 0,0061             |
| SHAFT      | 6,921  | 0,0028             |
| TOTAL      | 25,635 | 0,0923             |

| ADAPTOR No. | COUPLING SAE No. | COUPLING DIMENSIONS |      | COUPLING ASSEMBLY WEIGHT kg | COUPLING DISC J kgm <sup>2</sup> |
|-------------|------------------|---------------------|------|-----------------------------|----------------------------------|
|             |                  | XX                  | YY   |                             |                                  |
| 6           | 7½               | 241,2               | 31,7 | 1,810                       | 0,0078                           |
| 4/5         | 7½               | 241,2               | 0    | 1,071                       | 0,0078                           |
| 4/5         | 8                | 263                 | 31,7 | 2,018                       | 0,0111                           |
| 4           | 10               | 314                 | 23,8 | 2,377                       | 0,0225                           |
| 3           | 10               | 314                 | 35,8 | 2,657                       | 0,0225                           |
| 3           | 1½               | 352                 | 21,5 | 2,793                       | 0,0356                           |

|        |     |      |         |          |     |           |
|--------|-----|------|---------|----------|-----|-----------|
|        |     |      |         | QYI 164A | 1:1 | OQY201001 |
|        |     |      |         | INERTIA  |     |           |
| VER    | MOD | DRW  | Date    |          |     |           |
| Design |     | APP  |         |          |     |           |
| CHK    |     | Date | 2018.01 |          |     |           |

WWW.FIRSTALLPOWER.COM



| COMPONENT  | Wt kg  | J kgm <sup>2</sup> |
|------------|--------|--------------------|
| EX. ROTOR  | 4,300  | 0,0170             |
| MAIN ROTOR | 13,670 | 0,0664             |
| FAN        | 0,744  | 0,0061             |
| SHAFT      | 7,704  | 0,0028             |
| TOTAL      | 26,418 | 0,0923             |

|        |     |      |         |          |     |           |
|--------|-----|------|---------|----------|-----|-----------|
|        |     |      |         | QYI 164A | 1:1 | OQY201002 |
|        |     |      |         | INERTIA  |     |           |
| VER    | MOD | DRW  | Date    |          |     |           |
| Design |     | APP  |         |          |     |           |
| CHK    |     | Date | 2018.01 |          |     |           |

WWW.FIRSTALLPOWER.COM