

# GIMAC1000 MODBUS MAP

| REGISTER | ADDRESS | BYTE | REGISTER NAME           | RANGE | UNIT | FORMAT | R/W | SWAP | Remark |
|----------|---------|------|-------------------------|-------|------|--------|-----|------|--------|
| 1        | 0       | 2    | Wh RESET                | -     | -    | F001   | W   | -    |        |
| 101      | 100     | 2    | rWh RESET               | -     | -    | F001   | W   | -    |        |
| 201      | 200     | 2    | VARh RESET              | -     | -    | F001   | W   | -    |        |
| 301      | 300     | 2    | rVARh RESET             | -     | -    | F001   | W   | -    |        |
| 401      | 400     | 2    | VAH RESET               | -     | -    | F001   | W   | -    |        |
| 501      | 500     | 2    | MAX V THD RESET         | -     | -    | F001   | W   | -    |        |
| 601      | 600     | 2    | MAX A RESET             | -     | -    | F001   | W   | -    |        |
| 701      | 700     | 2    | MAX A THD RESET         | -     | -    | F001   | W   | -    |        |
| 801      | 800     | 2    | MAX W RESET             | -     | -    | F001   | W   | -    |        |
| 901      | 900     | 2    | MAX VAR RESET           | -     | -    | F001   | W   | -    |        |
| 1001     | 1000    | 2    | MAX VA RESET            | -     | -    | F001   | W   | -    |        |
| 1101     | 1100    | 2    | MAX DEMAND W RESET      | -     | -    | F001   | W   | -    |        |
| 1201     | 1200    | 2    | MAX DEMAND A RESET      | -     | -    | F001   | W   | -    |        |
| 1301     | 1300    | 2    | DEMAND A RESET          | -     | -    | F001   | W   | -    |        |
| 1401     | 1400    | 2    | DEMAND W RESET          | -     | -    | F001   | W   | -    |        |
| 1501     | 1500    | 2    | DI1 COUNTER RESET       | -     | -    | F001   | W   | -    |        |
| 1511     | 1510    | 2    | DI2 COUNTER RESET       | -     | -    | F001   | W   | -    |        |
| 2001     | 2000    | 2    | ALL DATA RESET          | -     | -    | F001   | W   | -    |        |
| 5555     | 5554    | 2    | ALL ERROR COUNTER RESET | -     | -    | F001   | W   | -    |        |

|       |    |   |                                  |                                        |       |      |   |   |                                                                                     |
|-------|----|---|----------------------------------|----------------------------------------|-------|------|---|---|-------------------------------------------------------------------------------------|
| 30001 | 0  | 4 | Average Voltage                  | 0 ~ 999.9k                             | V     | F004 | R | O |                                                                                     |
| 30003 | 2  | 4 | Average Current                  | 0 ~ 999.9k                             | A     | F004 | R | O |                                                                                     |
| 30005 | 4  | 4 | A Phase Current                  | 0 ~ 999.9k                             | A     | F004 | R | O |                                                                                     |
| 30007 | 6  | 4 | B Phase Current                  | 0 ~ 999.9k                             | A     | F004 | R | O |                                                                                     |
| 30009 | 8  | 4 | C Phase Current                  | 0 ~ 999.9k                             | A     | F004 | R | O |                                                                                     |
| 30011 | 10 | 4 | A-N Phase Voltage                | 0 ~ 999.9k                             | V     | F004 | R | O |                                                                                     |
| 30013 | 12 | 4 | B-N Phase Voltage                | 0 ~ 999.9k                             | V     | F004 | R | O |                                                                                     |
| 30015 | 14 | 4 | C-N Phase Voltage                | 0 ~ 999.9k                             | V     | F004 | R | O |                                                                                     |
| 30017 | 16 | 4 | A-B Line Voltage                 | 0 ~ 999.9k                             | V     | F004 | R | O |                                                                                     |
| 30019 | 18 | 4 | B-C Line Voltage                 | 0 ~ 999.9k                             | V     | F004 | R | O |                                                                                     |
| 30021 | 20 | 4 | C-A Line Voltage                 | 0 ~ 999.9k                             | V     | F004 | R | O |                                                                                     |
| 30023 | 22 | 4 | Power Factor                     | -1.000 ~ 1.000                         | F / R | F004 | R | O | '-'(minus) means Lead                                                               |
| 30025 | 24 | 4 | Total Active Power               | -999,999,999,999.9 ~ 999,999,999,999.9 | W     | F004 | R | O |                                                                                     |
| 30027 | 26 | 4 | Total Reactive Power             | -999,999,999,999.9 ~ 999,999,999,999.9 | Var   | F004 | R | O |                                                                                     |
| 30029 | 28 | 4 | Total Apparent Power             | -999,999,999,999.9 ~ 999,999,999,999.9 | VA    | F004 | R | O |                                                                                     |
| 30031 | 30 | 4 | Frequency                        | 0, 40 ~ 70.5                           | Hz    | F004 | R | O |                                                                                     |
| 30033 | 32 | 4 | Active Electric Energy           | 0 ~ 999,999,999.9                      | Wh    | F004 | R | O | When reading the power amount, the Giga counter value (30531) needs to be added up. |
| 30035 | 34 | 4 | Reactive Electric Energy         | 0 ~ 999,999,999.9                      | Varh  | F004 | R | O | When reading the power amount, the Giga counter value (30532) needs to be added up. |
| 30037 | 36 | 4 | Apparent Electric Energy         | 0 ~ 999,999,999.9                      | VAh   | F004 | R | O | When reading the power amount, the Giga counter value (30533) needs to be added up. |
| 30039 | 38 | 4 | A Phase Current Load Factor      | 0 ~ 9999                               | %     | F004 | R | O |                                                                                     |
| 30041 | 40 | 4 | B Phase Current Load Factor      | 0 ~ 9999                               | %     | F004 | R | O |                                                                                     |
| 30043 | 42 | 4 | C Phase Current Load Factor      | 0 ~ 9999                               | %     | F004 | R | O |                                                                                     |
| 30045 | 44 | 4 | Reverse Active Electric Energy   | 0 ~ 999,999,999.9                      | Wh    | F004 | R | O | Only EX Model is supported, the Giga counter value (30534) needs to be added up.    |
| 30047 | 46 | 4 | Reverse Reactive Electric Energy | 0 ~ 999,999,999.9                      | Varh  | F004 | R | O | Only EX Model is supported, the Giga counter value (30535) needs to be added up.    |
| 30049 | 48 | 4 | A Phase Active Power             | -999,999,999,999.9 ~ 999,999,999,999.9 | W     | F004 | R | O | Only EX Model is supported                                                          |
| 30051 | 50 | 4 | B Phase Active Power             | -999,999,999,999.9 ~ 999,999,999,999.9 | W     | F004 | R | O | Only EX Model is supported                                                          |
| 30053 | 52 | 4 | C Phase Active Power             | -999,999,999,999.9 ~ 999,999,999,999.9 | W     | F004 | R | O | Only EX Model is supported                                                          |
| 30055 | 54 | 4 | A Phase Reactive Power           | -999,999,999,999.9 ~ 999,999,999,999.9 | Var   | F004 | R | O | Only EX Model is supported                                                          |
| 30057 | 56 | 4 | B Phase Reactive Power           | -999,999,999,999.9 ~ 999,999,999,999.9 | Var   | F004 | R | O | Only EX Model is supported                                                          |
| 30059 | 58 | 4 | C Phase Reactive Power           | -999,999,999,999.9 ~ 999,999,999,999.9 | Var   | F004 | R | O | Only EX Model is supported                                                          |
| 30061 | 60 | 4 | A Phase Apparent Power           | -999,999,999,999.9 ~ 999,999,999,999.9 | VA    | F004 | R | O | Only EX Model is supported                                                          |
| 30063 | 62 | 4 | B Phase Apparent Power           | -999,999,999,999.9 ~ 999,999,999,999.9 | VA    | F004 | R | O | Only EX Model is supported                                                          |
| 30065 | 64 | 4 | C Phase Apparent Power           | -999,999,999,999.9 ~ 999,999,999,999.9 | VA    | F004 | R | O | Only EX Model is supported                                                          |

| REGISTER | ADDRESS | BYTE | REGISTER NAME                     | RANGE          | UNIT  | FORMAT | R/W | SWAP | Remark                                              |
|----------|---------|------|-----------------------------------|----------------|-------|--------|-----|------|-----------------------------------------------------|
| 30067    | 66      | 4    | Va angle(3P4W) / Vab angle(3P3W)  | 0 ~ 359.9      | °     | F004   | R   | O    | Only EX Model is supported                          |
| 30069    | 68      | 4    | Vb angle(3P4W) / Vbc angle(3P3W)  | 0 ~ 359.9      | °     | F004   | R   | O    | Only EX Model is supported                          |
| 30071    | 70      | 4    | Vc angle(3P4W) / Vca angle(3P3W)  | 0 ~ 359.9      | °     | F004   | R   | O    | Only EX Model is supported                          |
| 30073    | 72      | 4    | A Phase Current angle             | 0 ~ 359.9      | °     | F004   | R   | O    | Only EX Model is supported                          |
| 30075    | 74      | 4    | B Phase Current angle             | 0 ~ 359.9      | °     | F004   | R   | O    | Only EX Model is supported                          |
| 30077    | 76      | 4    | C Phase Current angle             | 0 ~ 359.9      | °     | F004   | R   | O    | Only EX Model is supported                          |
| 30079    | 78      | 4    | A Phase Power Factor              | -1.000 ~ 1.000 | F / R | F004   | R   | O    | Only EX Model is supported ( '-'(minus) means Lead) |
| 30081    | 80      | 4    | B Phase Power Factor              | -1.000 ~ 1.000 | F / R | F004   | R   | O    | Only EX Model is supported ( '-'(minus) means Lead) |
| 30083    | 82      | 4    | C Phase Power Factor              | -1.000 ~ 1.000 | F / R | F004   | R   | O    | Only EX Model is supported ( '-'(minus) means Lead) |
| 30085    | 84      | 4    | A Phase Fundamental Power Factor  | -1.000 ~ 1.000 | F / R | F004   | R   | O    | Only EX Model is supported ( '-'(minus) means Lead) |
| 30087    | 86      | 4    | B Phase Fundamental Power Factor  | -1.000 ~ 1.000 | F / R | F004   | R   | O    | Only EX Model is supported ( '-'(minus) means Lead) |
| 30089    | 88      | 4    | C Phase Fundamental Power Factor  | -1.000 ~ 1.000 | F / R | F004   | R   | O    | Only EX Model is supported ( '-'(minus) means Lead) |
| 30091    | 90      | 4    | A Phase Voltage THD               | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30093    | 92      | 4    | B Phase Voltage THD               | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30095    | 94      | 4    | C Phase Voltage THD               | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30097    | 96      | 4    | A Phase Current THD               | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30099    | 98      | 4    | B Phase Current THD               | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30101    | 100     | 4    | C Phase Current THD               | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30103    | 102     | 4    | A Phase Current Demand            | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30105    | 104     | 4    | B Phase Current Demand            | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30107    | 106     | 4    | C Phase Current Demand            | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30109    | 108     | 4    | Average Current Demand            | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30111    | 110     | 4    | Power Demand                      | 0 ~ 999.9M     | W     | F004   | R   | O    | Only EX Model is supported                          |
| 30113    | 112     | 4    | A Phase MAX Current               | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30115    | 114     | 4    | B Phase MAX Current               | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30117    | 116     | 4    | C Phase MAX Current               | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30119    | 118     | 4    | MAX Average Current               | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30121    | 120     | 4    | MAX Apparnet Power                | 0 ~ 999.9M     | VA    | F004   | R   | O    | Only EX Model is supported                          |
| 30123    | 122     | 4    | MAX Active Power                  | 0 ~ 999.9M     | W     | F004   | R   | O    | Only EX Model is supported                          |
| 30125    | 124     | 4    | MAX Reactive Power                | 0 ~ 999.9M     | Var   | F004   | R   | O    | Only EX Model is supported                          |
| 30127    | 126     | 4    | A Phase Voltage MAX THD           | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30129    | 128     | 4    | B Phase Voltage MAX THD           | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30131    | 130     | 4    | C Phase Voltage MAX THD           | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30133    | 132     | 4    | A Phase Current MAX THD           | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30135    | 134     | 4    | B Phase Current MAX THD           | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30137    | 136     | 4    | C Phase Current MAX THD           | 0 ~ 100        | %     | F004   | R   | O    | Only EX Model is supported                          |
| 30139    | 138     | 4    | MAX Demand for A Phase Current    | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30141    | 140     | 4    | MAX Demand for B Phase Current    | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30143    | 142     | 4    | MAX Demand for C Phase Current    | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30145    | 144     | 4    | MAX Demand for Average Current    | 0 ~ 99.99k     | A     | F004   | R   | O    | Only EX Model is supported                          |
| 30147    | 146     | 4    | MAX Demand for Active Power       | 0 ~ 999.9M     | W     | F004   | R   | O    | Only EX Model is supported                          |
| 30149    | 148     | 4    | 1st harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30151    | 150     | 4    | 2nd harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30153    | 152     | 4    | 3rd harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30155    | 154     | 4    | 4th harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30157    | 156     | 4    | 5th harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30159    | 158     | 4    | 6th harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30161    | 160     | 4    | 7th harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30163    | 162     | 4    | 8th harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30165    | 164     | 4    | 9th harmonic for A Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30167    | 166     | 4    | 10th harmonic for A Phase Voltage | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30169    | 168     | 4    | 11th harmonic for A Phase Voltage | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30171    | 170     | 4    | 12th harmonic for A Phase Voltage | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30173    | 172     | 4    | 13th harmonic for A Phase Voltage | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30175    | 174     | 4    | 14th harmonic for A Phase Voltage | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30177    | 176     | 4    | 15th harmonic for A Phase Voltage | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30179    | 178     | 4    | 1st harmonic for B Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30181    | 180     | 4    | 2nd harmonic for B Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |
| 30183    | 182     | 4    | 3rd harmonic for B Phase Voltage  | 0 ~ 999.9k     | V     | F004   | R   | O    | Only EX Model is supported                          |

| REGISTER | ADDRESS | BYTE | REGISTER NAME                     | RANGE      | UNIT | FORMAT | R/W | SWAP | Remark                     |
|----------|---------|------|-----------------------------------|------------|------|--------|-----|------|----------------------------|
| 30185    | 184     | 4    | 4th harmonic for B Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30187    | 186     | 4    | 5th harmonic for B Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30189    | 188     | 4    | 6th harmonic for B Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30191    | 190     | 4    | 7th harmonic for B Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30193    | 192     | 4    | 8th harmonic for B Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30195    | 194     | 4    | 9th harmonic for B Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30197    | 196     | 4    | 10th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30199    | 198     | 4    | 11th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30201    | 200     | 4    | 12th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30203    | 202     | 4    | 13th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30205    | 204     | 4    | 14th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30207    | 206     | 4    | 15th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30209    | 208     | 4    | 1st harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30211    | 210     | 4    | 2nd harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30213    | 212     | 4    | 3rd harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30215    | 214     | 4    | 4th harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30217    | 216     | 4    | 5th harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30219    | 218     | 4    | 6th harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30221    | 220     | 4    | 7th harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30223    | 222     | 4    | 8th harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30225    | 224     | 4    | 9th harmonic for C Phase Voltage  | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30227    | 226     | 4    | 10th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30229    | 228     | 4    | 11th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30231    | 230     | 4    | 12th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30233    | 232     | 4    | 13th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30235    | 234     | 4    | 14th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30237    | 236     | 4    | 15th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
| 30239    | 238     | 4    | 1st harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30241    | 240     | 4    | 2nd harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30243    | 242     | 4    | 3rd harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30245    | 244     | 4    | 4th harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30247    | 246     | 4    | 5th harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30249    | 248     | 4    | 6th harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30251    | 250     | 4    | 7th harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30253    | 252     | 4    | 8th harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30255    | 254     | 4    | 9th harmonic for A Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30257    | 256     | 4    | 10th harmonic for A Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30259    | 258     | 4    | 11th harmonic for A Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30261    | 260     | 4    | 12th harmonic for A Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30263    | 262     | 4    | 13th harmonic for A Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30265    | 264     | 4    | 14th harmonic for A Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30267    | 266     | 4    | 15th harmonic for A Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30269    | 268     | 4    | 1st harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30271    | 270     | 4    | 2nd harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30273    | 272     | 4    | 3rd harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30275    | 274     | 4    | 4th harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30277    | 276     | 4    | 5th harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30279    | 278     | 4    | 6th harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30281    | 280     | 4    | 7th harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30283    | 282     | 4    | 8th harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30285    | 284     | 4    | 9th harmonic for B Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30287    | 286     | 4    | 10th harmonic for B Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30289    | 288     | 4    | 11th harmonic for B Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30291    | 290     | 4    | 12th harmonic for B Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30293    | 292     | 4    | 13th harmonic for B Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30295    | 294     | 4    | 14th harmonic for B Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30297    | 296     | 4    | 15th harmonic for B Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30299    | 298     | 4    | 1st harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
| 30301    | 300     | 4    | 2nd harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |

|  | REGISTER | ADDRESS | BYTE | REGISTER NAME                     | RANGE      | UNIT | FORMAT | R/W | SWAP | Remark                     |
|--|----------|---------|------|-----------------------------------|------------|------|--------|-----|------|----------------------------|
|  | 30303    | 302     | 4    | 3rd harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30305    | 304     | 4    | 4th harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30307    | 306     | 4    | 5th harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30309    | 308     | 4    | 6th harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30311    | 310     | 4    | 7th harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30313    | 312     | 4    | 8th harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30315    | 314     | 4    | 9th harmonic for C Phase Current  | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30317    | 316     | 4    | 10th harmonic for C Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30319    | 318     | 4    | 11th harmonic for C Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30321    | 320     | 4    | 12th harmonic for C Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30323    | 322     | 4    | 13th harmonic for C Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30325    | 324     | 4    | 14th harmonic for C Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30327    | 326     | 4    | 15th harmonic for C Phase Current | 0 ~ 999.9k | A    | F004   | R   | O    | Only EX Model is supported |
|  | 30329    | 328     | 4    | 16th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30331    | 330     | 4    | 17th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30333    | 332     | 4    | 18th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30335    | 334     | 4    | 19th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30337    | 336     | 4    | 20th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30339    | 338     | 4    | 21st harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30341    | 340     | 4    | 22nd harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30343    | 342     | 4    | 23rd harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30345    | 344     | 4    | 24th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30347    | 346     | 4    | 25th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30349    | 348     | 4    | 26th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30351    | 350     | 4    | 27th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30353    | 352     | 4    | 28th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30355    | 354     | 4    | 29th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30357    | 356     | 4    | 30th harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30359    | 358     | 4    | 31st harmonic for A Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30361    | 360     | 4    | 16th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30363    | 362     | 4    | 17th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30365    | 364     | 4    | 18th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30367    | 366     | 4    | 19th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30369    | 368     | 4    | 20th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30371    | 370     | 4    | 21st harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30373    | 372     | 4    | 22nd harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30375    | 374     | 4    | 23rd harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30377    | 376     | 4    | 24th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30379    | 378     | 4    | 25th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30381    | 380     | 4    | 26th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30383    | 382     | 4    | 27th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30385    | 384     | 4    | 28th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30387    | 386     | 4    | 29th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30389    | 388     | 4    | 30th harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30391    | 390     | 4    | 31st harmonic for B Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30393    | 392     | 4    | 16th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30395    | 394     | 4    | 17th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30397    | 396     | 4    | 18th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30399    | 398     | 4    | 19th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30401    | 400     | 4    | 20th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30403    | 402     | 4    | 21st harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30405    | 404     | 4    | 22nd harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30407    | 406     | 4    | 23rd harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30409    | 408     | 4    | 24th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30411    | 410     | 4    | 25th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30413    | 412     | 4    | 26th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30415    | 414     | 4    | 27th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30417    | 416     | 4    | 28th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |
|  | 30419    | 418     | 4    | 29th harmonic for C Phase Voltage | 0 ~ 999.9k | V    | F004   | R   | O    | Only EX Model is supported |

| REGISTER | ADDRESS | BYTE | REGISTER NAME                       | RANGE                    | UNIT  | FORMAT | R/W | SWAP | Remark                     |
|----------|---------|------|-------------------------------------|--------------------------|-------|--------|-----|------|----------------------------|
| 30421    | 420     | 4    | 30th harmonic for C Phase Voltage   | 0 ~ 999.9k               | V     | F004   | R   | O    | Only EX Model is supported |
| 30423    | 422     | 4    | 31st harmonic for C Phase Voltage   | 0 ~ 999.9k               | V     | F004   | R   | O    | Only EX Model is supported |
| 30425    | 424     | 4    | 16th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30427    | 426     | 4    | 17th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30429    | 428     | 4    | 18th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30431    | 430     | 4    | 19th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30433    | 432     | 4    | 20th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30435    | 434     | 4    | 21st harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30437    | 436     | 4    | 22nd harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30439    | 438     | 4    | 23rd harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30441    | 440     | 4    | 24th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30443    | 442     | 4    | 25th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30445    | 444     | 4    | 26th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30447    | 446     | 4    | 27th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30449    | 448     | 4    | 28th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30451    | 450     | 4    | 29th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30453    | 452     | 4    | 30th harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30455    | 454     | 4    | 31st harmonic for A Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30457    | 456     | 4    | 16th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30459    | 458     | 4    | 17th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30461    | 460     | 4    | 18th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30463    | 462     | 4    | 19th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30465    | 464     | 4    | 20th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30467    | 466     | 4    | 21st harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30469    | 468     | 4    | 22nd harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30471    | 470     | 4    | 23rd harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30473    | 472     | 4    | 24th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30475    | 474     | 4    | 25th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30477    | 476     | 4    | 26th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30479    | 478     | 4    | 27th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30481    | 480     | 4    | 28th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30483    | 482     | 4    | 29th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30485    | 484     | 4    | 30th harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30487    | 486     | 4    | 31st harmonic for B Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30489    | 488     | 4    | 16th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30491    | 490     | 4    | 17th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30493    | 492     | 4    | 18th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30495    | 494     | 4    | 19th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30497    | 496     | 4    | 20th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30499    | 498     | 4    | 21st harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30501    | 500     | 4    | 22nd harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30503    | 502     | 4    | 23rd harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30505    | 504     | 4    | 24th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30507    | 506     | 4    | 25th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30509    | 508     | 4    | 26th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30511    | 510     | 4    | 27th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30513    | 512     | 4    | 28th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30515    | 514     | 4    | 29th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30517    | 516     | 4    | 30th harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30519    | 518     | 4    | 31st harmonic for C Phase Current   | 0 ~ 999.9k               | A     | F004   | R   | O    | Only EX Model is supported |
| 30521    | 520     | 2    | DI Status Flag                      | -                        | -     | F221   | R   | X    |                            |
| 30522    | 521     | 4    | DI1 Counter                         | 0 ~ 999.9M               | Count | F037   | R   | O    |                            |
| 30524    | 523     | 4    | DI2 Counter                         | 0 ~ 999.9M               | Count | F037   | R   | O    |                            |
| 30526    | 525     | 2    | Error 1 Counter                     | 0 ~ 9999 (Not Roll-over) | Count | F038   | R   | X    |                            |
| 30527    | 526     | 2    | Status Flag                         | -                        | -     | F225   | R   | X    |                            |
| 30528    | 527     | 2    | Error 3 Counter                     | 0 ~ 9999 (Not Roll-over) | Count | F038   | R   | X    |                            |
| 30529    | 528     | 2    | Error 4 Counter                     | 0 ~ 9999 (Not Roll-over) | Count | F038   | R   | X    |                            |
| 30530    | 529     | 2    | Error 5 Counter                     | 0 ~ 9999 (Not Roll-over) | Count | F038   | R   | X    |                            |
| 30531    | 530     | 2    | Active Electric Energy Giga Counter | 0 ~ 999                  | Count | F038   | R   | X    |                            |

| REGISTER | ADDRESS | BYTE | REGISTER NAME                         | RANGE                              | UNIT  | FORMAT | R/W | SWAP | Remark                     |
|----------|---------|------|---------------------------------------|------------------------------------|-------|--------|-----|------|----------------------------|
| 30532    | 531     | 2    | Reactive Electric Energy Giga Counter | 0 ~ 999                            | Count | F038   | R   | X    |                            |
| 30533    | 532     | 2    | Apparent Electric Energy Giga Counter | 0 ~ 999                            | Count | F038   | R   | X    |                            |
| 30534    | 533     | 2    | Reverse Active Energy Giga Counter    | 0 ~ 999                            | Count | F038   | R   | X    | Only EX Model is supported |
| 30535    | 534     | 2    | Reverse Reactive Energy Giga Counter  | 0 ~ 999                            | Count | F038   | R   | X    | Only EX Model is supported |
| 30536    | 535     | 2    | calibration flag                      | 0 : not applied , 0xAAAA : applied | -     | F038   | R   | X    |                            |
| 30537    | 536     | 4    | A Phase Current TDD                   | 0 ~ 100                            | %     | F004   | R   | O    | Only EX Model is supported |
| 30539    | 538     | 4    | B Phase Current TDD                   | 0 ~ 100                            | %     | F004   | R   | O    | Only EX Model is supported |
| 30541    | 540     | 4    | C Phase Current TDD                   | 0 ~ 100                            | %     | F004   | R   | O    | Only EX Model is supported |

|       |      |   |                                               |                                                |    |      |   |   |  |
|-------|------|---|-----------------------------------------------|------------------------------------------------|----|------|---|---|--|
| 31001 | 1000 | 2 | Wiring Connection                             | 1:1P2W, 2:1P3W, 3:3P3W(D),4:3P3W(Y),5:3P4W     | -  | F219 | R | X |  |
| 31002 | 1001 | 2 | Demand Time                                   | 1,2,3,4,5,6,10,15,20,30,60                     | -  | F038 | R | X |  |
| 31003 | 1002 | 2 | The constant part of PT Ratio (PT Ratio High) | 1.0000~1400.0000(STEP:0.0001)                  | -  | F220 | R | X |  |
| 31004 | 1003 | 2 | The decimal part of PT Ratio (PT Ratio Low)   |                                                | -  | F220 | R | X |  |
| 31005 | 1004 | 2 | CT Ratio ( High Word )                        | 1~2000                                         | -  | F038 | R | X |  |
| 31006 | 1005 | 2 | CT Ratio ( Low Word )                         |                                                | -  | F038 | R | X |  |
| 31007 | 1006 | 2 | RS485 Address/ Tx delay time                  | High(Address):1~247/Low(Delay Time):10~200(ms) | -  | F217 | R | X |  |
| 31008 | 1007 | 2 | RS485 Comm Speed / Swap                       | High(SWAP):1~2/Low(Speed):1~3                  | -  | F218 | R | X |  |
| 31009 | 1008 | 2 | DI Debounce Time                              | 5~200                                          | ms | F222 | R | X |  |
| 31010 | 1009 | 2 | RS485 Comm Termination Resistance             | 1(OFF),2(ON)                                   | -  | F223 | R | X |  |

| REGISTER | ADDRESS | BYTE | REGISTER NAME                                 | RANGE                                      | UNIT | FORMAT | R/W | Default Value                           | Remark                                                  |
|----------|---------|------|-----------------------------------------------|--------------------------------------------|------|--------|-----|-----------------------------------------|---------------------------------------------------------|
| 40001    | 0       | 32   | Manufacturer Name                             | -                                          | -    | STRING | R   | "LSELECTRIC"                            |                                                         |
| 40017    | 16      | 32   | Modbus Map Identifier                         | -                                          | -    | STRING | R   | "GIMAC1000"                             |                                                         |
| 40033    | 32      | 10   | Modbus Map Version                            | -                                          | -    | STRING | R   | "01.00.00"                              |                                                         |
| 40038    | 37      | 32   | Product Name                                  | -                                          | -    | STRING | R   | "GIMAC1000"                             |                                                         |
| 40054    | 53      | 22   | Manufacturing number                          | -                                          | -    | STRING | R   | -                                       |                                                         |
| 40065    | 64      | 12   | Product code                                  | -                                          | -    | STRING | R   | -                                       |                                                         |
| 40071    | 70      | 10   | Hardware Version                              | -                                          | -    | STRING | R   | "01.00.00"                              |                                                         |
| 40076    | 75      | 10   | Software Version                              | -                                          | -    | STRING | R   | "01.00.00"                              |                                                         |
| 41001    | 1000    | 2    | Product Option Specification                  | -                                          | -    | F224   | R   | 0(Normal,5A,60Hz,RS485 OFF, ETH OFF)    |                                                         |
| 41002    | 1001    | 2    | Wiring Connection                             | 1:1P2W, 2:1P3W, 3:3P3W(D),4:3P3W(Y),5:3P4W | -    | F219   | R   | 5(3P4W)                                 |                                                         |
| 41003    | 1002    | 2    | Demand Time                                   | 1,2,3,4,5,6,10,15,20,30,60                 | min  | F038   | R   | 15(min)                                 |                                                         |
| 41004    | 1003    | 2    | The constant part of PT Ratio (PT Ratio High) | 1~1400                                     | -    | F038   | R   | 1                                       | NAK reply if the value is outside the range of 1 ~ 1400 |
| 41005    | 1004    | 2    | The decimal part of PT Ratio (PT Ratio Low)   | 0~9999                                     | -    | F038   | R   | 0                                       |                                                         |
| 41006    | 1005    | 2    | CT Ratio ( High Word )                        | 0                                          | -    | F038   | R   | 0                                       | don't care                                              |
| 41007    | 1006    | 2    | CT Ratio ( Low Word )                         | 1~2000                                     | -    | F038   | R   | 1                                       |                                                         |
| 41008    | 1007    | 2    | RS485 Address/ Tx delay time                  | 상위(국번):1~247/하위(지연시간):10~200(ms)           | -    | F217   | R   | High(Address):1,Low(Delay Time):20(ms)  |                                                         |
| 41009    | 1008    | 2    | RS485 Comm Speed / Swap                       | 상위(SWAP):1~2/하위(속도):1~3                    | -    | F218   | R   | High(SWAP):1(NO),Low(Speed):3(38400bps) |                                                         |
| 41010    | 1009    | 2    | DI Debounce Time                              | 10~200                                     | ms   | F222   | R   | High(DI1):5,Low(DI2):5                  |                                                         |
| 41011    | 1010    | 2    | RS485 Comm Termination Resistance             | 1(OFF),2(ON)                               | -    | F223   | R   | 1(OFF)                                  |                                                         |
| 41012    | 1011    | 6    | MAC Address                                   | 00-0B-29-00-00-00 ~ 00-0B-29-FF-FF-FF      | -    | F040   | R   | 00-0B-29-00-00-00                       |                                                         |
| 41015    | 1014    | 4    | IP Address                                    | 01-00-00-00 ~ DF-FF-FF-FF                  | -    | F041   | R   | 192.168.0.100                           |                                                         |
| 41017    | 1016    | 4    | Subnet Mask                                   | 00-00-00-00 ~ FF-FF-FF-FF                  | -    | F041   | R   | 255.255.255.0                           |                                                         |
| 41019    | 1018    | 4    | Gateway Address                               | 01-00-00-00 ~ DF-FF-FF-FF                  | -    | F041   | R   | 192.168.0.1                             |                                                         |
| 41021    | 1020    | 2    | Idle Time                                     | 0x000A ~ 0x003C                            | ms   | F038   | R   | 0x000A                                  |                                                         |
| 41022    | 1021    | 2    | Ethernet Module Swap                          | 0x0000 : On, 0x5555 : off                  | -    | F038   | R   | 0x0000                                  |                                                         |
| 41023    | 1022    | 2    | Ethernet Module Software Version              |                                            | -    | F038   | R   | 0x000A                                  | 0x000A = 10 ( Means 1.0 )                               |

\* Address 40000 does not apply SWAP

## ■ Format details

### F001

F038 type

Only ON (0xFF00) can be input to data

### F004

*IEEE754 32bit short float form*

### F037

*32bit Unsigned Integer type*

### F038

*16Bit Unsigned Integer type*

### F040

*48bit Mac address*

In the form (00-0B-29-hh-hh-hh), h has a value from 0 to f.

Ex) Write : 85 10 08 34 00 03 06 00 0b 29 00 00 01 crc-h crc-l

Read : 85 03 08 34 00 03 crc-h crc-l

### F041

*32bit IP/SUB NET/G,W address*

In the form (hh.hh.hh.hh), h has a value from 0 to f.

### F217

F038 type

| High Byte             | Low Byte      |
|-----------------------|---------------|
| Communication Address | Tx delay time |

### F218

F038 type

| High Byte       | Low Byte        |
|-----------------|-----------------|
| Comm. Data Swap | Comm. Baud Rate |

1) Comm. Data Swap : 0x01 - Disable , 0x02 - Enable

2) Comm. Baud Rate : 0x01 - 9600 , 0x02 - 19600, 0x03 - 38400

### F219

F038 type

| Value  | Description    |
|--------|----------------|
| 0x0001 | 1P2W           |
| 0x0002 | 1P3W           |
| 0x0003 | 3P3W OPENDELTA |
| 0x0004 | 3P3W Y         |
| 0x0005 | 3P4W           |

**F220**

F038 type

| 상위 Byte               | 하위 Byte               |
|-----------------------|-----------------------|
| PT Ratio integer part | PT Ratio decimal part |

Ex) If PT Ratio data is 00 02 00 01, PT Ratio is 2.001

**F221**

F038 type

| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1           | D0           |
|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|--------------|--------------|
| -   | -   | -   | -   | -   | -   | -  | -  | -  | -  | -  | -  | -  | -  | DI 02 Status | DI 01 Status |

※ 0:Open, 1:Close

**F222**

F038 type

| High Byte         | Low Byte          |
|-------------------|-------------------|
| DI1 Debounce Time | DI2 Debounce Time |

Ex) If Debounce data is 05 06, DI1 Debounce time is 5ms, DI2 Debounce time is 6ms.

**F223**

F038 type

| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0  |
|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|-----|
| -   | -   | -   | -   | -   | -   | -  | -  | -  | -  | -  | -  | -  | -  | ON | OFF |

Ex) If the Comm. terminal resistance status data is 00 01, the function is OFF. If it is 00 02, the function is ON.

**F224**

F038 type

| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4           | D3        | D2            | D1        | D0       |
|-----|-----|-----|-----|-----|-----|----|----|----|----|----|--------------|-----------|---------------|-----------|----------|
| -   | -   | -   | -   | -   | -   | -  | -  | -  | -  | -  | Ethernet Y/N | RS485 Y/N | Rated current | Frequency | Function |

- 1) Function : 0 -> NO, 1 -> EX
- 2) Rated frequency : 0 -> 60Hz, 1-> 50Hz
- 3) Rated current : 0 -> 5A Type, 1-> 1A Type
- 4) RS485 : 0 -> No Comm, 1-> M485
- 5) ETHERNET : 0 -> No ETHERNET, 1-> ETHERNET

**F225**

F038 type

| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6         | D5 | D4              | D3       | D2 | D1 | D0 |
|-----|-----|-----|-----|-----|-----|----|----|----|------------|----|-----------------|----------|----|----|----|
| -   | -   | -   | -   | -   | -   | -  | -  | -  | OVER THD V | -  | Frequency alarm | PF alarm | -  | -  | -  |

- 1) Bit 3: Power factor abnormal (0: normal, 1: abnormal)  
Normal if  $0.9 \leq \text{+power factor (PF)} \leq 1$ , normal even if the value is 0 (based on total power factor)
- 2) Bit 4: Frequency error (0: normal, 1: abnormal)  
Normal if  $58.5\text{Hz} \leq \text{frequency} \leq 61.5\text{Hz}$ , normal even if the value is 0
- 3) Bit 6: Sum of each voltage harmonic exceeds upper limit (0: normal, 1: occurrence)  
Occurs when the total voltage harmonic distortion (THD V) exceeds 5% (if even one phase of Va, Vb, Vc occurs, operates as 'OR')

※ Status Flag is reflected in real time (updated every 1 second)

## < Exception Codes >

If abnormal request frame is transmitted, Slave responses to it with following frame.

| Response            |                      |
|---------------------|----------------------|
| Field Name          | (Hex)                |
| Slave Address       | 01                   |
| Function            | 0x80 + Function Code |
| Starting Address Hi | Exception Code       |
| CRC Lo              | -                    |
| CRC Hi              | -                    |

Ex) If Master tries to READ the 30551 Register under the condition where 30551 Register is not defined at the register map,  
Slave device responses to it with ILLEGAL DATA ADDRESS(02).

| Request               |       | Response       |           |
|-----------------------|-------|----------------|-----------|
| Field Name            | (Hex) | Field Name     | (Hex)     |
| Slave Address         | 01    | Slave Address  | 01        |
| Function              | 04    | Function       | <b>84</b> |
| Starting Address Hi   | 02    | Exception Code | <b>02</b> |
| Starting Address Lo   | 26    | CRC Lo         | -         |
| Quantity of Inputs Hi | 00    | CRC Hi         | -         |
| Quantity of Inputs Lo | 01    |                |           |
| CRC Lo                | -     |                |           |
| CRC Hi                | -     |                |           |

Supported exception codes are as follows.

| Hex  | Meaning                                                               |
|------|-----------------------------------------------------------------------|
| 0x01 | ILLEGAL FUNCTION(Unsupported FUNCTION CODE)                           |
| 0x02 | ILLEGAL DATA ADDRESS(Undefined Address or Address Out of Range)       |
| 0x03 | ILLEGAL DATA VALUE(Setting data range exceeded)                       |
| 0x12 | Illegal Adu Length(Data length error when writing multiple registers) |

< Objects for Read Device Identification >

| Read Device ID Code          | Object Category | M/O       | Object ID | Object Name              | Type         | Initial Value | Object Length in bytes |
|------------------------------|-----------------|-----------|-----------|--------------------------|--------------|---------------|------------------------|
| 0x01<br>0x02<br>0x03<br>0x04 | Basic(1)        | Mandatory | 0x00      | Manufacturer Name        | ASCII String | LSELECTRIC    | 32                     |
|                              |                 | Mandatory | 0x01      | Modbus Map Identifier    | ASCII String | GIMAC1000     | 32                     |
|                              |                 | Mandatory | 0x02      | Modbus Map Version       | ASCII String | 01.00.00      | 10                     |
|                              | Regular (2)     | Optional  | 0x03      | Product URL              | ASCII String | -             | -                      |
|                              |                 | Mandatory | 0x04      | Product Name             | ASCII String | GIMAC1000     | 32                     |
|                              |                 | Optional  | 0x05      | Model Name               | ASCII String | -             | -                      |
|                              | Extended(3)     | Optional  | 0x06      | User-defined device name | ASCII String | -             | -                      |
|                              |                 | Mandatory | 0x80      | Serial Number            | ASCII String | -             | 22                     |
|                              |                 | Mandatory | 0x81      | Product Number           | ASCII String | -             | 12                     |
|                              |                 | Mandatory | 0x82      | Hardware Version         | ASCII String | 01.00.00      | 10                     |
|                              |                 | Mandatory | 0x83      | Software Version         | ASCII String | 01.00.00      | 10                     |
|                              |                 | Optional  | 0x84      | Model description        | ASCII String | -             | -                      |

※ Excluding ST type products

사용예) Object Category : Basic Data Request

| Request                              |       |
|--------------------------------------|-------|
| Field Name                           | (Hex) |
| Slave Address                        | 01    |
| Function                             | 2B    |
| MEI Type(Sub-function)               | 0E    |
| Read Device ID Code(Object Category) | 01    |
| Object ID                            | 00    |
| CRC Hi                               | -     |
| CRC Lo                               | -     |

| Response                             |       | Explanation                                            | Size(Bytes) |
|--------------------------------------|-------|--------------------------------------------------------|-------------|
| Field Name                           | (Hex) |                                                        |             |
| Slave Address                        | 01    |                                                        | 1           |
| Function                             | 2B    |                                                        | 1           |
| MEI Type(Sub-function)               | 0E    |                                                        | 1           |
| Read Device ID Code(Object Category) | 01    | Object Category : Basic = 1                            | 1           |
| Conformity Level                     | 81    | Same as Read Device ID Code (only Stream Access)       | 1           |
| More Follows                         | 00    | Fixed value (no repetition)                            | 1           |
| Next Object ID                       | 00    | Fixed value (no next Object ID)                        | 1           |
| Number of Objects                    | 03    | Object Category to be transmitted: Basic = Number of 1 | 1           |
| Object ID                            | 00    | Object ID = 0                                          | 1           |
| Object Length                        | 0A    | "LSELECTRIC" Length = 10                               | 1           |
| Object Value                         | ASCII | "LSELECTRIC"                                           | 10          |
| Object ID                            | 01    | Object ID = 1                                          | 1           |
| Object Length                        | 09    | "GIMAC1000" Length = 9                                 | 1           |
| Object Value                         | ASCII | "GIMAC1000"                                            | 9           |
| Object ID                            | 02    | Object ID = 2                                          | 1           |
| Object Length                        | 08    | "UV.WX.YZ" Length = 8                                  | 1           |
| Object Value                         | ASCII | "01.00.00"                                             | 8           |
| CRC Hi                               | -     |                                                        | 1           |
| CRC Lo                               | -     |                                                        | 1           |

| Error          |       |
|----------------|-------|
| Field Name     | (Hex) |
| Slave Address  | 01    |
| Function       | AB    |
| Exception Code | xx    |
| Exception Code | xx    |
| CRC Hi         | -     |
| CRC Lo         | -     |

# Introduction of GIMAC1000 MODBUS RTU Protocol

## 1. Introduction

MODBUS RTU protocol

## 2. Physical Layer

Communication port : RS485, Ethernet

Asynchronous format: One character consists of 10 or 11 bits.

(1 start bit + 8 data bits + (1 parity bit) +1 stop bit)

Baud rate: 9600 bps (setting value: 1), 19200 bps (setting value: 2), 38400 bps (setting value: 3)

Parity: Even, Odd, no parity (GIMAC1000 supports only no parity)

In the Master-Slave method, only the master can make a request,

Slaves send responses to the master by sending requested data or performing actions requested in the query.

## 3. Data Link Layer

When the master sends a request frame to the slave, the slave sends a response frame.

Each frame is distinguished by dead time.

The following is the general format for sending and receiving frames.

| DESCRIPTION   | SIZE                        |
|---------------|-----------------------------|
| SLAVE ADDRESS | 1 byte                      |
| FUNCTION CODE | 1 byte                      |
| DATA          | N byte                      |
| CRC           | 2 byte                      |
| DEAD TIME     | 3.5 bytes transmission time |

| Master                                                                        | Request        |   | Response       | Slave                            |
|-------------------------------------------------------------------------------|----------------|---|----------------|----------------------------------|
| Slave address                                                                 | Device Address | ↔ | Device Address | 자신의 Address                      |
| Slave action definition                                                       | Function Code  |   | Function Code  | Echo or MSB=1                    |
| Additional information required for the slave to perform the requested action | Data           |   | Data           | Requested data or Exception code |
| CRC                                                                           | Error check    |   | Error check    | CRC                              |

### SLAVE ADDRESS

Valid slave device address range : 0~247 decimal

Slave device address range actually used: 1~247 decimal

If the slave device address area of the frame in which the master requests the slave is 0, it means that the master device is broadcasting to all slaves.

When the master makes a request to the slave, the slave address is entered in the address field and transmitted.

When the slave responds to the master, it enters its own address in the address field and transmits it.

## FUNCTION CODE

Valid range : 1~255

normal : 1~127, error : 129 ~ 255(normal + 0x80)

It defines the actions that the master requires from the slave.

The slave enters the following information.

In case of normal response: Echo the function code value of the request as is

In case of exception response: Enter the MSB of the function code value of the request by setting it to 1.

## DATA

Register address

Amount of items to handle

Number of bytes of actual data

## CRC

Used as an error checking method.

CRC-16

### CRC Generation Function

```
unsigned short CRC16(puchMsg, usDataLen)
{
    unsigned char *puchMsg ; /* message to calculate CRC upon */
    unsigned short usDataLen ; /* quantity of bytes in message */

    unsigned char uchCRCHi = 0xFF ; /* high byte of CRC initialized */
    unsigned char uchCRCLo = 0xFF ; /* low byte of CRC initialized */
    unsigned uIndex ; /* will index into CRC lookup table */

    while (usDataLen--) /* pass through message buffer */
    {
        uIndex = uchCRCHi ^ *puchMsg ; /* calculate the CRC */
        uchCRCHi = uchCRCLo ^ uchCRCHi[uIndex] ;
        uchCRCLo = uchCRCLo[uIndex] ;
    }

    return (uchCRCHi << 8 | uchCRCLo) ;
}
```

## DEAD TIME

A frame ends when there is a silent interval of 3.5 character times or more after the last character is received.

## MODBUS Exception Codes

| code | Name                               |
|------|------------------------------------|
| 01h  | ILLEGAL FUNCTION                   |
| 02h  | ILLEGAL DATA ADDRESS               |
| 03h  | ILLEGAL DATA VALUE                 |
| 04h  | SLAVE DEVICE FAILURE               |
| 05h  | ACKNOWLEDGE                        |
| 06h  | SLAVE DEVICE BUSY                  |
| 10h  | No Event/Fault record data         |
| 11h  | TIME OUT                           |
| 12h  | ILLEGAL ADU LENGTH                 |
| FFh  | Branch or DSP No Response time out |

# Modbus RTU Examples

## (1) 03(0x03) Read Holding Registers

Example of a Request/response to read registers 40001 ... 40002 from slave device 1

| Request               |       | ↔ | Response                 |       |
|-----------------------|-------|---|--------------------------|-------|
| Field Name            | (Hex) |   | Field Name               | (Hex) |
| Slave Address         | 01    |   | Slave Address            | 01    |
| Function              | 03    |   | Function                 | 03    |
| Starting Address Hi   | 00    |   | Byte Count               | 04    |
| Starting Address Lo   | 00    |   | Register value Hi(40001) | 42    |
| Quantity of Inputs Hi | 00    |   | Register value Lo(40001) | DC    |
| Quantity of Inputs Lo | 02    |   | Register value Hi(40002) | 00    |
| CRC Lo                | -     |   | Register value Lo(40002) | 00    |
| CRC Hi                | -     |   | CRC Lo                   | -     |
|                       |       |   | CRC Hi                   | -     |

## (2) 04(0x04) Read Input Registers

Example of a Request/response to read registers 30001 ... 30002 from slave device 1

| Request               |       | ↔ | Response                 |       |
|-----------------------|-------|---|--------------------------|-------|
| Field Name            | (Hex) |   | Field Name               | (Hex) |
| Slave Address         | 01    |   | Slave Address            | 01    |
| Function              | 04    |   | Function                 | 04    |
| Starting Address Hi   | 00    |   | Byte Count               | 04    |
| Starting Address Lo   | 00    |   | Register value Hi(30001) | 00    |
| Quantity of Inputs Hi | 00    |   | Register value Lo(30001) | 00    |
| Quantity of Inputs Lo | 02    |   | Register value Hi(30002) | 00    |
| CRC Lo                | -     |   | Register value Lo(30002) | 00    |
| CRC Hi                | -     |   | CRC Lo                   | -     |
|                       |       |   | CRC Hi                   | -     |

## (3) 05(0x05) Write Single Coil

Example of a Request/response to force coil 1 ON in slave device 1

| Request             |       | ↔ | Response            |       |
|---------------------|-------|---|---------------------|-------|
| Field Name          | (Hex) |   | Field Name          | (Hex) |
| Slave Address       | 01    |   | Slave Address       | 01    |
| Function            | 05    |   | Function            | 05    |
| Starting Address Hi | 00    |   | Starting Address Hi | 00    |
| Starting Address Lo | 00    |   | Starting Address Lo | 00    |
| Force Data Hi       | FF    |   | Force Data Hi       | FF    |
| Force Data Lo       | 00    |   | Force Data Lo       | 00    |
| CRC Lo              | -     |   | CRC Lo              | -     |
| CRC Hi              | -     |   | CRC Hi              | -     |

#### (4) 16(0x10) Write Multiple Registers

Example of a Request/response to preset two registers starting at 40001 to 42 DC and 00 00 hex, in slave device 1

| Request                |       | ←→ | Response               |       |
|------------------------|-------|----|------------------------|-------|
| Field Name             | (Hex) |    | Field Name             | (Hex) |
| Slave Address          | 01    |    | Slave Address          | 01    |
| Function               | 10    |    | Function               | 10    |
| Starting Address Hi    | 00    |    | Starting Address Hi    | 00    |
| Starting Address Lo    | 00    |    | Starting Address Lo    | 00    |
| Number of Registers Hi | 00    |    | Number of Registers Hi | 00    |
| Number of Registers Lo | 02    |    | Number of Registers Lo | 02    |
| Byte Count             | 04    |    | CRC Lo                 | -     |
| Data Hi                | 42    |    | CRC Hi                 | -     |
| Data Lo                | DC    |    |                        |       |
| Data Hi                | 00    |    |                        |       |
| Data Lo                | 00    |    |                        |       |
| CRC Lo                 | -     |    |                        |       |
| CRC Hi                 | -     |    |                        |       |

#### <Important information>

##### \* MAX register read count : 124

(03h, 04h): You can read one register or several registers.

When reading multiple registers, up to 124 registers can be read.

**However, 124 words can be read only in the continuous address area.**

#### (5) Exception Codes

If the received Request frame is not normal, the device (slave) responds with a frame in the following format.

| Response            |                      |
|---------------------|----------------------|
| Field Name          | (Hex)                |
| Slave Address       | 01                   |
| Function            | 0x80 + Function Code |
| Starting Address Hi | Exception Code       |
| CRC Lo              | -                    |
| CRC Hi              | -                    |

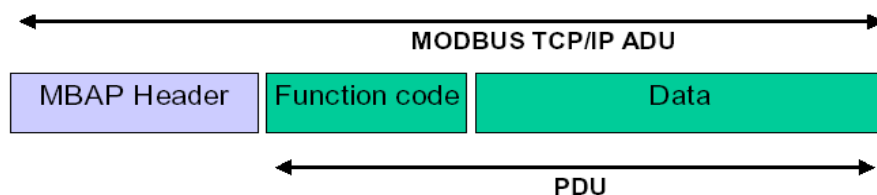
Ex) If the master attempts to read the value of the 30551 register while the 30551 register is not defined in the device's register map, the device (slave) responds with ILLEGAL DATA ADDRESS (02).

| Request               |       | ←→ | Response       |           |
|-----------------------|-------|----|----------------|-----------|
| Field Name            | (Hex) |    | Field Name     | (Hex)     |
| Slave Address         | 01    |    | Slave Address  | 01        |
| Function              | 04    |    | Function       | <b>84</b> |
| Starting Address Hi   | 02    |    | Exception Code | <b>02</b> |
| Starting Address Lo   | 26    |    | CRC Lo         | -         |
| Quantity of Inputs Hi | 00    |    | CRC Hi         | -         |
| Quantity of Inputs Lo | 01    |    |                |           |
| CRC Lo                | -     |    |                |           |
| CRC Hi                | -     |    |                |           |

# Introduction of GIMAC1000 MODBUS TCP Protocol

## 1. Introduction

MODBUS TCP protocol



ADU : Application Data Unit

PDU : Protocol Data Unit

MBAP : MODBUS Application Protocol

Slaves send responses to the master by sending requested data or performing actions requested in the query.

### MODBUS Request ADU

|                    | Description               | Size(byte) |
|--------------------|---------------------------|------------|
| MBAP Header        | Transaction Identifier Hi | 1          |
|                    | Transaction Identifier Lo | 1          |
|                    | Protocol Identifier       | 2          |
|                    | Length                    | 2          |
|                    | Unit Identifier           | 1          |
| MODBUS request PDU | Function Code             | 1          |
|                    | Starting Address          | 2          |
|                    | Quantity of register      | 2          |

**Transaction Identifier** : Identification of a MODBUS Request / Response transaction

- The server echoes the value received from the client.
- Usually has values from 1 to 16.

**Protocol Identifier** : 0 = MODBUS protocol

- Always 0

**Length** : Number of following bytes Unit Identifier(1Byte) + PDU Length

**Unit Identifier** : Identification of a remote slave connected on a serial line or on other buses

- The server echoes the value received from the client.

### Function Code

Valid range : 1~255

normal : 1~127, error : 129 ~ 255(normal + 0x80)

It defines the action that the client requests from the server.

The server enters the following information.

In case of normal response: Echo the function code value of the request as is

In case of exception response: Enter the MSB of the function code value of the request by setting it to 1.

### Data

Register address

Amount of items to handle

Number of bytes of actual data

**MODBUS Exception Codes**

| code | Name                       |
|------|----------------------------|
| 01h  | ILLEGAL FUNCTION           |
| 02h  | ILLEGAL DATA ADDRESS       |
| 03h  | ILLEGAL DATA VALUE         |
| 04h  | SLAVE DEVICE FAILURE       |
| 10h  | No Event/Fault record data |
| 11h  | SBO TIME OUT               |
| 12h  | ILLEGAL ADU LENGTH         |
| 13h  | LOCAL MODE                 |
| 14h  | DEVICE NAK                 |

# Modbus TCP Examples

## (1) 03(0x03) Read Holding Registers

Example of a Request/response to read registers 40001 ... 40002 from slave device 1

| Request                   |       | ←→ | Response                  |       |
|---------------------------|-------|----|---------------------------|-------|
| Field Name                | (Hex) |    | Field Name                | (Hex) |
| Transaction Identifier Hi | 00    |    | Transaction Identifier Hi | 00    |
| Transaction Identifier Lo | 01    |    | Transaction Identifier Lo | 01    |
| Protocol Identifier Hi    | 00    |    | Protocol Identifier Hi    | 00    |
| Protocol Identifier Lo    | 00    |    | Protocol Identifier Lo    | 00    |
| Length Hi                 | 00    |    | Length Hi                 | 00    |
| Length Lo                 | 06    |    | Length Lo                 | 07    |
| Unit Identifier           | 01    |    | Unit Identifier           | 01    |
| Function                  | 03    |    | Function                  | 03    |
| Starting Address Hi       | 00    |    | Byte Count                | 04    |
| Starting Address Lo       | 00    |    | Register value Hi (40001) | 42    |
| Quantity of Inputs Hi     | 00    |    | Register value Lo (40001) | DC    |
| Quantity of Inputs Lo     | 02    |    | Register value Hi (40002) | 00    |
|                           |       |    | Register value Lo (40002) | 00    |

## (2) 04(0x04) Read Input Registers

Example of a Request/response to read registers 30001 ... 30002 from slave device 1

| Request                   |       | ←→ | Response                  |       |
|---------------------------|-------|----|---------------------------|-------|
| Field Name                | (Hex) |    | Field Name                | (Hex) |
| Transaction Identifier Hi | 00    |    | Transaction Identifier Hi | 00    |
| Transaction Identifier Lo | 01    |    | Transaction Identifier Lo | 01    |
| Protocol Identifier Hi    | 00    |    | Protocol Identifier Hi    | 00    |
| Protocol Identifier Lo    | 00    |    | Protocol Identifier Lo    | 00    |
| Length Hi                 | 00    |    | Length Hi                 | 00    |
| Length Lo                 | 06    |    | Length Lo                 | 07    |
| Unit Identifier           | 01    |    | Unit Identifier           | 01    |
| Function                  | 04    |    | Function                  | 04    |
| Starting Address Hi       | 00    |    | Byte Count                | 04    |
| Starting Address Lo       | 00    |    | Register value Hi(30001)  | 00    |
| Quantity of Inputs Hi     | 00    |    | Register value Lo(30001)  | 00    |
| Quantity of Inputs Lo     | 02    |    | Register value Hi(30002)  | 00    |
|                           |       |    | Register value Lo(30002)  | 00    |

## (3) 05(0x05) Write Single Coil

Example of a Request/response to force coil 1 ON in slave device 1

| Request                   |       | ←→ | Response                  |       |
|---------------------------|-------|----|---------------------------|-------|
| Field Name                | (Hex) |    | Field Name                | (Hex) |
| Transaction Identifier Hi | 00    |    | Transaction Identifier Hi | 00    |
| Transaction Identifier Lo | 01    |    | Transaction Identifier Lo | 01    |
| Protocol Identifier Hi    | 00    |    | Protocol Identifier Hi    | 00    |
| Protocol Identifier Lo    | 00    |    | Protocol Identifier Lo    | 00    |
| Length Hi                 | 00    |    | Length Hi                 | 00    |
| Length Lo                 | 06    |    | Length Lo                 | 06    |
| Unit Identifier           | 01    |    | Unit Identifier           | 01    |
| Function                  | 05    |    | Function                  | 05    |
| Starting Address Hi       | 00    |    | Starting Address Hi       | 00    |
| Starting Address Lo       | 00    |    | Starting Address Lo       | 00    |
| Force Data Hi             | FF    |    | Force Data Hi             | FF    |
| Force Data Lo             | 00    |    | Force Data Lo             | 00    |

#### (4) 16(0x10) Write Multiple Registers

Example of a Request/response to preset two registers starting at 40001 to 42 DC and 00 00 hex, in slave device 1

| Request                   |       | ←→ | Response                  |       |
|---------------------------|-------|----|---------------------------|-------|
| Field Name                | (Hex) |    | Field Name                | (Hex) |
| Transaction Identifier Hi | 00    |    | Transaction Identifier Hi | 00    |
| Transaction Identifier Lo | 01    |    | Transaction Identifier Lo | 01    |
| Protocol Identifier Hi    | 00    |    | Protocol Identifier Hi    | 00    |
| Protocol Identifier Lo    | 00    |    | Protocol Identifier Lo    | 00    |
| Length Hi                 | 00    |    | Length Hi                 | 00    |
| Length Lo                 | 0B    |    | Length Lo                 | 06    |
| Unit Identifier           | 01    |    | Unit Identifier           | 01    |
| Function                  | 10    |    | Function                  | 10    |
| Starting Address Hi       | 00    |    | Starting Address Hi       | 00    |
| Starting Address Lo       | 00    |    | Starting Address Lo       | 00    |
| Number of Registers Hi    | 00    |    | Number of Registers Hi    | 00    |
| Number of Registers Lo    | 02    |    | Number of Registers Lo    | 02    |
| Byte Count                | 04    |    |                           |       |
| Data Hi                   | 42    |    |                           |       |
| Data Lo                   | DC    |    |                           |       |
| Data Hi                   | 00    |    |                           |       |
| Data Lo                   | 00    |    |                           |       |

#### <Important information>

##### \* MAX register read count : 124

(03h, 04h): You can read one register or several registers.

When reading multiple registers, up to 124 registers can be read.

**However, 124 words can be read only in the continuous address area.**

#### (5) Exception Codes

If the received Request frame is not normal, the device (slave) responds with a frame in the following format.

| Response                  |                      |
|---------------------------|----------------------|
| Field Name                | (Hex)                |
| Transaction Identifier Hi | 00                   |
| Transaction Identifier Lo | 01                   |
| Protocol Identifier Hi    | 00                   |
| Protocol Identifier Lo    | 00                   |
| Length Hi                 | 00                   |
| Length Lo                 | 03                   |
| Unit Identifier           | 01                   |
| Function                  | 0x80 + Function Code |
| Starting Address Hi       | Exception Code       |

Ex) If the master attempts to read the value of the 30551 register while the 30551 register is not defined in the device's register map, the device (slave) responds with ILLEGAL DATA ADDRESS (02).

| Request                   |       | Response                  |       |
|---------------------------|-------|---------------------------|-------|
| Field Name                | (Hex) | Field Name                | (Hex) |
| Transaction Identifier Hi | 00    | Transaction Identifier Hi | 00    |
| Transaction Identifier Lo | 01    | Transaction Identifier Lo | 01    |
| Protocol Identifier Hi    | 00    | Protocol Identifier Hi    | 00    |
| Protocol Identifier Lo    | 00    | Protocol Identifier Lo    | 00    |
| Length Hi                 | 00    | Length Hi                 | 00    |
| Length Lo                 | 06    | Length Lo                 | 03    |
| Unit Identifier           | 01    | Unit Identifier           | 01    |
| Function                  | 04    | Function                  | 84    |
| Starting Address Hi       | 02    | Exception Code            | 02    |
| Starting Address Lo       | 56    |                           |       |
| Quantity of Inputs Hi     | 00    |                           |       |
| Quantity of Inputs Lo     | 01    |                           |       |