

# QYI224E

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

| THREE-PHASE SYNCHRONOUS GENERATOR                                   |                                                    |                                  |         |         |                    |                   |         |         |         |
|---------------------------------------------------------------------|----------------------------------------------------|----------------------------------|---------|---------|--------------------|-------------------|---------|---------|---------|
| WINDING QY311 Datasheet for 4 poles -50Hz @ 1500rpm/ 60Hz @ 1800rpm |                                                    |                                  |         |         |                    |                   |         |         |         |
| Ambient Temperature                                                 | 40 ℃                                               | Method of Cooling                |         |         |                    | Air cooling       |         |         |         |
| Temperature Rise                                                    | 125 ℃                                              | 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  | MX341B  | MX321              |                   |         |         |         |
| Voltage Regulation - in steady state condition                      | ±1.0                                               | ±1.0                             | ±1.0    | ±0.5    | ±0.5               |                   |         |         |         |
| Short Circuit Current Capacity                                      | Control does not sustain a short circuit current   |                                  |         |         |                    | 260A              |         |         |         |
| Electrical Characteristic                                           |                                                    |                                  |         |         |                    |                   |         |         |         |
| Frequency                                                           | Hz                                                 | 50                               |         |         |                    | 60                |         |         |         |
| Voltage ( series star ) Y                                           | V                                                  | 380/220                          | 400/231 | 415/240 | 440/254            | 416/240           | 440/254 | 460/266 | 480/277 |
| Voltage ( parallel star ) YY                                        | V                                                  | 190/110                          | 200/115 | 208/120 | 220/127            | 208/120           | 220/127 | 230/133 | 240/138 |
| Voltage ( series delta ) Δ                                          | V                                                  | 220                              | 230     | 240     | 254                | 240               | 254     | 266     | 277     |
| Rated power at Class H (125 ℃) temperature rise                     | kVA                                                | 60                               | 60      | 60      | 45                 | 67.5              | 70      | 72.5    | 75      |
|                                                                     | kW                                                 | 48.0                             | 48.0    | 48.0    | 36.0               | 54.0              | 56.0    | 58.0    | 60.0    |
| Efficiency at Class H (P.F.=0.8)                                    | 4/4%                                               | 88.2                             | 88.8    | 89      | 90.1               | 88.9              | 89.1    | 89.4    | 89.6    |
|                                                                     | 3/4%                                               | 89.5                             | 89.8    | 90      | 90.2               | 90                | 90.1    | 90.4    | 90.5    |
|                                                                     | 2/4%                                               | 90.3                             | 90.3    | 90.4    | 90                 | 90.9              | 90.9    | 91      | 91      |
| Efficiency at Class H (P.F.=1.0)                                    | 4/4%                                               | 90.9                             | 91.2    | 91.5    | 92.5               | 91.1              | 91.5    | 91.8    | 92      |
|                                                                     | 3/4%                                               | 91.9                             | 92.1    | 92.3    | 92.7               | 92.1              | 92.4    | 92.6    | 92.8    |
|                                                                     | 2/4%                                               | 92.7                             | 92.8    | 92.8    | 92.4               | 92.9              | 93      | 93      | 93      |
| Reactances (%) at Class H                                           |                                                    |                                  |         |         |                    |                   |         |         |         |
| Direct axis synchronous reactance unsaturated                       | Xd                                                 | 2.48                             | 2.24    | 2.08    | 1.39               | 3                 | 2.78    | 2.64    | 2.5     |
| Direct axis transient reactance saturated                           | X'd                                                | 0.19                             | 0.17    | 0.16    | 0.11               | 0.22              | 0.2     | 0.19    | 0.18    |
| Direct axis subtransient reactance saturated                        | X''d                                               | 0.13                             | 0.12    | 0.11    | 0.07               | 0.15              | 0.14    | 0.13    | 0.13    |
| Quadrature axis synchronous reactance unsaturated                   | Xq                                                 | 1.13                             | 1.02    | 0.95    | 0.63               | 1.38              | 1.28    | 1.21    | 1.15    |
| Quadrature axis subtransient reactance saturated                    | X''q                                               | 0.14                             | 0.13    | 0.12    | 0.08               | 0.14              | 0.13    | 0.12    | 0.12    |
| Leakage reactance                                                   | Xl                                                 | 0.08                             | 0.08    | 0.07    | 0.05               | 0.09              | 0.08    | 0.08    | 0.08    |
| Negative sequence reactance saturated                               | X2                                                 | 0.13                             | 0.12    | 0.11    | 0.07               | 0.14              | 0.13    | 0.12    | 0.12    |
| Zero sequence reactance unsaturated                                 | X0                                                 | 0.11                             | 0.1     | 0.09    | 0.06               | 0.09              | 0.08    | 0.08    | 0.08    |
| Short-circuit ratio                                                 | Kcc                                                | 0.4032                           | 0.4464  | 0.4808  | 0.7194             | 0.3333            | 0.3597  | 0.3788  | 0.4000  |
|                                                                     |                                                    |                                  |         |         |                    |                   |         |         |         |
| Short-circuit transient time constant (sec.)                        | T'd                                                | 0.029                            |         |         |                    |                   |         |         |         |
| Subtransient time constant (sec.)                                   | T''d                                               | 0.008                            |         |         |                    |                   |         |         |         |
| Open circuit time constant (sec.)                                   | T'do                                               | 0.7                              |         |         |                    |                   |         |         |         |
| Armature time constant (sec.)                                       | Tα                                                 | 0.0065                           |         |         |                    |                   |         |         |         |
| Stator Winding Resistance (20℃)                                     | ohm                                                | 0.101                            |         |         |                    |                   |         |         |         |
| Rotor Winding Resistance (20℃)                                      | ohm                                                | 0.69                             |         |         |                    |                   |         |         |         |
| Exciter Stator Resistance (20℃)                                     | ohm                                                | 20                               |         |         |                    |                   |         |         |         |
| Exciter Rotor Phase resistance                                      | ohm                                                | 0.08                             |         |         |                    |                   |         |         |         |
| No load excitation current                                          | io (A)                                             | 0.5                              | 0.52    | 0.6     | 0.5                | 0.5               | 0.51    | 0.52    | 0.53    |
| Full load excitation current                                        | ic(A)                                              | 1.8                              | 1.8     | 1.9     | 1.8                | 1.8               | 1.8     | 1.9     | 1.9     |
| Cooling air requirement                                             | m³/sec                                             | 0.216m3/s 458cfm                 |         |         |                    | 0.281m3/s 595cfm  |         |         |         |
| Mechanical Characteristic                                           |                                                    |                                  |         |         |                    |                   |         |         |         |
| Configuration                                                       | Single Bearing                                     |                                  |         |         | Double Bearing     |                   |         |         |         |
| Type of Construction                                                | B2-SAE                                             |                                  |         |         | IM B34             |                   |         |         |         |
| Total Weight - kgs                                                  | 277                                                |                                  |         |         | 268                |                   |         |         |         |
| Weight wound stator - kgs                                           | 98                                                 |                                  |         |         | 98                 |                   |         |         |         |
| Weight wound rotor - kgs                                            | 95.89                                              |                                  |         |         | 87.52              |                   |         |         |         |
| Inertia (J) [kgm2]                                                  | 0.4999kgm2                                         |                                  |         |         | 0.4682kgm2         |                   |         |         |         |
| Drive end bearing / Lubrication                                     |                                                    |                                  |         |         | BALL.6312-2RS(ISO) |                   |         |         |         |
| Non-drive end bearing / Lubrication                                 | BALL.6309-2RS(ISO)                                 |                                  |         |         | BALL.6309-2RS(ISO) |                   |         |         |         |
| Packing crate size (cm)                                             | 86X55X84                                           |                                  |         |         | 86X49X84           |                   |         |         |         |

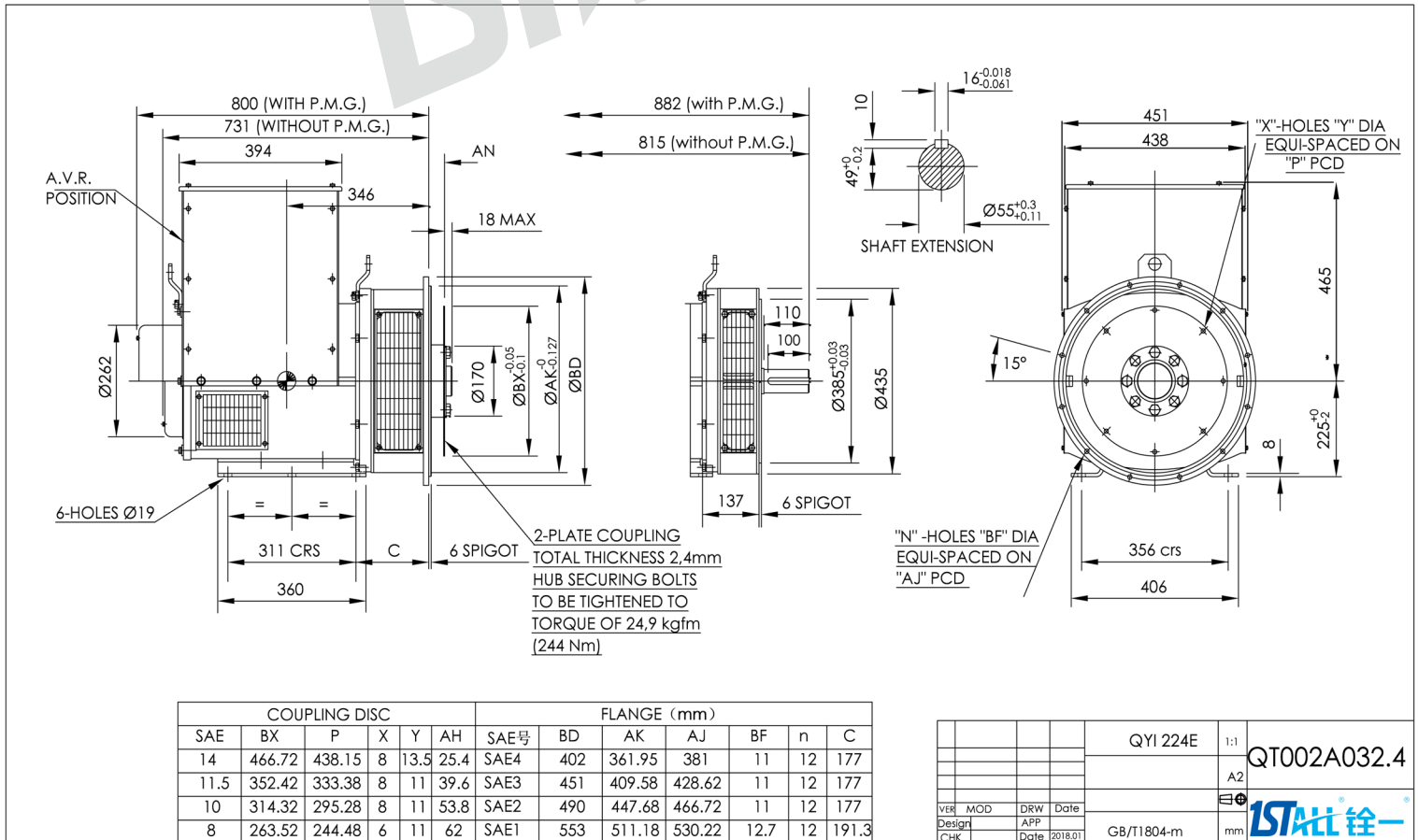
# QYI224E

## 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 |      |      |      |
|-------------------|-------------------|--------------------|------|------|------|--------------------|------|------|------|--------------------|------|------|------|--------------------|------|------|------|
| 50<br>Hz          | 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               | 53.0               | 53.0 | 53.0 | 40.3 | 60.0               | 60.0 | 60.0 | 45.0 | 61.0               | 61.0 | 61.0 | 45.8 | 63.0               | 63.0 | 63.0 | 47.3 |
|                   | kW                | 42.4               | 42.4 | 42.4 | 32.2 | 48.0               | 48.0 | 48.0 | 36.0 | 48.8               | 48.8 | 48.8 | 36.6 | 50.4               | 50.4 | 50.4 | 37.8 |
|                   | Efficiency (%)    | 88.9               | 89.3 | 89.5 | 90.3 | 88.3               | 88.8 | 89.1 | 90.2 | 88.2               | 88.7 | 89.0 | 90.2 | 88.0               | 88.5 | 88.8 | 90.1 |
|                   | kW Input          | 47.7               | 47.5 | 47.4 | 35.7 | 54.4               | 54.1 | 53.9 | 39.9 | 55.3               | 55.0 | 54.8 | 40.6 | 57.3               | 56.9 | 56.8 | 42.0 |
| 60<br>Hz          | 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               | 62.5               | 65.0 | 65.0 | 68.0 | 67.5               | 70.0 | 72.5 | 75.0 | 70.0               | 73.8 | 73.8 | 78.8 | 72.5               | 75.0 | 75.0 | 80.0 |
|                   | kW                | 50.0               | 52.0 | 52.0 | 54.4 | 54.0               | 56.0 | 58.0 | 60.0 | 56.0               | 59.0 | 59.0 | 63.0 | 58.0               | 60.0 | 60.0 | 64.0 |
|                   | Efficiency (%)    | 89.2               | 89.5 | 89.9 | 90.0 | 88.8               | 89.2 | 89.4 | 89.6 | 88.6               | 88.9 | 89.3 | 89.4 | 88.4               | 88.8 | 89.3 | 89.3 |
|                   | kW Input          | 56.1               | 58.1 | 57.8 | 60.4 | 60.8               | 62.8 | 64.9 | 67.0 | 63.2               | 66.4 | 66.1 | 70.5 | 65.6               | 67.6 | 67.2 | 71.7 |

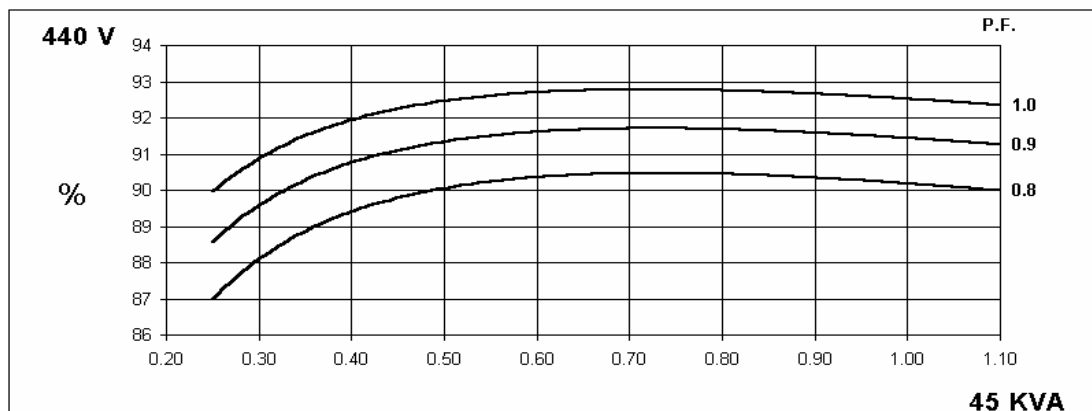
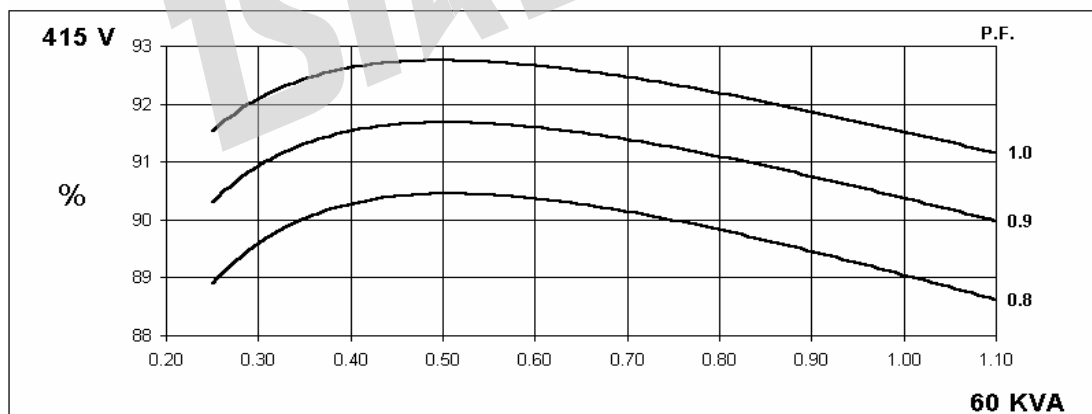
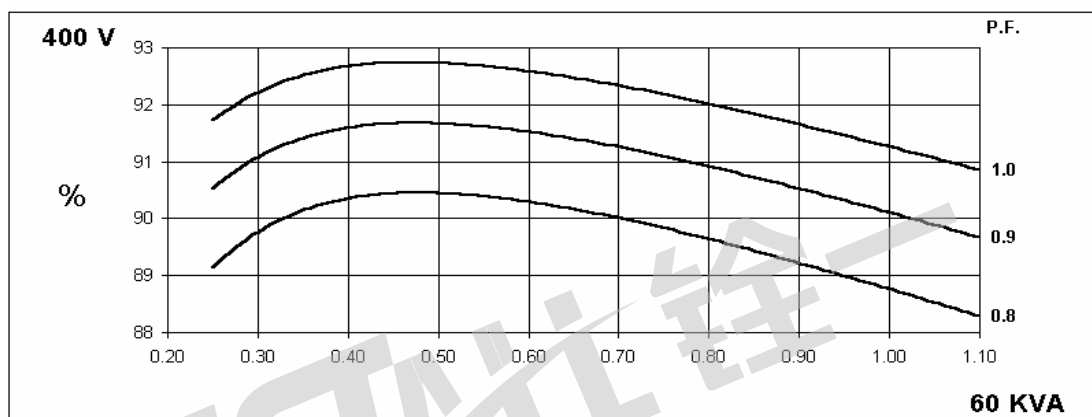
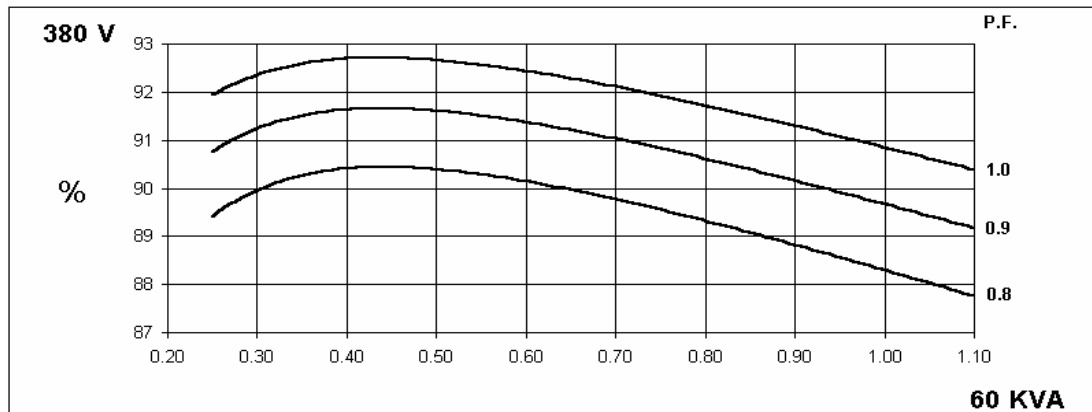
### DIMENSIONS



50  
Hz

QYI224E  
Winding 311

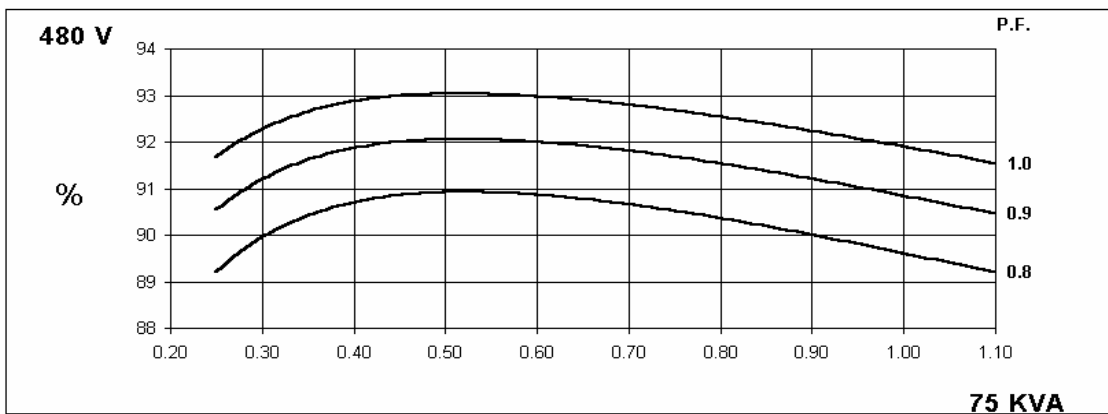
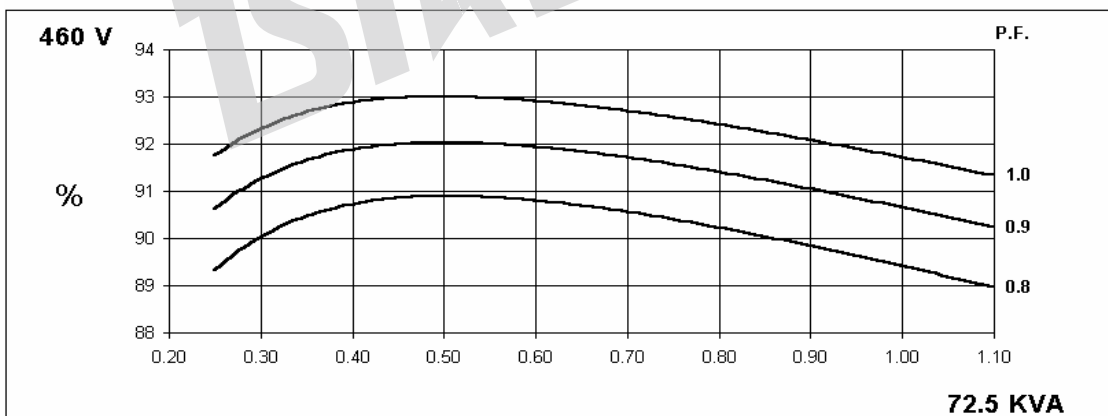
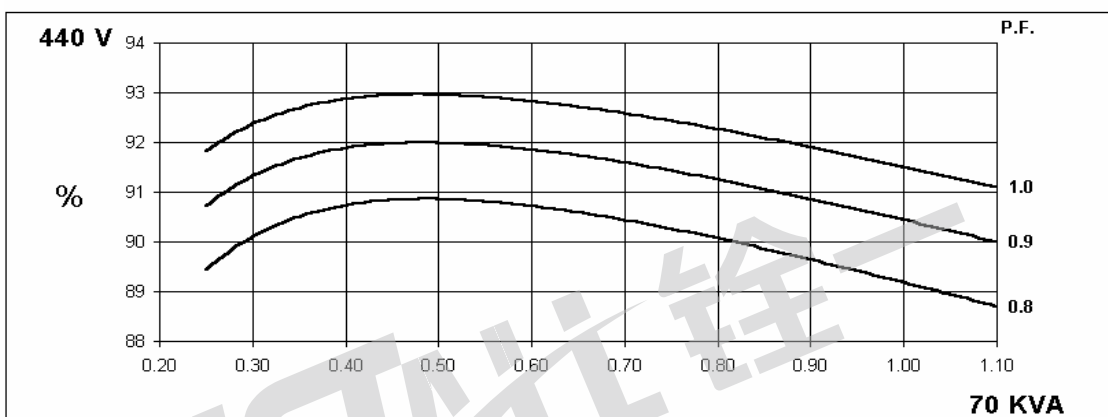
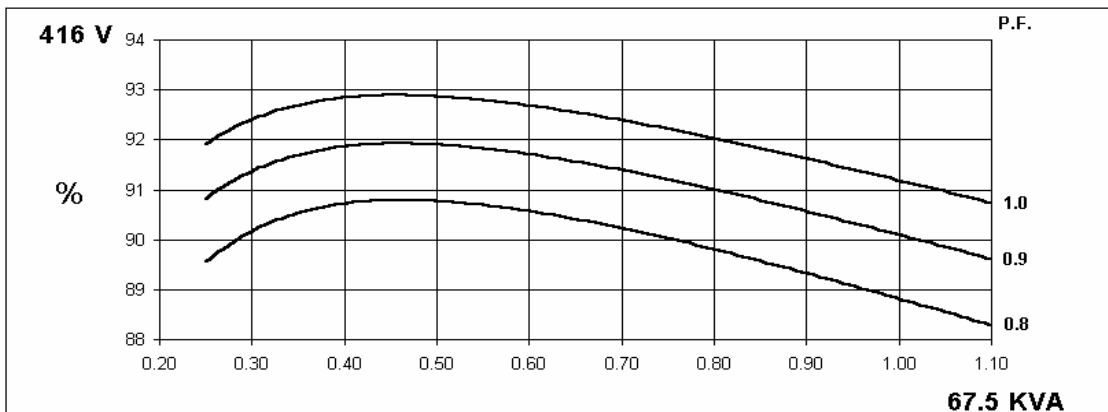
THREE PHASE EFFICIENCY CURVES



60  
Hz

QYI224E  
Winding 311

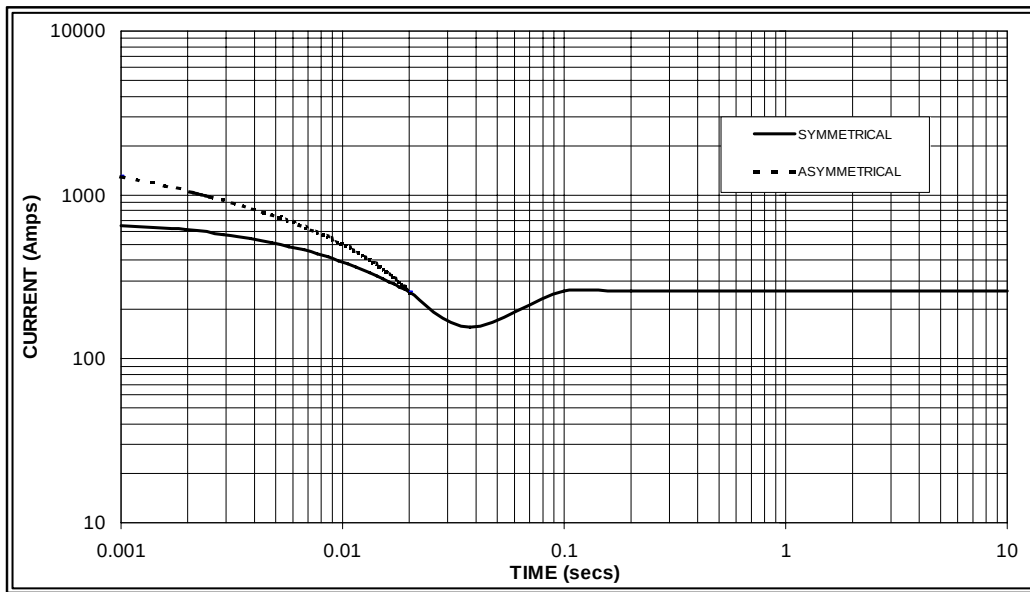
THREE PHASE EFFICIENCY CURVES



# QYI224E

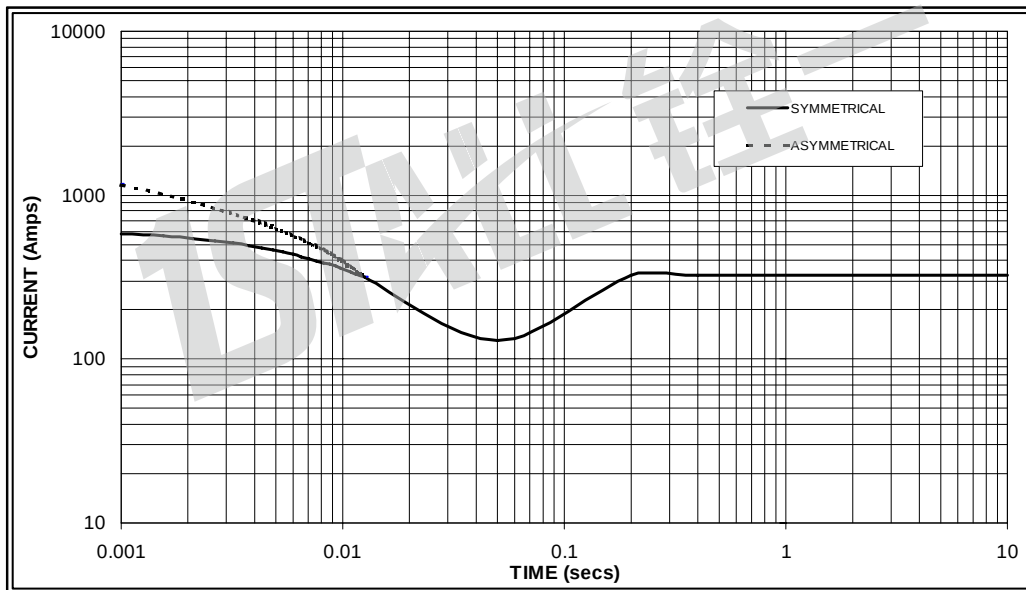
## Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50  
Hz



Sustained Short Circuit = 260 Amps

60  
Hz



Sustained Short Circuit = 325 Amps

### Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

| 50Hz    |        | 60Hz    |        |
|---------|--------|---------|--------|
| Voltage | Factor | Voltage | Factor |
| 380v    | X 1.00 | 416v    | X 1.00 |
| 400v    | X 1.07 | 440v    | X 1.06 |
| 415v    | X 1.12 | 460v    | X 1.12 |
| 440v    | X 1.18 | 480v    | X 1.17 |

The sustained current value is constant irrespective of voltage level

### Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

|                         | 3-phase | 2-phase L-L | 1-phase L-N |
|-------------------------|---------|-------------|-------------|
| Instantaneous           | x 1.00  | x 0.87      | x 1.30      |
| Minimum                 | x 1.00  | x 1.80      | x 3.20      |
| Sustained               | x 1.00  | x 1.50      | x 2.50      |
| Max. sustained duration | 10 sec. | 5 sec.      | 2 sec.      |

All other times are unchanged

### Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

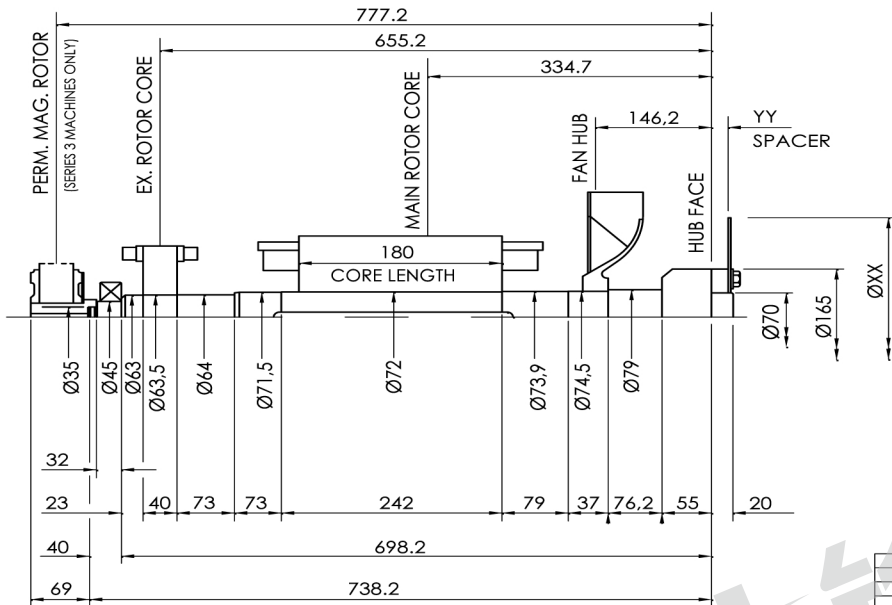
Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

# QYI224E

## Winding 311

### INERTIA

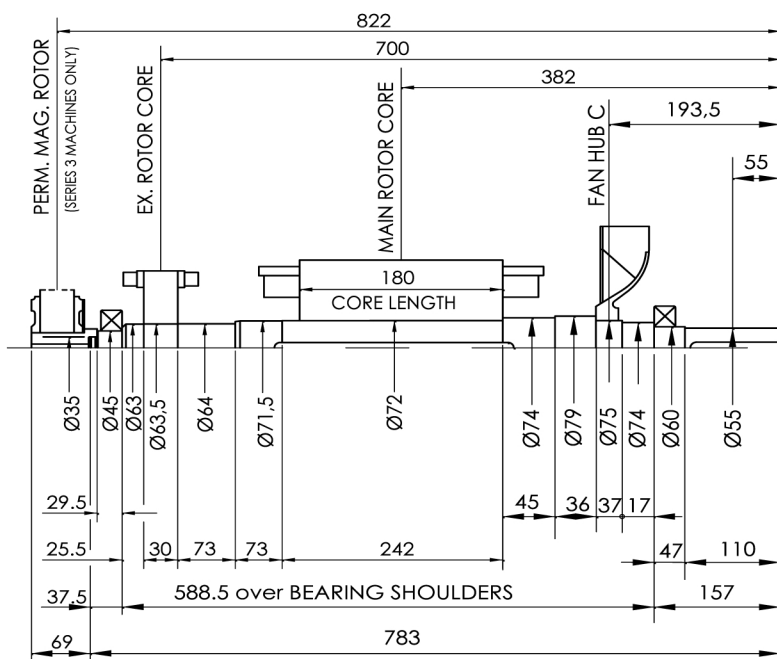


| COMPONENT  | Wt kg  | J kgm <sup>2</sup> |
|------------|--------|--------------------|
| EX. ROTOR  | 8.490  | 0,0508             |
| MAIN ROTOR | 49.670 | 0,3621             |
| FAN        | 1,940  | 0,0271             |
| SHAFT      | 23,247 | 0,0149             |
| HUB        | 7,093  | 0,0300             |
| TOTAL      | 90.440 | 0,4849             |
| PERM. MAG. | 5,450  | 0,0150             |
| TOTAL      | 95.89  | 0,4999             |

| COUPLING<br>SAE<br>No | COUPLING<br>DIMEN's |      | COUPLING<br>ASSEMBLY<br>WEIGHT<br>kg | COUPLING<br>DISC<br>J<br>kgm <sup>2</sup> |
|-----------------------|---------------------|------|--------------------------------------|-------------------------------------------|
|                       | XX                  | YY   |                                      |                                           |
| * 8                   | 263                 | 22,2 | 4,43                                 | 0,0087                                    |
| * 10                  | 314                 | 14,3 | 3,70                                 | 0,0178                                    |
| * 11 1/2              | 352                 | -    | 1,76                                 | 0,0282                                    |
| ! 11 1/2              | 352                 | 14,3 | 4,07                                 | 0,0282                                    |
| ! 14                  | 467                 | -    | 3,16                                 | 0,0878                                    |

|          |     |      |         |     |            |
|----------|-----|------|---------|-----|------------|
| QYI 224E |     |      |         | 1:1 | 0QY2010023 |
| INERTIA  |     |      |         |     |            |
| VER      | MOD | DRW  | Date    | mm  | ISTALL 铨一  |
| Design   |     | APP  |         |     |            |
| CHK      |     | Date | 2018.01 |     |            |

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| COMPONENT  | Wt kg  | J kgm <sup>2</sup> |
|------------|--------|--------------------|
| EX. ROTOR  | 8.49   | 0,0508             |
| MAIN ROTOR | 49.67  | 0,3621             |
| FAN        | 1,940  | 0,0271             |
| SHAFT      | 21.971 | 0,0132             |
| TOTAL      | 82.071 | 0,4532             |
| PERM. MAG. | 5,450  | 0,0150             |
| TOTAL      | 87.521 | 0,4682             |

|          |     |      |         |     |            |
|----------|-----|------|---------|-----|------------|
| QYI 224E |     |      |         | 1:1 | 0QY2010024 |
| INERTIA  |     |      |         |     |            |
| VER      | MOD | DRW  | Date    | mm  | ISTALL 铨一  |
| Design   |     | APP  |         |     |            |
| CHK      |     | Date | 2018.01 |     |            |

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