

# VALIADIS S.A.

## ELECTRIC MOTOR TEST REPORT - THREE PHASE INDUCTION MOTOR

|                                     |        |       |         |        |            |            |     |    |      |
|-------------------------------------|--------|-------|---------|--------|------------|------------|-----|----|------|
| Type                                | K90L-4 |       | Poles   | 4      |            | Power      | 1,5 | kW | IE:3 |
| Voltage                             | 400    | V     | Current | 3,3    | A          | Frequency  | 50  | Hz |      |
| Speed                               | 1440   | r/min | Duty    | S1     |            | Connection | Y   |    |      |
| Ins.class                           | F      |       | Weight  | 39     | kg         | IP55       |     |    |      |
| MAJOR CONTENTS                      |        |       |         |        | TEST VALUE |            |     |    |      |
| 95,0 °C PHASE RESISTANCE OF WINDING |        |       | Ω       | 2,6568 |            |            |     |    |      |
| NO LOAD CURRENT                     |        |       | A       | 1,840  |            |            |     |    |      |
| NO LOAD INPUT                       |        |       | W       | 102,12 |            |            |     |    |      |
| CORE LOSS(Pfe)                      |        |       | W       | 57,84  |            |            |     |    |      |
| WINDAGE FRICTION LOSS(Pfw)          |        |       | W       | 22,24  |            |            |     |    |      |
| STATOR WINDING LOSS(Pcu1)           |        |       | W       | 78,52  |            |            |     |    |      |
| ROTOR WINDING LOSS(Pcu2)            |        |       | W       | 65,25  |            |            |     |    |      |
| STRAY LOAD LOSS(Ps)                 |        |       | W       | 35,20  |            |            |     |    |      |
| LOCKED ROTOR CURRENT                |        |       | A       | 23,356 |            |            |     |    |      |
| LOCKED ROTOR INPUT @ FULL LOAD      |        |       | W       | 8468   |            |            |     |    |      |
| LOCKED ROTOR TORQUE                 |        |       | N.m     | 29,0   |            |            |     |    |      |
| PULL OUT TORQUE                     |        |       | N.m     | 29,9   |            |            |     |    |      |
| LOCKED ROTOR CURRENT/RATED CURRENT  |        |       | P.U     | 7,04   |            |            |     |    |      |
| LOCKED ROTOR TORQUE/RATED TORQUE    |        |       | P.U     | 2,88   |            |            |     |    |      |
| PULL OUT TORQUE/RATED TORQUE        |        |       | P.U     | 2,97   |            |            |     |    |      |
| FULL LOAD TORQUE                    |        |       | N.m     | 10,0   |            |            |     |    |      |
| FULL LOAD CURRENT                   |        |       | A       | 3,3    |            |            |     |    |      |
| FULL LOAD SLIP                      |        |       | %       | 4,020  |            |            |     |    |      |
| INPUT @ FULL LOAD                   |        |       | kW      | 1,760  |            |            |     |    |      |
| FULL LOAD SPEED                     |        |       | r/min   | 1439,7 |            |            |     |    |      |
| EFFICIENCY @ FULL LOAD              |        |       | %       | 85,25  |            |            |     |    |      |
| EFFICIENCY @ 75% LOAD               |        |       | %       | 85,77  |            |            |     |    |      |
| POWER FACTOR @ FULL LOAD            |        |       |         | 0,765  |            |            |     |    |      |
| STATOR WINDING TEMPERATURE RISE     |        |       | K       | 33     |            |            |     |    |      |
| D.E. BEARINGS TEMPERATURE BY PT100  |        |       | °C      | 26,7   |            |            |     |    |      |
| STATOR WINDING TEMPERATURE          |        |       | °C      | 39,0   |            |            |     |    |      |
| High voltage test                   |        |       | V       | 1800   | Imin       |            |     |    |      |
| Insulation resistance               |        |       | MΩ      | 500    |            |            |     |    |      |
| NOISE ( LW)                         |        |       | dB(A)   | 59     |            |            |     |    |      |
| VIBRATION                           |        |       | mm/s    | 0,4    |            |            |     |    |      |

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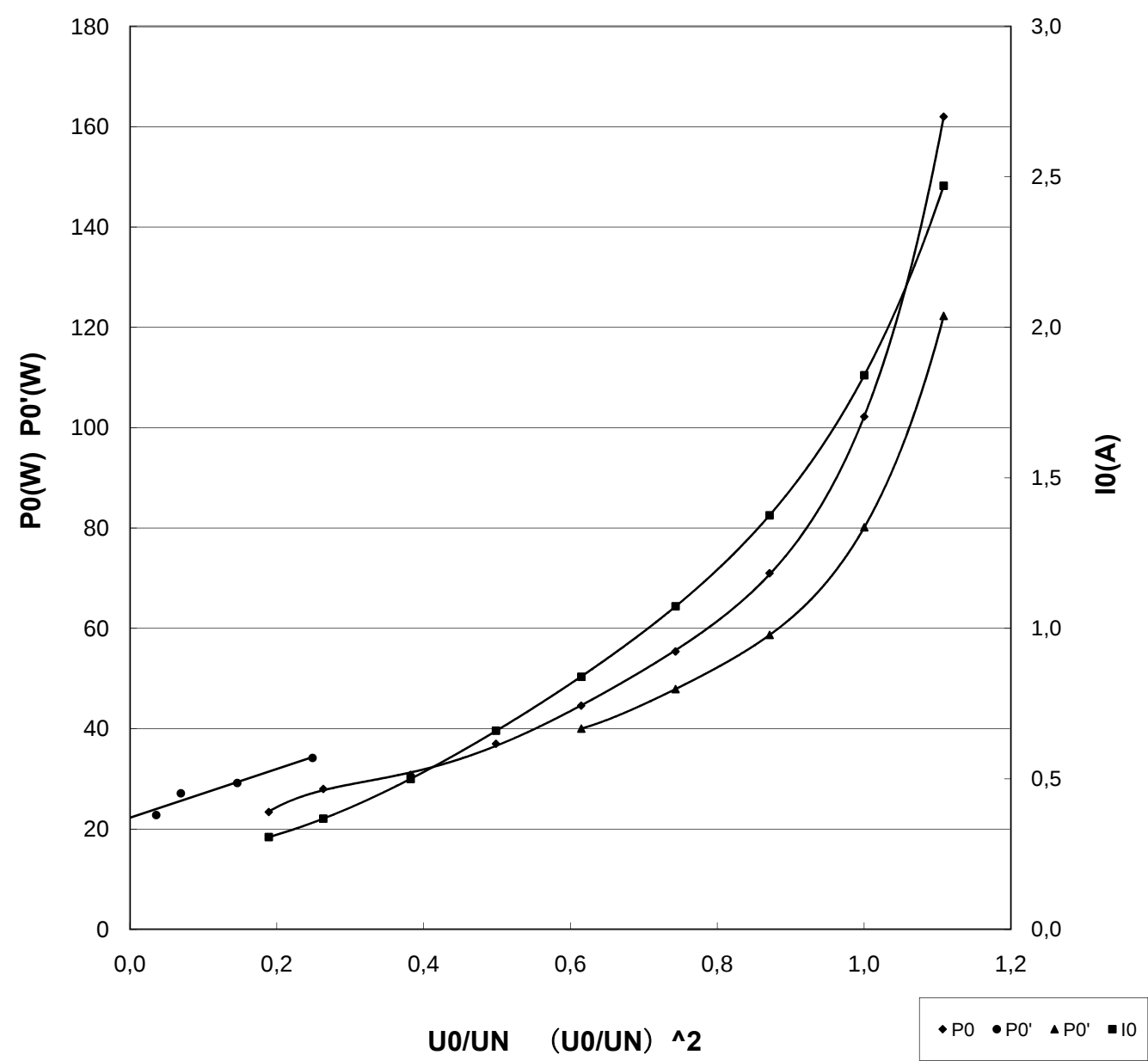
|                             |        |             |         |           |       |        |            |       |        |      |        |
|-----------------------------|--------|-------------|---------|-----------|-------|--------|------------|-------|--------|------|--------|
|                             |        |             |         |           |       |        |            |       |        | IE:3 |        |
| Type                        | K90L-4 |             | Poles   |           | 4     |        | Power      |       | 1,5 kW |      |        |
| Voltage                     | 400    | V           | Current |           | 3,3   | A      | Frequency  |       | 50     | Hz   |        |
| Speed                       | 1440   | r/min       | Duty    |           | S1    |        | Connection |       | Y      |      |        |
| Ins.class                   | F      |             | Weight  |           | 39    | kg     | IP55       |       |        |      |        |
| NO LOAD TEST                |        |             |         |           |       |        |            |       |        |      |        |
| VOL                         | mul.   | HZ          | I01     | I02       | I03   | mul.   | W1         | W2    | mul.   | °C   | Ω      |
| 443,4                       | 1      | 50          | 2,413   | 2,489     | 2,510 | 1      | -445,8     | 607,8 | 1      | 34,5 | 2,1697 |
| 400,1                       | 1      | 50          | 1,822   | 1,832     | 1,870 | 1      | -303,6     | 405,8 | 1      | 34,5 | 2,1697 |
| 348,5                       | 1      | 50          | 1,379   | 1,379     | 1,368 | 1      | -205,0     | 276,0 | 1      | 34,5 | 2,1697 |
| 297,3                       | 1      | 50          | 1,081   | 1,089     | 1,051 | 1      | -137,0     | 192,4 | 1      | 34,5 | 2,1697 |
| 245,9                       | 1      | 50          | 0,844   | 0,859     | 0,815 | 1      | -85,8      | 130,4 | 1      | 34,5 | 2,1697 |
| 199,5                       | 1      | 50          | 0,659   | 0,680     | 0,640 | 1      | -50,6      | 87,6  | 1      | 34,1 | 2,1665 |
| 152,9                       | 1      | 50          | 0,494   | 0,521     | 0,485 | 1      | -24,4      | 55,2  | 1      | 34,1 | 2,1665 |
| 105,4                       | 1      | 50          | 0,355   | 0,388     | 0,361 | 1      | -5,2       | 33,2  | 1      | 33,9 | 2,1649 |
| 75,7                        | 1      | 50          | 0,289   | 0,325     | 0,306 | 1      | 1,2        | 22,2  | 1      | 33,7 | 2,1633 |
| data calculation of no load |        |             |         |           |       |        |            |       |        |      |        |
| V%                          | U0/UN  | I0          | P0      | (U0/UN)^2 | P0cu1 | P0'    |            |       |        |      |        |
| 110,8%                      | 1,11   | 2,471       | 162,0   | 1,229     | 39,73 | 122,27 |            |       |        |      |        |
| 100,0%                      | 1,00   | 1,841       | 102,2   | 1,001     | 22,06 | 80,14  |            |       |        |      |        |
| 87,1%                       | 0,87   | 1,376       | 71,0    | 0,759     | 12,32 | 58,68  |            |       |        |      |        |
| 74,3%                       | 0,74   | 1,074       | 55,4    | 0,552     | 7,50  | 47,90  |            |       |        |      |        |
| 61,5%                       | 0,61   | 0,839       | 44,6    | 0,378     | 4,58  | 40,02  |            |       |        |      |        |
| 49,9%                       | 0,50   | 0,660       | 37,0    | 0,249     | 2,83  | 34,17  |            |       |        |      |        |
| 38,2%                       | 0,38   | 0,500       | 30,8    | 0,146     | 1,62  | 29,18  |            |       |        |      |        |
| 26,3%                       | 0,26   | 0,368       | 28,0    | 0,069     | 0,88  | 27,12  |            |       |        |      |        |
| 18,9%                       | 0,19   | 0,307       | 23,4    | 0,036     | 0,61  | 22,79  |            |       |        |      |        |
|                             |        |             |         |           |       |        |            |       |        |      |        |
| RESULTS AT: 400 V           |        |             |         |           |       |        |            |       |        |      |        |
| N.L.AMP                     | 1,84   | N.L.LOSS(W) | 102,12  | Pw(W)     | 22,2  | Pe(W)  | 57,8       |       |        |      |        |

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|           |        |       |         |     |    |            |      |      |
|-----------|--------|-------|---------|-----|----|------------|------|------|
| Type      | K90L-4 |       | Poles   | 4   |    | Power      | 1,5  | IE:3 |
| Voltage   | 400    | V     | Current | 3,3 | A  | Frequency  | 50,0 | kW   |
| Speed     | 1440   | r/min | Duty    | S1  |    | Connection | Y    | Hz   |
| Ins.class |        | F     | Weight  | 39  | kg |            | IP55 |      |

No Load Curve



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| Type      | K90L-4 |       | Poles   | 4   |    | Power      | 1,5  | IE:3 |
| Voltage   | 400    | V     | Current | 3,3 | A  | Frequency  | 50,0 | kW   |
| Speed     | 1440   | r/min | Duty    | S1  |    | Connection | Y    | Hz   |
| Ins.class |        | F     | Weight  | 39  | kg |            | IP55 |      |

### LOCKED ROTOR TEST

| VOL   | mul. | Ik1   | Ik2   | Ik3   | mul. | W1    | W2    | mul. | Torqur<br>( kg.m) |
|-------|------|-------|-------|-------|------|-------|-------|------|-------------------|
| 408,5 | 1,0  | 2,402 | 2,409 | 2,424 | 10,0 | 27,9  | 865,7 | 10,0 | 3,11              |
| 362,8 | 1,0  | 1,997 | 2,003 | 2,012 | 10,0 | 9,4   | 633,4 | 10,0 | 2,29              |
| 316,3 | 1,0  | 1,614 | 1,621 | 1,631 | 10,0 | -5,4  | 440,7 | 10,0 | 1,58              |
| 270,4 | 1,0  | 1,269 | 1,275 | 1,283 | 10,0 | -14,6 | 290,3 | 10,0 | 1,02              |
| 213,4 | 1,0  | 0,886 | 0,889 | 0,895 | 10,0 | -16,7 | 154,7 | 10,0 | 0,53              |
| 153,9 | 1,0  | 0,560 | 0,562 | 0,564 | 10,0 | -11,9 | 68,2  | 10,0 | 0,22              |
| 105,8 | 1,0  | 0,356 | 0,359 | 0,358 | 10,0 | -6,3  | 29,3  | 10,0 | 0,09              |

### data calculation of locked rotor

| Uk     | IK    | PK    | TK    | LOGUk  | LOGIk  | LOGPk   | LOGTk   |
|--------|-------|-------|-------|--------|--------|---------|---------|
| V      | A     | kW    | N.m   |        |        |         |         |
| 408,53 | 24,12 | 8,936 | 30,50 | 2,6112 | 1,3823 | 0,9511  | 1,4843  |
| 362,84 | 20,04 | 6,428 | 22,40 | 2,5597 | 1,3019 | 0,8081  | 1,3502  |
| 316,32 | 16,22 | 4,353 | 15,50 | 2,5001 | 1,2100 | 0,6388  | 1,1903  |
| 270,42 | 12,76 | 2,757 | 10,00 | 2,4320 | 1,1057 | 0,4404  | 1,0000  |
| 213,37 | 8,90  | 1,380 | 5,20  | 2,3291 | 0,9495 | 0,1399  | 0,7160  |
| 153,89 | 5,62  | 0,563 | 2,20  | 2,1872 | 0,7498 | -0,2495 | 0,3424  |
| 105,79 | 3,58  | 0,230 | 0,90  | 2,0244 | 0,5537 | -0,6383 | -0,0458 |

### performance collection of locked rotor

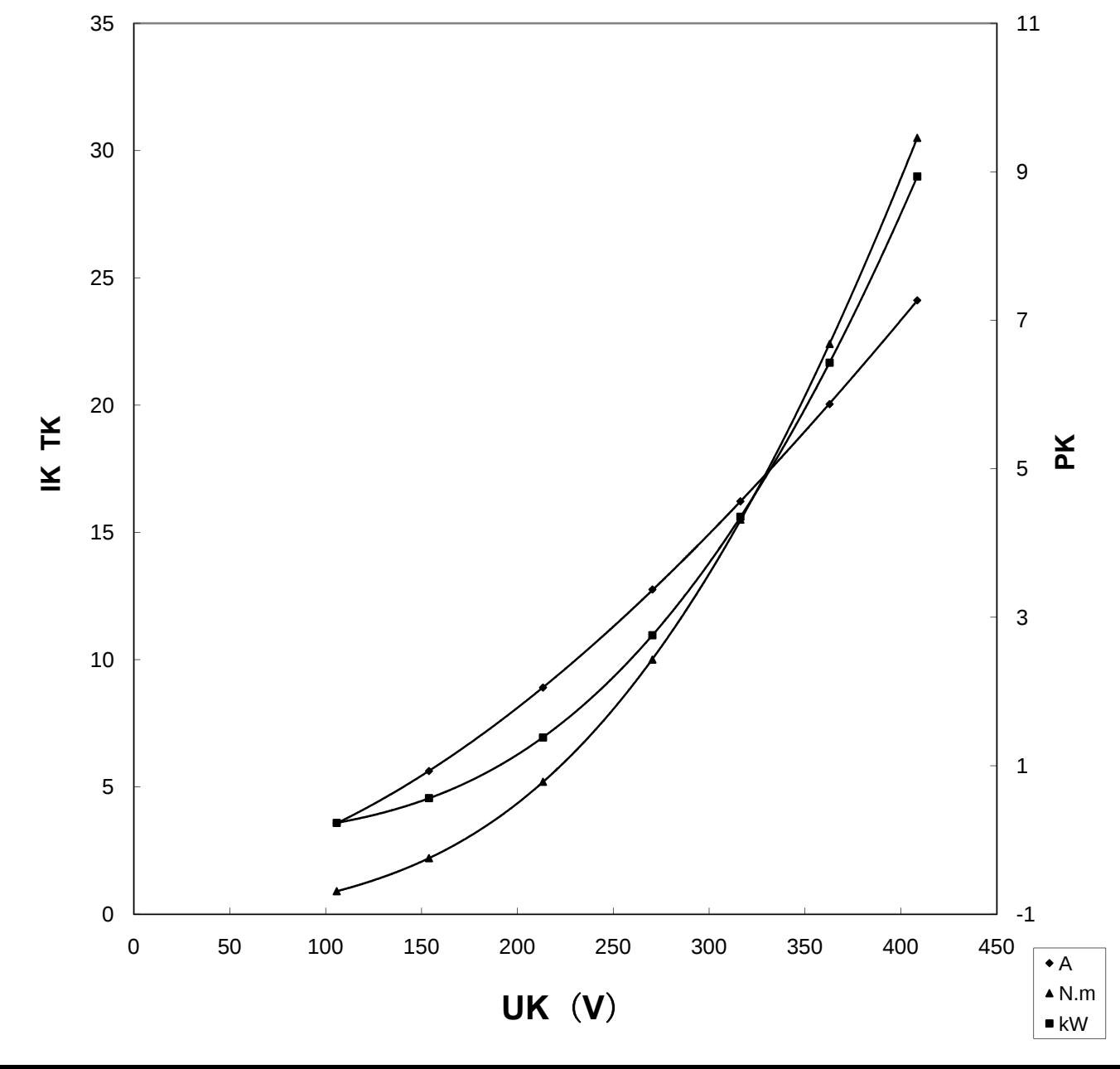
|               | at rated volts | at rated current | at 2.5 times rated<br>current | at 100V |
|---------------|----------------|------------------|-------------------------------|---------|
| VOLTS ( V )   | 400            | 99,234           | 202,0                         | 100,0   |
| AMPS ( A )    | 23,4           | 3,3              | 8,3                           | 3,17    |
| INPUT ( kW )  | 8,47           |                  | 1,2                           | 0,101   |
| TORQUE ( N.m) | 28,99          |                  |                               |         |

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|-----------|--------|-------|---------|-----|----|------------|------|--|------|
| Type      | K90L-4 |       | Poles   | 4   |    | Power      | 1,5  |  | IE:3 |
| Voltage   | 400    | V     | Current | 3,3 | A  | Frequency  | 50,0 |  | kW   |
| Speed     | 1440   | r/min | Duty    | S1  |    | Connection | Y    |  | Hz   |
| Ins.class |        | F     | Weight  | 39  | kg |            |      |  | IP55 |

Locked Rotor Curve



## ELECTRIC MOTOR TEST REPORT - THREE PHASE INDUCTION MOTOR

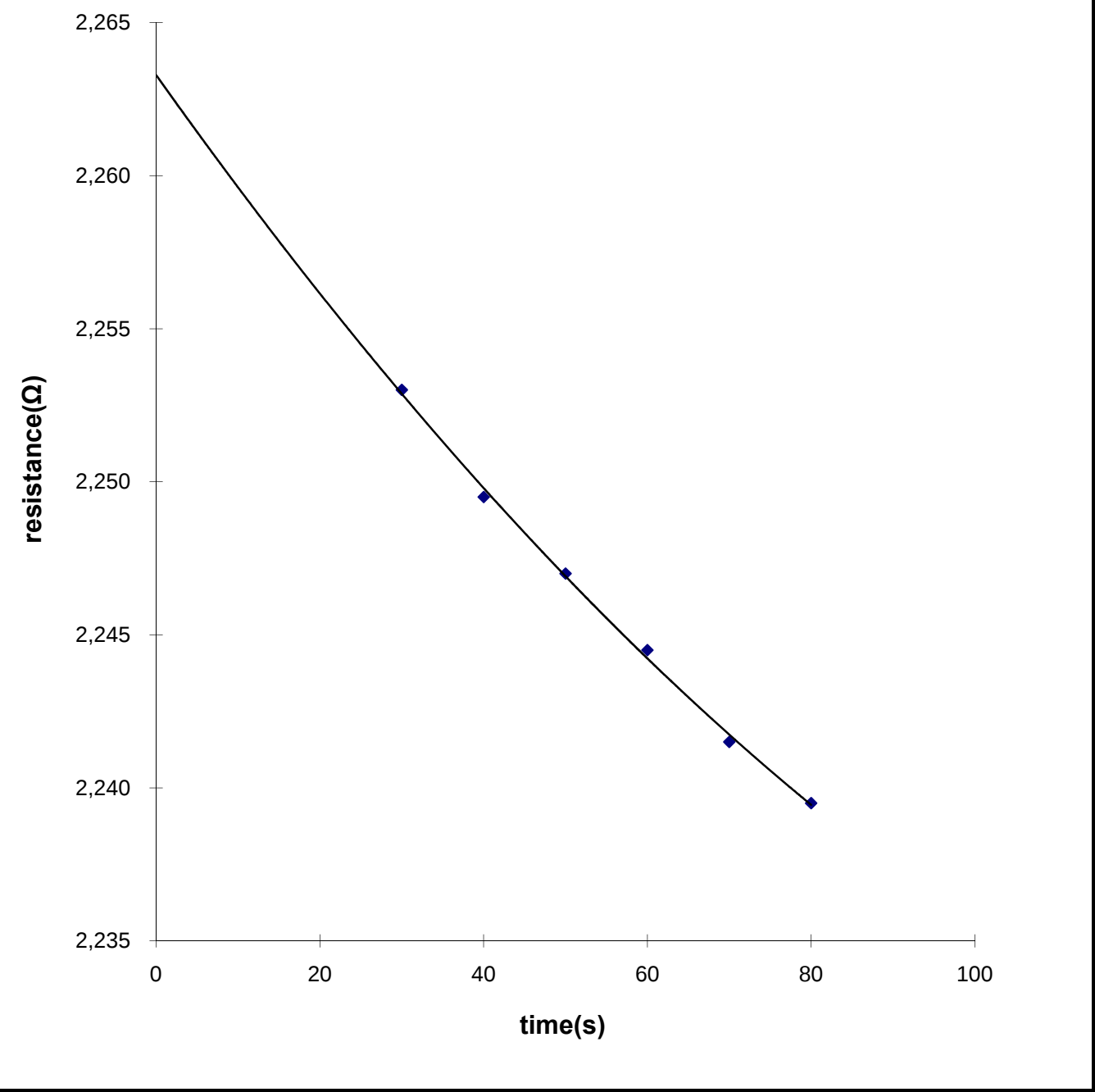
|                                                          |        |          |        |                                  |         |         |         |      |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
|----------------------------------------------------------|--------|----------|--------|----------------------------------|---------|---------|---------|------|---------------------------|------------|--------------|----------|----------|----------|----------|-----------------------|----------|-----------|-----------|-----------|-----------|--|
| Type                                                     | K90L-4 |          |        |                                  |         |         |         |      | Poles                     | 4          |              | Power    | 1,5 kW   |          | IE:3     |                       |          |           |           |           |           |  |
| Voltage                                                  | 400    |          | V      |                                  | Current | 3,3     |         | A    |                           | Frequency  | 50           |          | Hz       |          |          |                       |          |           |           |           |           |  |
| Speed                                                    | 1440   |          | r/min  |                                  | Duty    | S1      |         |      |                           | Connection | Y            |          |          |          |          |                       |          |           |           |           |           |  |
| Ins.class                                                | F      |          |        |                                  | Weight  | 39      |         | kg   |                           |            |              | IP55     |          |          |          |                       |          |           |           |           |           |  |
| TEMPERATURE RISE TEST                                    |        |          |        |                                  |         |         |         |      |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| TIME<br>(h:min)                                          | V      | I1       | I2     | I3                               | mul.    | W1      | W2      | mul. | T1<br>°C                  | T2<br>°C   | T3<br>°C     | T4<br>°C | T5<br>°C | T6<br>°C | T7<br>°C | T8<br>°C              | T9<br>°C | T10<br>°C | T11<br>°C | T12<br>°C | T13<br>°C |  |
| 14,00                                                    | 399,7  | 1,653    | 1,653  | 1,684                            | 2       | 219,1   | 652,0   | 2    | 28,7                      | —          | 39,6         | 39,1     | —        | —        | —        | —                     | —        | —         | —         | —         | 11,1      |  |
| 14,30                                                    | 400,2  | 1,658    | 1,658  | 1,689                            | 2       | 219,8   | 654,6   | 2    | 28,5                      | —          | 39,4         | 38,9     | —        | —        | —        | —                     | —        | —         | —         | —         | 11,4      |  |
| 15,02                                                    | 400,2  | 1,658    | 1,658  | 1,689                            | 2       | 219,5   | 654,5   | 2    | 27,2                      | —          | 39,4         | 38,9     | —        | —        | —        | —                     | —        | —         | —         | —         | 11,4      |  |
| 15,30                                                    | 399,7  | 1,655    | 1,653  | 1,686                            | 2       | 219,7   | 651,9   | 2    | 26,7                      | —          | 39,0         | 38,5     | —        | —        | —        | —                     | —        | —         | —         | —         | 11,6      |  |
| The average of the last three                            |        | 3,335    |        | A                                |         | 1746,67 |         | W    | 26,7                      | —          | 39,3         | 38,5     | —        | —        | —        | —                     | —        | —         | —         | —         | 11,5      |  |
| T1 T2 : DE BEARING TEMPERATURE                           |        |          |        |                                  |         |         |         |      | T11 : CORE TEMPERATRE     |            |              |          |          |          |          | T12: FRAME TEMPERATRE |          |           |           |           |           |  |
| T3~T10 : DE WINDING TEMPERATURE                          |        |          |        |                                  |         |         |         |      | T13 : AMBIENT TEMPERATURE |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| WINDING RESISTANCE (HOT) AT END OF TEMPERATURE RISE TEST |        |          |        |                                  |         |         |         |      |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| TIME (S)                                                 | 30     | 40       | 50     | 60                               | 70      | 80      |         |      |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| RESISTANC                                                | 2,2530 | 2,2495   | 2,2470 | 2,2445                           | 2,2415  | 2,2395  |         |      |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| WINDING RESISTANCE(COLD)                                 |        |          |        |                                  |         |         |         |      |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| Δ                                                        | U1-V1  |          | U1-W1  |                                  | V1-W1   |         | AVERAGE |      | MIN                       |            | AMBIENT TEM. |          |          |          |          |                       |          |           |           |           |           |  |
|                                                          |        |          |        |                                  |         |         |         |      |                           |            | °C           |          |          |          |          |                       |          |           |           |           |           |  |
| Y                                                        | U1-U2  |          | V1-V2  |                                  | W1-W2   |         | AVERAGE |      | MIN                       |            | AMBIENT TEM. |          |          |          |          |                       |          |           |           |           |           |  |
|                                                          | 1,9715 |          | 1,9716 |                                  | 1,9695  |         | 1,971   |      | 1,9695                    |            | 9,8 °C       |          |          |          |          |                       |          |           |           |           |           |  |
| resistance value at 0 sec ( Ω )                          |        |          |        |                                  |         |         |         |      |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| 30 S ( Ω )                                               |        | 2,263289 |        | calculation value of temp.rising |         | 34,85   |         | K    |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
| full load curent                                         |        | 2,252833 |        | calculation value of temp.rising |         | 33,55   |         | K    |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |
|                                                          |        | 3,32 A   |        | modify value of temp. rising     |         | 33,25   |         | K    |                           |            |              |          |          |          |          |                       |          |           |           |           |           |  |

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| Type      | K90L-4 |       | Poles   | 4   |    | output Power | 1,5  | IE:3 |
| Voltage   | 400    | V     | Current | 3,3 | A  | Frequency    | 50,0 | kW   |
| Speed     | 1440   | r/min | Duty    | S1  |    | Connection   | Y    | Hz   |
| Ins.class | F      |       | Weight  | 39  | kg |              | IP55 |      |

RESISTANCE CURVE



## ELECTRIC MOTOR TEST REPORT - THREE PHASE INDUCTION MOTOR

| LOAD TEST |       |       |       |       |      |        |       |      |        |              |                |            |
|-----------|-------|-------|-------|-------|------|--------|-------|------|--------|--------------|----------------|------------|
| V         | HZ    | I1    | I2    | I3    | mul. | W1     | W2    | mul. | r/min  | Resistance Ω | Temperature °C | Torque N.m |
| 400,1     | 50,00 | 2,404 | 2,403 | 2,445 | 2    | 344,2  | 963,7 | 2    | 1416,3 | 2,1842       | 36,3           | 14,65      |
| 399,9     | 50,00 | 1,915 | 1,910 | 1,942 | 2    | 288,0  | 770,9 | 2    | 1431,3 | 2,1874       | 36,7           | 12,03      |
| 399,8     | 50,00 | 1,630 | 1,631 | 1,659 | 2    | 215,9  | 650,4 | 2    | 1443,9 | 2,1923       | 37,3           | 9,87       |
| 400,3     | 50,00 | 1,339 | 1,351 | 1,362 | 2    | 125,3  | 525,2 | 2    | 1459,7 | 2,1939       | 37,5           | 7,36       |
| 399,9     | 50,00 | 1,103 | 1,110 | 1,119 | 2    | 34,2   | 404,1 | 2    | 1473,6 | 2,1907       | 37,1           | 4,83       |
| 400,1     | 50,00 | 0,949 | 0,957 | 0,971 | 2    | -55,7  | 300,5 | 2    | 1485,2 | 2,1874       | 36,7           | 2,43       |
|           |       |       |       |       |      |        |       |      |        |              |                |            |
| 400,0     | 50,0  | 1,836 | 1,839 | 1,845 | 1,0  | -267,9 | 440,5 | 1    | 1496,8 | 2,1858       | 36,5           | 0,47       |
| 400,1     | 50,0  | 1,835 | 1,842 | 1,839 | 1,0  | -303,5 | 406,1 | 1    | 1500,0 | 2,1705       | 34,6           | 0,00       |

| LOAD % | P2<br>W | I<br>A | P1<br>W | Pcu1s<br>W | Ss<br>% | Pcu2s<br>W | Ps<br>W | Pz<br>W | N.m  | EFF<br>% | P.F   |
|--------|---------|--------|---------|------------|---------|------------|---------|---------|------|----------|-------|
| 150,0  | 2250    | 5,10   | 2749,3  | 185,4      | 6,213   | 155,7      | 82,8    | 503,9   | 15,3 | 81,84    | 0,778 |
| 125,0  | 1875    | 4,08   | 2238,2  | 118,8      | 5,116   | 105,5      | 56,3    | 360,6   | 12,6 | 83,77    | 0,791 |
| 100,0  | 1500    | 3,32   | 1759,5  | 78,5       | 4,020   | 65,3       | 35,2    | 259,1   | 10,0 | 85,25    | 0,765 |
| 75,0   | 1125    | 2,72   | 1311,6  | 52,6       | 2,868   | 34,4       | 19,3    | 186,4   | 7,4  | 85,77    | 0,697 |
| 50,0   | 750     | 2,24   | 889,4   | 35,6       | 1,893   | 15,1       | 8,4     | 139,2   | 4,9  | 84,33    | 0,574 |
| 25,0   | 375     | 1,92   | 487,4   | 26,2       | 1,042   | 4,2        | 2,0     | 112,5   | 2,4  | 76,93    | 0,367 |

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| Type      | K90L-4 |       | Poles   | 4   |    | output Power | 1,5  | IE:3 |
| Voltage   | 400    | V     | Current | 3,3 | A  | Frequency    | 50,0 | kW   |
| Speed     | 1440   | r/min | Duty    | S1  |    | Connection   | Y    | Hz   |
| Ins.class |        | F     | Weight  | 39  | kg |              | IP55 |      |

### LOAD CURVE

