# OpenPLC Modbus addresses bind to PLC addresses based on the hierarchical address value

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Modbus Data Type | Usage | PLC Address | Modbus Data Address | RP2040 Modbus addressing | Data Size | Range | Access |
| Discrete Output Coils | Digital Outputs | %QX0.0 – %QX99.7 | 0 – 799 | 0 – 55 | 1 bit | 0 or 1 | RW |
| Discrete Output Coils | Slave Outputs | %QX100.0 – %QX199.7 | 800 – 1599 | 56 – 156 | 1 bit | 0 or 1 | RW |
| Discrete Input Contacts | Digital Inputs | %IX0.0 – %IX99.7 | 0 – 799 | 0 – 55 | 1 bit | 0 or 1 | R |
| Discrete Input Contacts | Slave Inputs | %IX100.0 – %IX199.7 | 800 – 1599 | 56 – 156 | 1 bit | 0 or 1 | RW |
| Analog Input Registers | Analog Input (including slave) | %IW0 – %IW1023 | 0 – 1023 | 0 – 32 | 16 bits | 0 – 65535 | R |
| Holding Registers | Analog Outputs (including slave) | %QW0 – %QW1023 | 0 – 1023 | 0 – 32 | 16 bits | 0 – 65535 | RW |
| Holding Registers | Memory (16-bits) | %MW0 – %MW1023 | 1024 – 2048 | 33 – 52 | 16 bits | 0 – 65535 | RW |
| Holding Registers | Memory (32-bits) | %MD0 – %MD1023 | 2048 – 4095 | 53 – 92 | 32 bits | 0 – 4294967295 | RW |
| Holding Registers | Memory (64-bits) | %ML0 – %ML1023 | 4096 – 8191 | 93 –172 | 64 bits | 0 – 264 | RW |

Due to memory limitations, microcontroller-based platforms the RP2040/RP2350 have a much more limited Modbus address space, according to the table below

# Raspberry Pi Pico, Pico W, Pico 2 addressing for the OpenPLC

|  |  |  |  |
| --- | --- | --- | --- |
| Modbus Data Type | Usage | Pico GPIO pin | PLC address |
| Discrete Output Coils | Digital Outputs |  | %QX100.0 - %QX100.7 |
| Discrete Output Coils | Slave Outputs | 21, 20, 19, 18, 17, 16, 15, 14 | %QX0.0 - %QX0.7 |
| Discrete Input Contacts | Digital Inputs |  | %IX100.0 - %IX100.7 |
| Discrete Input Contacts | Slave Inputs | 6, 7, 8, 9, 10, 11, 12, 13 | %IX0.0 - %IX0.7 |
| Analog Input Registers | Analog Input (including slave) | A1, A2, A3 (26,27,28) | %IW0 - %IW2 |
| Holding Registers | Analog Outputs (including slave) | 4,5 | %QW0 - %QW1 |

# Additional pin functionality on the Raspberry Pi Pico, Pico W, Pico 2 with CircuitPython/MicroPython and NOT OpenPLC

|  |  |  |
| --- | --- | --- |
| Dallas 1-Wire serial protocol or DHT11/22 | **GP22** |  |
| I2C | SDA **GP0**, SCL **GP1** | Can be mapped as GPIO |
| SPI | SPI0 RX **GP0**, SPI0 CS **GP1**, SPI0 SCK **GP2**, SPI0 TX **GP3** | Can be mapped as GPIO |
| UART | UART0 TX **GP0**, UART0 RX **GP1** | Can be mapped as GPIO |