

Modbus-Protokoll

@michi[®]

MODBUS Protokoll

1. Die Kommunikation erfolgt über den RS485-Bus, ein asynchrones seriell Signal mit 1 Startbit, 8 Datenbits, 1 Stoppbit, ohne Paritätsprüfung und mit einer Baudrate von 9600 bps.
2. Entspricht dem Standard-MODBUS-RTU-Protokoll, 16-Bit-Datenstruktur, wobei das niedrigste Byte der 16-Bit-CRC-Prüfung zuerst und das höchste Byte zuletzt kommt.
3. Die Adresse der Einheit reicht von #1 bis #8 und wird durch den DIP-Schalter 2-4 bestimmt.
4. Der übergeordnete Computer fungiert als Master, während der Controller als Slave fungiert.
5. Die Master-Slave-Kommunikation verwendet drei Befehle:

Befehl 03H (Abfrage von 1 oder mehreren Registern)

Befehl senden: [Geräteadresse] + [Befehlsnummer 03 H] + [Höchste 8 Bits der Startregisteradresse] + [Niederste 8 Bits] + [Höchste 8 Bits der Anzahl der zu lesenden Register] + [Niederste 8 Bits] + [Niederste 8 Bits der CRC-Prüfung] + [Höchste 8 Bits der CRC-Prüfung] Geräteantwort: [Geräteadresse] + [Befehlsnummer 03 H] + [Anzahl der zurückgegebenen Bytes] + [Daten 1] + [Daten 2] + ... + [Daten n] + [Niederste 8 Bits der CRC-Prüfung] + [Höchste 8 Bits der CRC-Prüfung]

Befehl 06H (Einzelnes Register ändern) Befehl senden: [Geräteadresse] + [Befehlsnummer 06 H] + [Höchste 8 Bits der einzustellenden Registeradresse] + [Niedrigste 8 Bits] + [Höchste 8 Bits der einzustellenden Daten] + [Niedrige 8 Bits] + [Niedrige 8 Bits der CRC-Prüfung] + [Höchste 8 Bits der CRC-Prüfung] Geräteantwort: Bei Erfolg wird der vom Computer gesendete Befehl unverändert zurückgegeben, andernfalls erfolgt keine Antwort.

Befehl 10H (Mehrere Register ändern) Befehl senden: [Geräteadresse] + [Befehlsnummer 10H] + [Startregisteradresse höchste 8 Bits] + [Niedrige 8 Bits] + [Anzahl der Register höchste 8 Bits] + [Niedrige 8 Bits] + [Registerbyte-Anzahl] + [Daten 1 höchste 8 Bits] + [Niedrige 8 Bits] + + [Daten N Hohe 8 Bits] + [Niedrige 8 Bits] + [CRC-Prüfung Niedrige 8 Bits] + [CRC Prüfung Hohe 8 Bits]

Geräteantwort: [Geräteadresse] + [Befehlsnummer 10H] + [Startregisteradresse Hohe 8 Bits] + [Niedrige 8 Bits] + [Anzahl der Register Hohe 8 Bits] + [Untere 8 Bits] + [CRC-Prüfung untere 8 Bits] + [CRC-Prüfung obere 8 Bits]

6. Ändern Sie die Parameter auf Gerät Nr. 1; andere Einheiten können nur Abfragen durchführen.

Vorsichtsmaßnahmen bei der Verwendung des Protokolls:

1. Das Zugriffsintervall des oberen Computers muss größer als 200 MS sein. Es wird empfohlen, einen Befehl zu verwenden, der auf mehrere Register gleichzeitig zugreift, um Kommunikationszeit zu sparen.
2. Nachdem der untere Computer den Änderungsbefehl empfangen hat, schreibt er auf den Speicherchip. Der obere Computer darf nur Änderungsbefehle (06H, 10H) senden, wenn er Parameter ändern muss, um übermäßige Schreibzyklen zu vermeiden, die den Speicherchip beschädigen könnten.
3. Die Anzahl der gleichzeitig aufgerufenen Register darf 120 nicht überschreiten; wenn dies der Fall ist, sind mehrere Zugriffe erforderlich.

Parameter address (R indicates that the parameter is read-only, RW indicates that the parameter is read-write)

| Data Address | Data Description | Set Range | Remarks |
|--------------|--------------------------|-----------|---|
| R 0x0000 | Reserved | | |
| R 0x0001 | Mainboard Version Number | | |
| R 0x0002 | Switch Status | | Bit0: SG Signal, 0 Closed, 1 Open Bit1: EVU Signal, 0 Closed, 1 Open Bit2: Low Power Shutdown Status, 0 No, 1 Yes Bit3: Emergency Switch Status, 0 Closed, 1 Open Bit4: Demand Switch, 0 Closed, 1 Open Bit5: Water Flow Switch, 0 Closed, 1 Open Bit6: Low Pressure Switch, 0 Closed, 1 Open Bit7: High Pressure Switch, 0 Closed, 1 Open |

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|----------|----------------|--|---|
| R 0x0003 | Working Status | | Bit0: Hot Water Available Bit1: Bit2: Heating Available Bit3: Cooling Available Bit4: DC Fan 1 Available Bit5: DC fan 2 Available Bit6: Bit 7: Defrost |
| R 0x0004 | Output Flag 1 | | Bit0: Compressor Bit1: Bit2: Bit3: Bit4: Bit5: Fan motor Bit 6: Four-way Valve Bit7: |
| R 0x0005 | Output Flag 2 | | Bit0: Chassis Electric Heating Bit1: Bit2: Bit3: Bit4: Bit5: Electric Heating Bit6: Three-Way Valve Bit7: Water Tank Electric Heating |
| R 0x0006 | Output Flag 3 | | Bit0: External Heat Source Bit1: Crankshaft Electric Heating Bit2: Circulating Water Pump Bit3: Bit4: Water Pump Bit5: Bit6: |

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| | | | Bit7: |
| R 0x0007 | Fault Indicator 1 | | Bit0: Er 14 Water Tank Temperature Fault Bit1: Er 21 Environment Temperature Fault Bit2: Er 16 External Coil Temperature Fault Bit3: Er 29 Inlet Water Temperature Fault Bit4: Er 27 Outlet Water Temperature Fault Bit5: Er 05 High Voltage Fault Bit6: Er 06 Low Voltage Fault Bit7: Er 01 Phase Sequence Fault |
| R 0x0008 | Fault Indicator 2 | | Bit0: Er 03 Water Flow Fault Bit1: Bit2: Er 32 Heating Outlet Water Temperature Too High Protection Bit3: Bit4: Bit5: Bit6: Bit7: |
| R 0x0009 | Fault Indicator 3 | | Bit0: Bit1: Bit2: Bit3: Bit4: Bit5: Er 73 Power Consumption Expansion Board Communication Fault Bit6: Er 18 Exhaust Temperature Fault Bit7: |

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| R 0x000A | Fault Indicator 4 | Bit0: Er 15 Inlet Water Temperature Fault Bit1: Er12 Exhaust Too High Protection Bit2: Bit3: Bit4: Bit5: Er23 Cooling Water Temperature Too Low Protection Bit6: Er29 Return Gas Temperature Fault Bit7: |
| R 0x000B | Fault Indicator 5 | Bit0: Er69 Low Pressure Protection Bit1: High Pressure Bit2: Er33 Coil Temperature Too High Bit3: Er42 Cooling Coil Temperature Sensor Fault Bit4: Bit5: Er72 DC Fan Communication Fault Bit6: Bit7: Er67 Low Pressure Sensor Fault |
| R 0x000C | Fault Indicator 6 | Bit0: Total Outlet Water Temperature Fault Bit1: Bit2: Bit3: Bit4: Bit5: Bit6: Bit7: |

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| R 0x000D | Fault Indicator 7 | | Bit0: Ambient Temperature Too High Bit1: Ambient Temperature Too Low Bit2: Bit3: Bit4: Er20 Frequency Conversion Module Communication Fault Bit5: Er66 DC Fan 2 Fault Bit6: Er64 DC Fan 1 Fault Bit7: |
| R 0x000E | Inlet Water Temperature | | n*0. 1℃ |
| R 0x000F | Water Tank Temperature | | n*0. 1℃ |
| R 0x0010 | Reserved | | |
| R 0x0011 | Ambient Temperature | | n*0. 5℃ |
| R 0x0012 | Outlet Water Temperature | | n*0. 1℃ |
| R 0x0013 | Reserved | | |
| R 0x0014 | Reserved | | |
| R 0x0015 | Return Air Temperature | | n*0. 5℃ |
| R 0x0016 | External Coil Temperature | | n*0. 5℃ |
| R 0x0017 | Reserved | | |
| R 0x0018 | Total Outlet Water Temperature | | n*0. 1℃ |
| R 0x0019 | Reserved | | |
| R 0x001A | Internal Coil Temperature | | n*0. 5℃ |
| R 0x001B | Exhaust Temperature | | n*1℃ |
| R 0x001C | Main Expansion Valve Opening | | |
| R 0x001D | Auxiliary Expansion Valve Opening | | |
| R 0x001E | Actual Frequency of the Compressor | | |

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| R 0x001F | <p>Low Eight Bits of Frequency</p> <p>Conversion Fault</p> | | <p>Bit0: IPM Overcurrent Bit1: Compressor Synchronization Abnormality Bit2: Reserved Bit3: Compressor Output Phase Loss Bit4: DC Bus Voltage Low Bit5: DC Bus Voltage High Bit6: Heat Sink Temperature Too High Bit7: Heat Sink Temperature Fault</p> |
| R 0x0020 | <p>Frequency Conversion Fault High</p> <p>Eight Bits</p> | | <p>Bit0: Communication Fault Bit1: AC Input Phase Loss Bit2: AC Input Overcurrent Bit3: AC Input Voltage Low Bit4: High Voltage Fault Bit5: IPM Temperature Too High Bit6: Compressor Peak Current Too High Bit7: PFC Module Over Temperature</p> |
| R 0x0021 | DC Bus Voltage Value | | |
| R 0x0022 | Heat Sink Temperature | | |

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| R 0x0023 | Compressor Current | | |
| R 0x0024 | Target Frequency | | |
| R 0x0025 | Variable Frequency Module | | Used to Control Overcurrent Shutdown |
| R 0x0026 | DC Fan 1 Wind Speed | | |
| R 0x0027 | DC Fan 2 Wind Speed | | |
| R 0x0028 | Low Pressure Pressure Conversion Temperature | | n*0.1°C |
| R 0x0029 | Reserved | | |
| R 0x002A | Actual Speed of DC Water Pump | | (%) |
| R 0x002B | Low Pressure Pressure Value | | n*0.1 (bar) |
| R 0x002C | Reserved | | n*0.1 (bar) |
| R 0x002D | Automatically Adjusted Target Temperature | | |
| R 0x002E | Compressor Operating Power | | |
| R 0x002F | Reserved | | |
| R 0x0030 | Current Water Flow | | n*0.01 (m ³ /h) |
| R 0x0031 | | | |
| R 0x0032 | | | |
| R 0x0033 | | | |
| R 0x0034 | | | |
| R 0x0035 | Total Machine Power | | (w) |
| R 0x0036 | Heating Capacity/Cooling Capacity | | n*0.1 (KW) |
| R 0x0037 | COP | | n*0.1 |
| R 0x0038 | | | |
| R 0x0039 | Heat Pump Status | | 0 - Shutdown Status 1 - Standby or Fault Shutdown 2 - Preparing to Start Compressor 3-Compressor running 4-Compressor reaches maximum frequency |

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| R 0x003A | Cost of heat pump for every 10,000 kcal of heating | | n*0.01 yuan |
| R 0x003B | Cost of gas for every 10,000 kcal of heating | | n*0.01 yuan |
| R 0x003C | Reserved | | |
| R 0x003D | Reserved | | |
| R 0x003E | Reserved | | |
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| RW 0x0800 | Shared status 1 | | Bit0: Hot water request, 1 for yes, 0 for no Bit1: Heating request, 1 for yes, 0 for no Bit2: Cooling request, 1 for yes, 0 for no Bit3: First level anti-freeze, 1 for yes, 0 for no Bit4: Secondary Anti-freeze, 1 Yes, 0 No Bit5: Bit6: Bit7: Bit8: Emergency Switch, 0 Closed, 1 Open Bit9: Demand Switch, 0 Closed, 1 Open Bit10: SG Signal, 0 Closed, 1 Open Bit11: EVU Signal, 0 Closed, 1 Open |
| RW 0x0801 | Reserved | | |
| RW 0x0802 | Common Fault 1 | | Bit0: Water Tank Temperature Sensor Fault Bit1: Inlet Water Temperature Sensor Fault Bit2: Ambient Temperature Sensor Fault Bit3: Total Outlet Water Temperature Sensor Fault |
| RW 0x0803 | Reserved | | |
| RW 0x0804 | Common Water Tank Temperature | | |
| RW 0x0805 | Common Inlet Water Temperature | | |
| RW 0x0806 | Common Ambient Temperature | | |
| RW 0x0807 | Common Total Outlet Water | | |

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| | Temperature | | |
| RW 0x0808 | Common Maximum Disinfection Time | | |
| RW 0x0809 | Shared SG-EVU Mode | | 1-Super Power Mode 2-Low Power Mode 3-Normal Mode 4-Enhanced Mode |
| | | | |
| RW 0x1000 | Timer Enable Flag | | Bit0: Timer 1 Allowed, 0 Not Allowed / 1 Allowed Bit1: Timer 2 Allowed, 0 Not Allowed / 1 Allowed Bit2: Timer 3 Allowed, 0 Not Allowed / 1 Allowed Bit3: Timer 4 Allowed, 0 Not Allowed / 1 Allowed Bit4: Timer 5 Allowed, 0 Not Allowed / 1 Allowed |
| RW 0x1001 | First Segment Timer On Hours | 00~23 | |
| RW 0x1002 | First Segment Timer On Minutes | 00~59 | |
| RW 0x1003 | First Segment Timer Off Hours | 00~23 | |
| RW 0x1004 | First Segment Timer Off Minutes | 00~59 | |
| RW 0x1005 | Second Segment Timer On Hours | 00~23 | |
| RW 0x1006 | Second segment timer on minutes | 00~59 | |
| RW 0x1007 | Second segment timer off hours | 00~23 | |
| RW 0x1008 | Second segment timer off minutes | 00~59 | |
| RW 0x1009 | Third segment timer on hours | 00~23 | |
| RW 0x100A | Third segment timer on minutes | 00~59 | |
| RW 0x100B | Third segment timer off hours | 00~23 | |
| RW 0x100C | Third segment timer off minutes | 00~59 | |
| RW 0x100D | Fourth segment timer on hours | 00~23 | |
| RW 0x100E | Fourth segment timer on minutes | 00~59 | |
| RW 0x100F | Fourth segment timer off hours | 00~23 | |
| RW 0x1010 | Fourth segment timer off minutes | 00~59 | |
| RW 0x1011 | Fifth segment timer on hours | 00~23 | |
| RW 0x1012 | Fifth segment timer on minutes | 00~59 | |

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| RW 0x1013 | Fifth segment timer off hours | 00~23 | |
| RW 0x1014 | Fifth segment timer off minutes | 00~59 | |
| RW 0x1015 | Reserved | | |
| RW 0x1016 | Reserved | | |
| RW 0x1017 | Reserved | | |
| RW 0x1018 | Reserved | | |
| RW 0x1019 | Reserved | | |
| RW 0x101A | Reserved | | |
| RW 0x101B | Reserved | | |
| RW 0x101C | Reserved | | |
| RW 0x101D | Reserved | | |
| RW 0x101E | Timer enable day | MON./TUE.WED./ THU./FRI./SAT./S UN. | Bit0: SUN. 0 No/1 Yes Bit1: MON. 0 No/1 Yes Bit2: TUE. 0 No/1 Yes Bit3: WED. 0 No/1 Yes Bit4: THU. 0 No/1 Yes Bit5: FRI. 0 No/1 Yes Bit6: SAT. 0 No/1 Yes Bit7: |
| RW 0x101F | Timer 1 Mode | | |
| RW 0x1020 | Timer 2 Mode | | |
| RW 0x1021 | Timer 3 Mode | | |
| RW 0x1022 | Timer 1 Hot Water Set Temperature | | |
| RW 0x1023 | Timer 1 Heating Set Temperature | | |
| RW 0x1024 | Timer 1 Cooling Set Temperature | | |
| RW 0x1025 | Timer 2 Hot Water Set Temperature | | |
| RW 0x1026 | Timer 2 Heating Set Temperature | | |
| RW 0x1027 | Timer 2 Cooling Set Temperature | | |

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| RW 0x1028 | Timer 3 Hot Water Set Temperature | | |
| RW 0x1029 | Timer 3 Heating Set Temperature | | |
| RW 0x102A | Timer 3 Cooling Set Temperature | | |
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| RW 0x2000 | Control Flag 1 | | Bit0: Power switch, 0 for off / 1 for on Bit1: Fahrenheit and Celsius switch Bit2: Heating target temperature automatic regulation enable, 0 for disabled / 1 for enabled (applicable only in heating mode and heating + heat mode) Bit3: Constant temperature frequency operation mode: 0 for frequency reduction, 1 for no frequency reduction Bit4: Smart grid function availability: 1 for valid / 0 for invalid Bit5: 0 for inlet control / 1 for outlet control Bit6: Turbo Mode Bit7: Silent Mode |
| RW 0x2001 | Control Flag 2 | | Bit0: Holiday mode selection Bit1: Anti-freeze three-way valve selection Bit2: Bit3: Bit4: Bit5: Bit6: Bit7: |
| RW 0x2002 | Mode | 0-4 | 0: Hot Water, 1: Heating, 2: Cooling, 3: Hot Water + Heating, 4: Hot Water + Cooling |
| RW 0x2003 | P01 Temp difference of return | 2°C~18°C | |

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| | water and cooling target temp | | |
| RW 0x2004 | P02 Temp difference of return water and hot water target temp | 2°C~18°C | |
| RW 0x2005 | P03 Hot water setting temp. | 28°C~60°C | |
| RW 0x2006 | P04 Cooling setting temp. | 7°C~30°C | |
| RW 0x2007 | P05 Heating Setting Temperature | 15°C~50°C | |
| RW 0x2008 | Holiday Mode Set Temperature | 7°C~50°C | |
| RW 0x2009 | | | |
| RW 0x200A | | | |
| RW 0x200B | P08 Water Temperature Compensation | -5°C~15°C | |
| RW 0x200C | Defrosting Frequency | 30-120HZ | |
| RW 0x200D | Defrosting Cycle | 20MIN~90MIN | |
| RW 0x200E | Defrosting Time | 5MIN~20MIN | |
| RW 0x200F | P11 Defrosting Entry Temperature | -15°C~-1°C | |
| RW 0x2010 | P13 Defrosting Exit Temperature | 1°C~40°C | |
| RW 0x2011 | P14 Defrosting environment and evaporator coil temp. difference 1 | 0°C~15°C | |
| RW 0x2012 | P15 Defrosting environment and evaporator coil temp. difference 2 | 0°C~15°C | |
| RW 0x2013 | P16 Ambient temp. for defrosting | 0°C~20°C | |
| RW 0x2014 | P17 High temperature disinfection cycle days | 0~30 days Disinfection function is not executed when set to 0 | |
| RW 0x2015 | P18 High temperature disinfection start time | 0~23:00 | |

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| RW 0x2016 | P19 High temperature disinfection sustaining time | 0~90min | |
| RW 0x2017 | P20 High temperature disinfection setting temperature | 0~90°C | |
| RW 0x2018 | P21 Heat pump's setting temperature for high temperature disinfection | 40~60°C | |
| RW 0x2019 | P23 Heating compensation temperature point (ambient temperature) | 0-40 | |
| RW 0x201A | P24 Target temperature compensation coefficient | 1~30 (1 corresponds to actual 0.1) | |
| RW 0x201B | P26 Ambient temperature for starting electric heating | -20-20°C | |
| RW 0x201C | Water Tank Electric Heating Delay Setting | 0-60 | |
| RW 0x201D | Model Selection | 1-4 | |
| RW 0x201E | Water Pump Constant Temperature Operation Mode | 0-2 | |
| RW 0x201F | Water Pump Constant Temperature Start/Stop Cycle | 1~120min | |
| RW 0x2020 | Direct Water Pump Mode | 0-2 | |
| RW 0x2021 | Direct Water Pump Adjustment Cycle | 10~120s | |
| RW 0x2022 | Direct Water Pump Manual Speed | 10~100% | |
| RW 0x2023 | Minimum Speed of Direct Water Pump | 10~100% | |
| RW 0x2024 | | | |
| RW 0x2025 | SG Operating Time | 0-60 | n*10 minutes |

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| RW 0x2026 | Electric Heating Mode | 0-3 | |
| RW 0x2027 | P32 Compressor Full Open Temperature Difference (Mainboard only saves parameters, no logic) | 1~20 | |
| RW 0x2028 | P35 Cascade Adjustment Cycle (Mainboard only saves parameters, no logic) | 1-250 | n*10 seconds |
| RW 0x2029 | P33 Load Hysteresis (Mainboard only saves parameters, no logic) | 1~20 | |
| RW 0x202A | P34 Unload Hysteresis (Mainboard only saves parameters, no logic) | 1~20 | |
| RW 0x202B | P32 Compressor Shutdown Time (Effective in Dual Mode) | | |
| RW 0x202C | P36 Heating Automatic Temperature Adjustment Maximum Value | | |
| RW 0x202D | H01 External Heat Source | | 0 Disabled; 1 Heating Only; 2 Hot Water Only; 3 Heating & Hot Water; |
| RW 0x202E | H02 External Heat Source Operating Mode | | 0: Low Carbon Mode 1: Eco Hybrid Mode |
| RW 0x202F | H03 Eco Hybrid Mode | | 0. Fixed Pricing; 1. Peak and Valley Pricing; 2. Ambient Temperature; |
| RW 0x2030 | H04 External Heat Source Open Loop Temperature | | |
| RW 0x2031 | H05 External Heat Source Start Delay | | |
| RW 0x2032 | H06 External Heat Source Temperature Difference | | |
| RW 0x2033 | H07 Standard Electricity Unit Price | | Accuracy: 0.01 Yuan |

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| RW 0x2034 | H08 Off-Peak Electricity Unit Price | | Accuracy: 0.01 Yuan |
| RW 0x2035 | H09 Gas Material Unit Price | | Accuracy: 0.01 Yuan |
| RW 0x2036 | H10 Weekday Off-Peak Start Time | | |
| RW 0x2037 | H11 Weekday Off-Peak End Time | | |
| RW 0x2038 | H12 Weekend Off-Peak Start Time | | |
| RW 0x2039 | H13 Weekend Off-Peak End Time | | |
| RW 0x203A | H14 Heat Pump Restart Temperature Change Value | | |
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| RW 0x8000 | Control Flag 1 | | Bit0: Manual Frequency Switch Bit1: Expansion Valve Initial Opening Adjustment Mode, 0 Fixed / 1 Adjustable Bit2: Bit3: Direct Water Pump Flow Control Bit4: Bit5: Bit6: Bit7: |
| RW 0x8001 | Main Expansion Valve Action Cycle | 20S~90S | |
| RW 0x8002 | A02 Main Expansion Valve Heating Target Superheat 1 | -5°C~10°C | |
| RW 0x8003 | A03 Main Expansion Valve Heating Target Superheat 2 | -5°C~10°C | |
| RW 0x8004 | A04 Main Expansion Valve Heating Target Superheat 3 | -5°C~10°C | |
| RW 0x8005 | A05 Main Expansion Valve Heating Target Superheat 4 | -5°C~10°C | |
| RW 0x8006 | A06 Main Expansion Valve Heating Target Superheat 5 | -5°C~10°C | |

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| RW 0x8007 | A07 Main Expansion Valve Heating Target Superheat 6 | -5°C~10°C | |
| RW 0x8008 | A08 Main Expansion Valve Heating Target Superheat 7 | -5°C~10°C | |
| RW 0x8009 | A09 Main Expansion Valve Heating Target Superheat 8 | -5°C~10°C | |
| RW 0x800A | A10 Main Expansion Valve Cooling Target Superheat 1 | -5°C~10°C | |
| RW 0x800B | A11 Main Expansion Valve Cooling Target Superheat 2 | -5°C~10°C | |
| RW 0x800C | A12 Main Expansion Valve Cooling Target Superheat 3 | -5°C~10°C | |
| RW 0x800D | A13 Main Expansion Valve Cooling Target Superheat 4 | -5°C~10°C | |
| RW 0x800E | Heating Main Valve Initial Opening Degree 00 | 0~240 | n*2P |
| RW 0x800F | Heating Main Valve Initial Opening Degree 01 | 0~240 | n*2P |
| RW 0x8010 | Heating Main Valve Initial Opening Degree 02 | 0~240 | n*2P |
| RW 0x8011 | Heating Main Valve Initial Opening Degree 03 | 0~240 | n*2P |
| RW 0x8012 | Heating Main Valve Initial Opening Degree 04 | 0~240 | n*2P |
| RW 0x8013 | Heating Main Valve Initial Opening Degree 05 | 0~240 | n*2P |
| RW 0x8014 | Heating Main Valve Initial Opening Degree 06 | 0~240 | n*2P |
| RW 0x8015 | Heating Main Valve Initial Opening Degree 07 | 0~240 | n*2P |

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| RW 0x8016 | Cooling Main Valve Initial Opening Degree 00 | 0~240 | n*2P |
| RW 0x8017 | Cooling Main Valve Initial Opening Degree 01 | 0~240 | n*2P |
| RW 0x8018 | Cooling Main Valve Initial Opening Degree 02 | 0~240 | n*2P |
| RW 0x8019 | Cooling Main Valve Initial Opening Degree 03 | 0~240 | n*2P |
| RW 0x801A | Hot Water Main Valve Initial Opening Degree 00 | 0~240 | n*2P |
| RW 0x801B | Hot Water Main Valve Initial Opening Degree 01 | 0~240 | n*2P |
| RW 0x801C | Hot Water Main Valve Initial Opening Degree 02 | 0~240 | n*2P |
| RW 0x801D | Hot Water Main Valve Initial Opening Degree 03 | 0~240 | n*2P |
| RW 0x801E | Heating Main Valve Automatic Regulation Lower Limit 00 | 0~240 | n*2P |
| RW 0x801F | Heating Main Valve Automatic Regulation Lower Limit 01 | 0~240 | n*2P |
| RW 0x8020 | Heating Main Valve Automatic Regulation Lower Limit 02 | 0~240 | n*2P |
| RW 0x8021 | Heating Main Valve Automatic Regulation Lower Limit 03 | 0~240 | n*2P |
| RW 0x8022 | Heating Main Valve Automatic Regulation Lower Limit 04 | 0~240 | n*2P |
| RW 0x8023 | Heating Main Valve Automatic Regulation Lower Limit 05 | 0~240 | n*2P |
| RW 0x8024 | Heating Main Valve Automatic Regulation Lower Limit 06 | 0~240 | n*2P |

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| RW 0x8025 | Heating Main Valve Automatic Regulation Lower Limit 07 | 0~240 | n*2P |
| RW 0x8026 | A38 Exhaust Temperature Adjusted by Main Expansion Valve | 70°C~125°C | |
| RW 0x8027 | Defrosting Main Expansion Valve Opening | 10~225 | n*2P |
| RW 0x8028 | Minimum Opening of Main Expansion Valve in Hot Water Mode | 25~75 | n*2P |
| RW 0x8029 | Main Expansion Valve Mode | 0-2 | |
| RW 0x802A | Manual Steps of Main Expansion Valve | 10~225 | n*2P |
| RW 0x802B | Overheat Ratio Coefficient of Main Expansion Valve | 1~20 | |
| RW 0x802C | Overheat Differential Coefficient of Main Expansion Valve | 1~180 | |
| RW 0x802D | Frequency Variation Coefficient of Main Valve | 1~50 | |
| RW 0x802E | Frequency Variation Coefficient of Auxiliary Valve | 1~50 | |
| RW 0x802F | Defrost Delay Variation Coefficient | 1~50 | |
| RW 0x8030 | Control Flag 2 | | Bit0: Auxiliary Expansion Valve Mode Selection, 0-Automatic/1-Manual Bit1: Bit2: Cooling Auxiliary Circuit Enable 0-Allow On/1-Do Not Allow On Bit3: Auxiliary Electric Expansion Valve Control Mode 0 Superheat/1 Exhaust Superheat Bit4: Bit5: |

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| | | | Bit6: Bit7: |
| RW 0x8031 | Manual Steps for Auxiliary Expansion Valve | 10~225 | n*2P |
| RW 0x8032 | B03 Superheat Solenoid Valve Opening Ambient Temperature | 11°C~45°C | |
| RW 0x8033 | Auxiliary Expansion Valve Exhaust Ratio Coefficient | 1~20 | |
| RW 0x8034 | Auxiliary Expansion Valve Exhaust Differential Coefficient | 0~180 | |
| RW 0x8035 | Auxiliary Expansion Valve Superheat Ratio Coefficient | 1~20 | |
| RW 0x8036 | Auxiliary Expansion Valve Superheat Differential Coefficient | 0~180 | |
| RW 0x8037 | Auxiliary Expansion Valve Adjustment Cycle | 10~20 | |
| RW 0x8038 | B09 Auxiliary Expansion Valve Target Exhaust Temperature | 70~120 | |
| RW 0x8039 | B10 Close Auxiliary Expansion Valve Exhaust Temperature | 40~70 | |
| RW 0x803A | Target of the auxiliary expansion overheat valve 1 | -10~10 | |
| RW 0x803B | Target of the auxiliary expansion overheat valve 2 | -10~10 | |
| RW 0x803C | Target of the auxiliary expansion overheat valvet 3 | -10~10 | |
| RW 0x803D | Target of the auxiliary expansion overheat valve 4 | -10~10 | |
| RW 0x803E | Target of the auxiliary expansion overheat valve 5 | -10~10 | |

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|-----------|---|---------------|-------------|
| RW 0x803F | B13 Low Pressure Conversion Temperature Low Protection Value | | |
| RW 0x8040 | B12 Main Valve Opening Coefficient After Defrosting | 0-100% | |
| RW 0x8041 | B11 Main Valve Initial Opening Hold Time | 0-300s | |
| RW 0x8042 | Heating Auxiliary Valve Initial Opening Degree 00 | 0~240 | n*2P |
| RW 0x8043 | Heating Auxiliary Valve Initial Opening Degree 01 | 0~240 | n*2P |
| RW 0x8044 | Heating Auxiliary Valve Initial Opening Degree 02 | 0~240 | n*2P |
| RW 0x8045 | Heating Auxiliary Valve Initial Opening Degree 03 | 0~240 | n*2P |
| RW 0x8046 | Heating Auxiliary Valve Initial Opening Degree 04 | 0~240 | n*2P |
| RW 0x8047 | Heating Auxiliary Valve Initial Opening Degree 05 | 0~240 | n*2P |
| RW 0x8048 | Heating Auxiliary Valve Initial Opening Degree 06 | 0~240 | n*2P |
| RW 0x8049 | Heating Auxiliary Valve Initial Opening Degree 07 | 0~240 | n*2P |
| RW 0x804A | Hot Water Auxiliary Valve Initial Opening Degree 00 | 0~240 | n*2P |
| RW 0x804B | Hot Water Auxiliary Valve Initial Opening Degree 01 | 0~240 | n*2P |
| RW 0x804C | Hot Water Auxiliary Valve Initial Opening Degree 02 | 0~240 | n*2P |
| RW 0x804D | Hot Water Auxiliary Valve Initial Opening Degree 03 | 0~240 | n*2P |

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|-----------|--|--------------|-------------|
| RW 0x804E | Heating Auxiliary Valve Automatic Regulation Lower Limit 00 | 0~240 | n*2P |
| RW 0x804F | Heating Auxiliary Valve Automatic Regulation Lower Limit 01 | 0~240 | n*2P |
| RW 0x8050 | Heating Auxiliary Valve Automatic Regulation Lower Limit 02 | 0~240 | n*2P |
| RW 0x8051 | Heating Auxiliary Valve Automatic Regulation Lower Limit 03 | 0~240 | n*2P |
| RW 0x8052 | Heating Auxiliary Valve Automatic Regulation Lower Limit 04 | 0~240 | n*2P |
| RW 0x8053 | Heating Auxiliary Valve Automatic Regulation Lower Limit 05 | 0~240 | n*2P |
| RW 0x8054 | Heating Auxiliary Valve Automatic Regulation Lower Limit 06 | 0~240 | n*2P |
| RW 0x8055 | Heating Auxiliary Valve Automatic Regulation Lower Limit 07 | 0~240 | n*2P |
| RW 0x8056 | Auxiliary Valve Opening during Defrosting | 0~240 | n*2P |
| RW 0x8057 | Auxiliary Valve Opening during Cooling | 0~240 | n*2P |
| RW 0x8058 | B41 Hot Water Auxiliary Valve Automatic Regulation Lower Limit 00 | 0~240 | n*2P |
| RW 0x8059 | B42 Hot Water Auxiliary Valve Automatic Regulation Lower Limit 01 | 0~240 | n*2P |
| RW 0x805A | B43 Hot Water Auxiliary Valve Automatic Regulation Lower Limit 02 | 0~240 | n*2P |
| RW 0x805B | B44 Hot Water Auxiliary Valve | 0~240 | n*2P |

| | Automatic Regulation Lower Limit 03 | | |
|-----------|--|-----------------|--|
| RW 0x805C | B45 EVI heating open exhaust temperature 00 | 50~125°C | |
| RW 0x805D | B46 EVI heating open exhaust temperature 01 | 50~125°C | |
| RW 0x805E | B47 EVI heating open exhaust temperature 02 | 50~125°C | |
| RW 0x805F | B48 EVI heating open exhaust temperature 03 | 50~125°C | |
| RW 0x8060 | B49 EVI heating open exhaust temperature 04 | 50~125°C | |
| RW 0x8061 | B50 EVI heating open exhaust temperature 05 | 50~125°C | |
| RW 0x8062 | B51 EVI heating open exhaust temperature 06 | 50~125°C | |
| RW 0x8063 | B52 EVI heating open exhaust temperature 07 | 50~125°C | |
| RW 0x8064 | B53 EVI hot water open exhaust temperature 00 | 50~125°C | |
| RW 0x8065 | B54 EVI hot water open exhaust temperature 01 | 50~125°C | |
| RW 0x8066 | B55 EVI hot water open exhaust temperature 02 | 50~125°C | |
| RW 0x8067 | B56 EVI hot water open exhaust temperature 03 | 50~125°C | |
| RW 0x8068 | B57 EVI cooling open exhaust temperature 00 | 50~125°C | |
| RW 0x8069 | B58 EVI cooling open exhaust temperature 01 | 50~125°C | |

| | | | |
|-----------|---|-----------------|--|
| RW 0x806A | B59 EVI cooling open exhaust temperature 02 | 50~125°C | |
| RW 0x806B | B60 EVI cooling open exhaust temperature 03 | 50~125°C | |
| RW 0x806C | B61 EVI Delay Open | 0~180S | |
| RW 0x806D | B63 EVI Closed Exhaust Deviation | 0~30 | |
| RW 0x806E | B64 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 00 | 0~125°C | |
| RW 0x806F | B65 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 01 | 0~125°C | |
| RW 0x8070 | B66 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 02 | 0~125°C | |
| RW 0x8071 | B67 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 03 | 0~125°C | |
| RW 0x8072 | B68 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 04 | 0~125°C | |
| RW 0x8073 | B69 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 05 | 0~125°C | |
| RW 0x8074 | B70 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 06 | 0~125°C | |
| RW 0x8075 | B71 Auxiliary Electronic Expansion Valve Heating Exhaust Temperature Difference 07 | 0~125°C | |

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|-----------|---|----------------|--|
| RW 0x8076 | B72 Auxiliary Electronic Expansion Valve Hot Water Exhaust Temperature Difference 00 | 0~125℃ | |
| RW 0x8077 | B73 Auxiliary Electronic Expansion Valve Hot Water Exhaust Temperature Difference 01 | 0~125℃ | |
| RW 0x8078 | B74 Auxiliary Electronic Expansion Valve Hot Water Exhaust Temperature Difference 02 | 0~125℃ | |
| RW 0x8079 | B75 Auxiliary Electronic Expansion Valve Hot Water Exhaust Temperature Difference 03 | 0~125℃ | |
| RW 0x807A | B77 Target overheat correction Value 1 | -30~30℃ | |
| RW 0x807B | B78 Target overheat correction Value 2 | -30~30℃ | |
| RW 0x807C | B79 Target overheat correction Value 3 | -30~30℃ | |
| RW 0x807D | B80 Target overheat correction Value 4 | -30~30℃ | |
| RW 0x807E | B81 Target overheat correction Value 5 | -30~30℃ | |
| RW 0x807F | B82 Target overheat correction Value 6 | -30~30℃ | |
| RW 0x8080 | B83 Target overheat correction Value 7 | -30~30℃ | |
| RW 0x8081 | Control Flag 3 | | Bit0: Pressure sensor status, 1 valid / 0 invalid Bit1: Extension board function status: 1 valid / 0 invalid Bit2: R39 refrigerant concentration sensor status, 1 |

| | | | |
|-----------|---|------------------|--|
| | | | valid / 0 invalid Bit3: Bit4: Bit5: Bit6: Bit7: |
| RW 0x8082 | | | |
| RW 0x8083 | | | |
| RW 0x8084 | Low Pressure Protection Value | 0-20.0bar | |
| RW 0x8085 | Low Pressure Recovery Value | 0-20.0bar | |
| RW 0x8086 | Linear Compensation Coefficient | -125-125 | |
| RW 0x8087 | Heating Water Flow Compensation Value | -10-10 | n*0.1m³/h (e.g.: 1=0.1m³/h) |
| RW 0x8088 | Heating Inlet and Outlet Water Temperature Difference Compensation Value | -100~100 | n*0.1 °C |
| RW 0x8089 | | | |
| RW 0x808A | | | |
| RW 0x808B | | | |
| RW 0x808C | | | |
| RW 0x808D | | | |
| RW 0x808E | | | |
| RW 0x808F | DC Fan motor 1 Selection | 0-3 | |
| RW 0x8090 | DC Fan motor 2 Selection | 0-3 | |
| RW 0x8091 | Heating Fan Speed 1 | 0~100 | |
| RW 0x8092 | Heating Fan Speed 2 | 0~100 | |
| RW 0x8093 | Heating Fan Speed 3 | 0~100 | |
| RW 0x8094 | Heating Fan Speed 4 | 0~100 | |
| RW 0x8095 | Heating Fan Speed 5 | 0~100 | |
| RW 0x8096 | Heating Fan Speed 6 | 0~100 | |

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|-----------|--|-----------------------|--|
| RW 0x8097 | | 0~100 | |
| RW 0x8098 | | 0~100 | |
| RW 0x8099 | D09 Heating/Hot Water Silent Mode Maximum Fan Speed | 0~100 | |
| RW 0x809A | D10 Cooling Silent Mode Maximum Fan Speed | 0~100 | |
| RW 0x809B | D11 Heating Fan Speed 1 Corresponds to Coil Temperature | -30~30 | |
| RW 0x809C | D12 Heating Fan Speed 2 Corresponds to Coil Temperature | -30~30 | |
| RW 0x809D | D13 Heating Fan Speed 3 Corresponds to Coil Temperature | -30~30 | |
| RW 0x809E | D14 Heating Fan Speed 4 Corresponds to Coil Temperature | -30~30 | |
| RW 0x809F | D15 Heating Fan Speed 5 Corresponds to Coil Temperature | -30~30 | |
| RW 0x80A0 | D16 Heating Fan Speed 6 Corresponds to Coil Temperature | -30~30 | |
| RW 0x80A1 | D17 Heating Fan Speed 7 Corresponds to Coil Temperature | -30~30 | |
| RW 0x80A2 | D18 Heating Fan Speed 8 Corresponds to Coil Temperature | -30~30 | |
| RW 0x80A3 | D19 DC Fan Speed Control Cycle | 10~180 seconds | |
| RW 0x80A4 | D20 Fan Speed Adjustment per Cycle | 0~100 RPM | |
| RW 0x80A5 | D21 Hot Water Fan Speed 1 | 0~100 | |
| RW 0x80A6 | D22 Hot Water Fan Speed 2 | 0~100 | |
| RW 0x80A7 | D23 Hot Water Fan Speed 3 | 0~100 | |
| RW 0x80A8 | D24 Hot Water Fan Speed 4 | 0~100 | |
| RW 0x80A9 | D25 Hot Water Fan Speed 1 | -30~30 | |

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|-----------|--|----------------|--|
| | Corresponding to Coil Temperature | | |
| RW 0x80AA | D26 Hot Water Fan Speed 2 Corresponding to Coil Temperature | -30~30 | |
| RW 0x80AB | D27 Hot Water Fan Speed 3 Corresponding to Coil Temperature | -30~30 | |
| RW 0x80AC | D28 Hot Water Fan Speed 4 Corresponding to Coil Temperature | -30~30 | |
| RW 0x80AD | D29 Cooling DC Maximum Fan Speed 1 | 0~100 | |
| RW 0x80AE | D30 Cooling DC Maximum Fan Speed 2 | 0~100 | |
| RW 0x80AF | D31 Cooling DC Maximum Fan Speed 3 | 0~100 | |
| RW 0x80B0 | D32 Cooling DC Maximum Fan Speed 4 | 0~100 | |
| RW 0x80B1 | Heating High Temperature Forced Fan Speed | 70~90 | |
| RW 0x80B2 | Fan Speed Frequency Compensation Coefficient | 0~100 | |
| RW 0x80B3 | Fan Speed Correction Coefficient Lower Limit | 10~100 | |
| RW 0x80B4 | Control Flag 5 | | |
| RW 0x80B5 | Maximum Speed of Direct Water Pump | 10~100% | |
| RW 0x80B6 | Adjustable Speed of Direct Water Pump | 0~50% | |
| RW 0x80B7 | Inlet and Outlet Water Temperature Difference Setting for Direct Water Pump | 2~30℃ | |
| RW 0x80B8 | | | |

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|-----------|---|-----------------|--|
| RW 0x80B9 | Control Flag 6 | | |
| RW 0x80BA | Manual Frequency | 15~120 | |
| RW 0x80BB | R00 Compressor Operating Frequency 1 | 30~120Hz | |
| RW 0x80BC | R01 Compressor Operating Frequency 2 | 30~120Hz | |
| RW 0x80BD | R02 Compressor Operating Frequency 3 | 30~120Hz | |
| RW 0x80BE | R03 Compressor Operating Frequency 4 | 30~120Hz | |
| RW 0x80BF | R04 Compressor Operating Frequency 5 | 30~120Hz | |
| RW 0x80C0 | R05 Compressor Operating Frequency 6 | 30~120Hz | |
| RW 0x80C1 | R06 Compressor Operating Frequency 7 | 30~120Hz | |
| RW 0x80C2 | R07 Compressor Operating Frequency 8 | 30~120Hz | |
| RW 0x80C3 | R08 Compressor Operating Frequency 9 | 30~120Hz | |
| RW 0x80C4 | R09 Compressor Operating Frequency 10 | 30~120Hz | |
| RW 0x80C5 | R10 Compressor Operating Frequency 11 | 30~120Hz | |
| RW 0x80C6 | R11 Compressor Operating Frequency 12 | 30~120Hz | |
| RW 0x80C7 | R12 Constant Temperature Operating Frequency Lower Limit | 30~120Hz | |
| RW 0x80C8 | R13 Constant Temperature Operating Frequency Upper Limit | 30~120Hz | |

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|-----------|--|-----------------|--|
| RW 0x80C9 | Hot Water Mode Compensation Frequency | -50~20Hz | |
| RW 0x80CA | R16 Discharge Setting TP0 | 50~125℃ | |
| RW 0x80CB | R17 Discharge Setting TP1 | 50~125℃ | |
| RW 0x80CC | R18 Discharge Setting TP2 | 50~125℃ | |
| RW 0x80CD | R19 Discharge Setting TP3 | 50~125℃ | |
| RW 0x80CE | R20 Discharge Setting TP4 | 50~125℃ | |
| RW 0x80CF | R21 Frequency Point Lower Limit 01 | 0~125Hz | |
| RW 0x80D0 | R22 Frequency Point Lower Limit 02 | 0~125Hz | |
| RW 0x80D1 | R23 Frequency Point Lower Limit 03 | 0~125Hz | |
| RW 0x80D2 | R24 Frequency Point Lower Limit 04 | 0~125Hz | |
| RW 0x80D3 | R25 Frequency Point Upper Limit 01 | 0~125Hz | |
| RW 0x80D4 | R26 Frequency Point Upper Limit 02 | 0~125Hz | |
| RW 0x80D5 | R27 Frequency Point Upper Limit 03 | 0~125Hz | |
| RW 0x80D6 | R28 Frequency Point Upper Limit 04 | 0~125Hz | |
| RW 0x80D7 | Heating Power Mode Frequency Increase | -30~30Hz | |
| RW 0x80D8 | Heating Silent Mode Maximum Frequency | 30~120Hz | |
| RW 0x80D9 | Cooling Power Mode Frequency Increase | -30~30Hz | |
| RW 0x80DA | Cooling Silent Mode Maximum | 30~120Hz | |

| | Frequency | | |
|-----------|--|---------------|--|
| RW 0x80DB | Constant Temperature Frequency Reduction Correction Temperature | 0-10°C | |
| RW 0x80DC | R34 Hot Water Mode Outlet Water Tank Maximum Temperature Difference | 1-20°C | |
| RW 0x80DD | R35 Return Oil Frequency | 0-90Hz | |
| RW 0x80DE | R36 Hot Water Maximum Set Temperature | | |
| RW 0x80DF | R37 Heating Maximum Set Temperature | | |
| RW 0x80E0 | R38 Refrigerant Type | | |
| RW 0x80E1 | F12 Target Water Flow Rate | | |
| RW 0x80E2 | | | |
| RW 0x80E3 | | | |
| RW 0x80E4 | | | |
| RW 0x80E5 | F17 Flow Control Adjustment Cycle | | |
| RW 0x80E6 | F18 Flow Control Error Adjustment 0 | | |
| RW 0x80E7 | F19 Flow Control Error Adjustment 1 | | |
| RW 0x80E8 | R40 Refrigerant Concentration Too High Protection Value | | |
| | | | |
| RW 0xF000 | Reset All Parameters | | Fixed Command Format: [Device Address] 06 F0 00 00 01 [Low 8 Bits of CRC Check] [High 8 Bits of CRC Check] |
| RW 0xF001 | Forced Defrost Command | | Fixed Command Format: [Device Address] 06 F0 01 00 01 [Low 8 bits of CRC Check] |

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|-----------|----------------------------------|--|--|
| | | | [High 8 bits of CRC Check] |
| RW 0xF002 | Disinfection Mode Command | | Fixed Command Format: [Device Address] 06 F0 02 00 01 [Low 8 bits of CRC Check] [High 8 bits of CRC Check] |
| RW 0xF003 | Silent Mode Command | | Fixed Command Format: [Device Address] 06 F0 03 00 01 [Low 8 bits of CRC Check] [High 8 bits of CRC Check] |
| RW 0xF004 | Acquisition time | | 0xF004 uses the modbus 0x06 command and broadcasts with address 0x00, it should broadcast when powered on and every minute, 00 06 F0 04 xx xx [Low 8 bits of CRC Check] [High 8 bits of CRC Check] bit0~bit7: minute (0~59) bit8~bit12: hour (0~23) bit13~bit15: week (0~6, 0 is Sunday, 6 is Saturday) |
| RW 0xFFFF | Cascading power on/off command | | [Machine enable high 8 bits] [Machine enable low 8 bits]: Bit0: Machine 1, 0 does not allow power on, 1 allows power on Bit1: Machine 2, 0 does not allow power on, 1 allows power on Bit2: Machine 3, 0 does not allow power on, 1 allows power on Bit3: Machine 4, 0 does not allow power on, 1 allows power on Bit4: Machine 5, 0 does not allow power on, 1 allows power on Bit5: Machine 6, 0 does not allow power on, 1 allows power on Bit6: Machine 7, 0 does not allow power on, 1 allows |

| | | | |
|--|--|--|---|
| | | | power on Bit7: Machine 8, 0 does not allow startup, 1 allows startup |
|--|--|--|---|

Note: The cascading control software is implemented in the online controller. If the customer needs to use the master station for cascading functionality, the cascading control logic needs to be implemented in the master station.

The master station determines the number of slave units to start based on the total outlet water temperature and the target temperature, sending start or shutdown commands to the slaves.

| | | | |
|-----------|--------------------------------|--|---|
| RW 0xFFFF | Cascading power on/off command | | [Machine enable high 8 bits] [Machine enable low 8 bits]: Bit0: Machine 1, 0 does not allow power on, 1 allows power on Bit1: Machine 2, 0 does not allow power on, 1 allows power on Bit2: Machine 3, 0 does not allow power on, 1 allows power on Bit3: Machine 4, 0 does not allow power on, 1 allows power on Bit4: Machine 5, 0 does not allow power on, 1 allows power on |
|-----------|--------------------------------|--|---|

- 1、 The controller/upper computer is responsible for coordination and must broadcast the cascading startup and shutdown commands in a fixed format: 00 06 ffff [H|L] [CRC16],
- 2、 The mainboard will determine whether the current slave can start based on the 0xffff address register in the Modbus protocol.

Upper computer Cascading Control Logic Reference

1. Cascade

When the online function is enabled, the heating function is controlled by the main outlet water sensor;
 When online, Unit 1 is the master, and Units 2-8 are slaves;

If hot water function is required, the master heats the hot water tank, and the slave heats the heating system. The tank can only be connected to the master unit's water circuit through a three-way valve, and is controlled by the master unit.

2. Cascade Compressor Start-Stop Logic

1) Startup Phase Adjustable

- During startup, the number of compressors to be loaded is calculated based on the temperature difference for energy regulation.
- When there is no energy loading demand, it directly enters the energy regulation of normal operation; When there is an energy loading demand, one compressor is started every 4 seconds (based on the actual startup interval) until the number of started compressors meets the demand, after which it transitions to the energy regulation of normal operation.

- Calculation method for the number of compressors to be activated:

Cooling: $N_{\text{need}} = (T_{\text{Wout2}} - T_{\text{cS}}) / T_{\text{max}} \times C_{\text{max}}$;

Heating: $N_{\text{need}} = (T_{\text{hS}} - T_{\text{Wout2}}) / T_{\text{max}} \times C_{\text{max}}$;

Hot Water: $N_{\text{need}} = (T_{\text{hwS}} - T_{\text{HWt}}) / T_{\text{max}} \times C_{\text{max}}$;

The meanings of the symbols are as follows:

N_{need} : Number of compressors to be activated; C_{max} : Total number of units ; T_{max} : 【 P32 compressor full open temperature difference 】 ;

T_{cS} : Cooling target temperature T_{hS} : Heating target temperature T_{hwS} : Hot water target temperature;

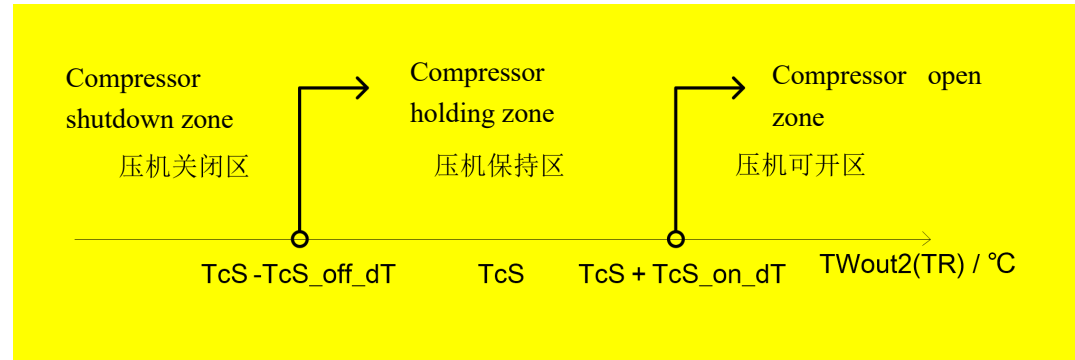
T_{Wout2} : Total outlet water temperature; T_{HWt} : Hot water tank temperature

2) Energy regulation during normal operation

Every 【 P35Cascading Regulation Cycle 】 execute a judgment once:

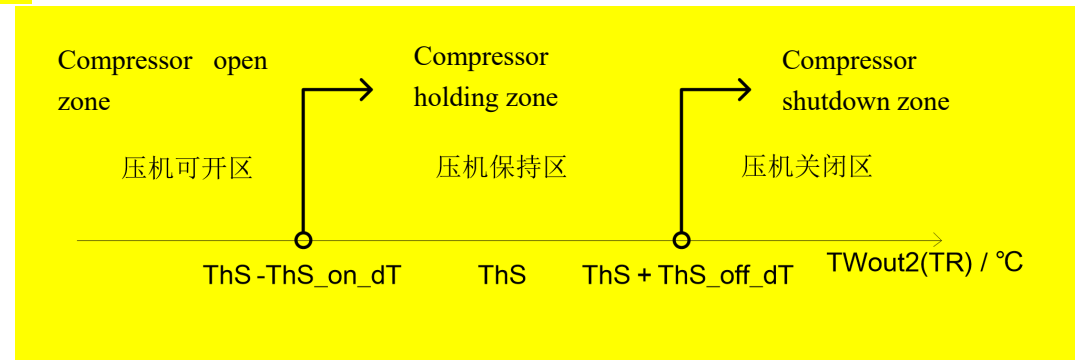
- When the controlled temperature is in the compressor's operating range and there is no compressor available for frequency increase, select the compressor with the shortest cumulative operating time to start;
- When the controlled temperature is in the compressor's holding range, perform frequency modulation on the compressor;
- When the controlled temperature is in the compressor's shutdown range, select the compressor with the longest cumulative operating time to shut down.

➤ Unit cooling operation:



TcS: Cooling energy regulation target temperature; TcS_on_dT: Load deviation; TcS_off_dT: Unload deviation

➤ Unit heating operation:



ThS: Heating can adjust the target temperature; ThS_on_dT: Load deviation; ThS_off_dT: Unload deviation

➤ When the unit is running hot water:



ThwS: Hot water can adjust the target temperature; ThwS_dT: Load deviation



Die Wärmepumpe.

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