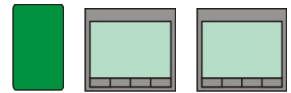




The ModbusSlave Driver



The ModbusSlave driver allows equipment supporting the Modbus over serial line protocol to interface with North. The driver can provide values to a Modbus front-end when requested. Available for Commander and ObSys.

This document relates to ModbusSlave driver version 2.0

Please read the *Commander Manual* or *ObSys Manual* alongside this document, available from www.northbt.com

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Compatibility with Modbus System

The ModbusSlave driver allows equipment supporting the Modbus over serial line protocol to interface with North. The driver can provide values to a Modbus front-end when requested.

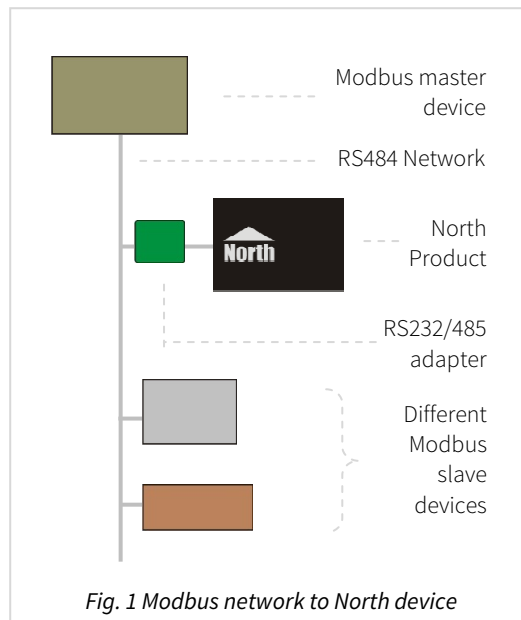
Modbus over serial line uses a master-slave model. The ModbusSlave driver is a slave device, capable of responding to a single master device.

The driver supports an RS485 or RS232 connection. Using RS485, via an adapter, a network of Modbus slave devices can be connected (Fig. 1). Using RS232, only a single Modbus device can be connected.

At least 32 devices are supported on an RS485 network. However, the maximum number depends on the unit load of each device on the network – typically 64 devices with a 0.5 unit load, or 128 devices with a 0.25 unit load. North RS485 adapters (order code MISC/RS232/485) have a unit load of 1.

The JBus protocol is fully compatible with Modbus over serial line.

Two alternative Modbus drivers are also available. The ModbusTCP driver provides support for Modbus over TCP/IP networks with client and server interfaces, and the Modbus driver provides a Modbus over serial line master interface.



Equipment

Any device that can request Modbus or JBus registers should be compatible with the driver.

Values

The driver presents values from the North device's Essential Data and Extra Data as Modbus values, accessible to any master device on the Modbus network. Essential Data contains 640 values on Commander, and 1280 values on ObSys. If necessary, start the Extra Data driver (which requires an interface licence) for an additional 1024 values. Access to these values can be controlled by configuring privilege levels within the driver.

Values may be accessed using any of the following Modbus function codes:

| Function code | Action |
|---------------|--|
| 01 | Read value as a Modbus coil (digital output) state |
| 02 | Read value as a Modbus discrete input (digital input) state |
| 03 | Read value as a Modbus holding register (analogue output) value |
| 04 | Read value as a Modbus input register (analogue input) value |
| 05 | Write single Modbus coil (digital output) state |
| 06 | Write single Modbus holding register (analogue output) value |
| 15 | Write multiple Modbus coils (digital outputs) state |
| 16 | Write multiple Modbus holding registers (analogue output) values |

The values from Essential Data may be accessed using any of the supported Modbus function codes. A single address range is used for all functions – 0...639 on Commander, and 0...1279 on ObSys. Refer to [Appendix A](#) for a list of Modbus register addresses and their corresponding Essential Data page/object reference.

If ExtraData is used, the extra 1024 values appear in registers that follow on from the existing Essential value registers – i.e. Registers 640...1663 on Commander, or 1280...2303 on ObSys.

The value is translated to a Modbus register or state depending which Modbus function is used and how the value is configured in Essential Data:

| | Essential Data Type | | | |
|--|--|--|--|---|
| | Number | Float | NoYes or OffOn | ENum |
| Input Register Holding Register | 16-bit unsigned register value in the range 0...65535. When reading and the value is negative, the register is converted to a 16-bit signed value in the range -32768...32767 | Value scaled 10^{dp} (dp is the number of decimal places configured in Essential Data). 16-bit unsigned register value in the range 0...65535. When reading and the value is negative, the register is converted to a 16-bit signed value in the range -32768...32767 | 'No' and 'Off' states are converted to the value 0 'Yes' and 'On' states are converted to the value 1 16-bit unsigned register value in the range 0...1. | 16-bit unsigned register value in the range 0...65535 |
| Discrete Input Coil | Binary on/off state. If the value is zero (0) then an 'off' state is returned, any other value returns an 'on' state | | | |

Prerequisites

All Modbus devices must be configured with a unique address on the network. All devices must have the same operating mode (RTU or ASCII), baud rate, and byte format.

The ModbusSlave driver requires Essential Data v3.0 (build 01/09/2015) or later.

Using the Driver

On ObSys and Commander, the ModbusSlave driver is pre-installed. Using all of these North devices, you can use the driver to create a Modbus device. Once started, you will need to set up the driver before it can communicate with the Modbus network.

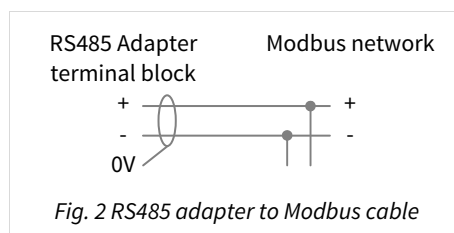
The ModbusSlave driver uses zero licence units.

Making the Cable

RS485 Devices

Connect the North device COM port to an RS232 to RS485 adapter.

Using the RS485 cable specification (Fig. 2), connect the RS485 adapter to the Modbus network.



RS485 adapters are available from North, order code MISC/RS232/485.

RS232 Devices

Connect the North device's COM port to the Modbus master device. The DB9 port supports the following pins:

- 2 RXD – data from external system
- 3 TXD – data from Commander
- 5 GND – signal ground

The maximum RS232 cable length is 15m and should be as short possible.

Starting the Interface

- 📄 To start an interface using the ModbusSlave driver, follow these steps:
 - **Start Engineering** your North device using ObSys
 - Navigate to **Configuration, Interfaces**, and set an unused **Interface** to 'ModbusSlave' to start that particular interface
 - Navigate to the top-level of your North device and re-scan it

The driver setup object (Mc), labelled **Modbus Slave Setup**, should now be available.

Setting up the Driver

- 📄 To set up the driver, follow these steps:
 - Navigate to the **Modbus Slave Setup** object. For example, if you started interface 1 with the driver earlier, then the object reference will be 'M1'
 - Set the **RS232 Com Port** to the port number of the North device you are connecting to Modbus
 - Set **Baud Rate, Byte Format** and **Operating Mode** to match all other devices on the Modbus network

→ Set the **Address on Modbus network** to a unique address on the network

Checking Communications

You can check the interface is communicating by connecting on to the Modbus network with a master device, and reading values from the driver.

Use the **Register List** object (RL) to check the registers available to a Modbus master. The list shows which registers are available, and what values they have.

Object Specifications

Once an interface is started, one or more extra objects become available within the top-level object of the device. As with all North objects, each of these extra objects may contain sub-objects, (and each of these may contain sub-objects, and so on) – the whole object structure being a multi-layer hierarchy. It is possible to navigate around the objects using the ObSys Engineering Software.

Each object is specified below, along with its sub-objects.

Device Top-Level Objects

When an interface is started using the ModbusSlave driver, the objects below become available within the top-level object of the device. For example, if Interface 1 is started, then the object with reference 'M1' becomes available.

| Description | Reference | Type |
|--|-----------|--|
| Modbus Slave Setup Set up the Modbus driver, started on interface <i>c</i> (<i>c</i> is the interface number) | Mc | Fixed Container: On the Commander platform this will be <i>[CDM v20\ModbusSlave v20]</i> On the ObSys platform this will be <i>[OSM v20\ModbusSlave v20]</i> |

Modbus Slave Setup

Object Type: [OSM v20\ModbusSlave v20]

Object Type: [CDM v20\ModbusSlave v20]

The ModbusSlave driver contains the following objects:

| Description | Reference | Type |
|--|-----------|--|
| RS232 COM Port | RS.COM | Obj\Num: 1...8; Adjustable |
| Baud Rate | RS.BR | Obj\Num; Adjustable; Default: 19200 Range: 1200, 2400, 4800, 9600, 19200 or 38400 |
| Byte Format Sets the parity, data bits, and stop bits | RS.BF | Obj\Enum: 0...11; Adjustable; Default: E81 See note 1 |
| Address on Modbus network Set to a unique address on the network | ADDR | Obj\Num; 1...247; Adjustable Note: address 0 is reserved for broadcast messages |
| Operating Mode Select RTU or ASCII framing | OM | Obj\Enum: 0...1; Adjustable; Default: RTU Values: 0=RTU Framing, 1=ASCII Framing |
| Database Objects Available Count of maximum objects available from Essential Data and Extra Data | EDC | Obj\Num |
| Database Privilege Levels Configure privilege levels to control read and adjust access to Essential Data and Extra Data from a Modbus device | S | Fixed Container: On the Commander platform this will be [CDM v20\ModbusSlave v20\Security] On the ObSys platform this will be [OSM v20\ModbusSlave v20\Security] |
| Register List List of registers available to the Modbus master device. Useful for documentation. | RL | Fixed Container: On the Commander platform this will be [CDM v20\ModbusSlave v20\RegList] On the ObSys platform this will be [OSM v20\ModbusSlave v20\RegList] |

Notes

- 1 Modbus RTU Framing mode requires 8-bit data, so byte formats with 7-bits are not supported.

Byte format can have the following values:

| Value | Parity | Data bits | Stop bits | Notes |
|-------|--------|-----------|-----------|--|
| 0 | None | 8 | 1 | In RTU Framing mode, use N82 rather than N81 |
| 1 | None | 8 | 2 | |
| 2 | None | 7 | 1 | Only use in ASCII Framing mode |
| 3 | None | 7 | 2 | Only use in ASCII Framing mode |
| 4 | Odd | 8 | 1 | |
| 5 | Odd | 8 | 2 | |
| 6 | Odd | 7 | 1 | Only use in ASCII Framing mode |
| 7 | Odd | 7 | 2 | Only use in ASCII Framing mode |
| 8 | Even | 8 | 1 | |
| 9 | Even | 8 | 2 | |
| 10 | Even | 7 | 1 | Only use in ASCII Framing mode |
| 11 | Even | 7 | 2 | Only use in ASCII Framing mode |

Database Privilege Levels

Object Type: [CDM v20\ModbusSlave v20\Security]

Object Type: [OSM v20\ModbusSlave v20\Security]

Security Areas and Levels

Within the North security model, there are eight security areas. Security areas could be actual areas in a building, but are normally functional areas – for example, ‘environmental control’ and ‘North engineering’ areas would allow a user to have different privileges in controlling set points and engineering Commanders.

Typically, a user is assigned a privilege level in each of the eight areas. The level is in the range zero to seven, seven being the most powerful. When a user wishes to pass a door, his/her privilege level in the door’s area is checked against the minimum required for that area – and then either allowed to pass, or rejected.

The engineer must decide the use of the eight areas. The engineer must also decide the power of the privilege levels. Most systems use only a few levels per area: 0=None, 1=Guest, 2=User, 7=Administrator.

As an example, imagine a page of values in Essential Data. The page needs a user to have a minimum privilege level of 2 in area 1 before it can be viewed. The page is available in a Web browser that checks users with a security database. User A has privilege level 7 in area 1 – she can view the page. User B has privilege level 5 in area 1 – he can also view the page. User C has privilege level 1 in area 1 – she cannot view the page.

The example continues: within this page of values in Essential Data is a temperature set point object. Users need a minimum privilege level of 6 in area 1 to adjust it – therefore User A can adjust the set point, but User B cannot.

Specifying Access Security

Essential Data and Extra Data have Access Security objects to control who can view a page, and who can adjust an adjustable object.

Each Access Security object has a two-digit value. Each controls the access to a particular feature - such as viewing the page, or adjusting the value. The two-digit value is made up of the area digit (1-8), followed by the minimum privilege level (1-7) – for example, if the minimum privilege level is 6 in area 2, then the two digit value is 26. If the value is 00, then no security checks are made.

Modbus Slave Driver

The Database Privilege Levels object contains a privilege level for each of the eight security areas, representing a virtual user. The ModbusSlave driver uses these to control access to Essential Data and Extra Data when reading or adjusting a value.

| Description | Reference | Type |
|--|-----------|---|
| Privilege Level in Area x The area, x, can be in the range 1...8 | Px | Obj\Num; Adjustable; Default: 7 Range: 0 (no access)...7 (highest privilege level) |

Register List

Object Type: *[CDM v20\ModbusSlave v20\RegList]*

Object Type: *[OSM v20\ModbusSlave v20\RegList]*

The Register List object contains the list of available Modbus registers presented from the North device's Essential Data. This list is provided for documentation and fault-finding purposes.

| Description | Reference | Type |
|---|-----------|--|
| Register x The register address, x, can be in the range 0...640 on Commander, and 0...1024 on ObSys. If Extra Data is used, the register address range is extended to 1663 on Commander, and 2303 on ObSys. | Ax | Fixed Container: On the Commander platform this will be <i>[CDM v20\ModbusSlave v20\RegList\Addr]</i> On the ObSys platform this will be <i>[OSM v20\ModbusSlave v20\RegList\Addr]</i> |

Register

Object Type: *[CDM v20\ModbusSlave v20\RegList\Addr]*

Object Type: *[OSM v20\ModbusSlave v20\RegList\Addr]*

A Register contains a single register address, holding a value from Essential Data. Use this object to view the value (V) held by Essential Data and the 16-bit Modbus register value (RV). To assist with documentation, the object includes label (L), multiplier factor (MF) and adjustability (A) objects.

| Description | Reference | Type |
|---|-----------|--------------------|
| Label Label from Essential Data | L | Obj\Text |
| Value Value from Essential Data | V | Obj\Text |
| Register Value Value converted to a 16-bit Modbus value | RV | Obj\Num: 0...65535 |
| Multiplier Factor Multiplication applied to the value to obtain Register Value | MF | Obj\Num: 1...10000 |
| Adjustable Indicates if the register can be written to using Modbus function codes 05 or 06 | A | Obj\NoYes |

Appendix A: Modbus Register List

The driver presents values from the North device’s Essential Data and Extra Data as Modbus values. For further information on Modbus function codes supported, refer to the section *Values*.

Essential Data

Essential Data contains 640 values on Commander, and 1280 values on ObSys. These values are arranged in pages of 10, 16, 32, or 48 objects.

The values may be accessed using any of the supported Modbus function codes. A single register address range is used for all functions – 0...639 on Commander, and 0...1279 on ObSys.

This address maps to the Essential Data page/object reference as shown below. Download this list as a spreadsheet from http://resource.northbt.com/driver/Modbus_RegisterList.xlsx

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|---|--------|--------|--------|
| | x10 | x16 | x32 | x64 |
| 0 | P1.01 | P1.01 | P1.01 | P1.01 |
| 1 | P1.02 | P1.02 | P1.02 | P1.02 |
| 2 | P1.03 | P1.03 | P1.03 | P1.03 |
| 3 | P1.04 | P1.04 | P1.04 | P1.04 |
| 4 | P1.05 | P1.05 | P1.05 | P1.05 |
| 5 | P1.06 | P1.06 | P1.06 | P1.06 |
| 6 | P1.07 | P1.07 | P1.07 | P1.07 |
| 7 | P1.08 | P1.08 | P1.08 | P1.08 |
| 8 | P1.09 | P1.09 | P1.09 | P1.09 |
| 9 | P1.010 | P1.010 | P1.010 | P1.010 |
| 10 | P2.01 | P1.011 | P1.011 | P1.011 |
| 11 | P2.02 | P1.012 | P1.012 | P1.012 |
| 12 | P2.03 | P1.013 | P1.013 | P1.013 |
| 13 | P2.04 | P1.014 | P1.014 | P1.014 |
| 14 | P2.05 | P1.015 | P1.015 | P1.015 |
| 15 | P2.06 | P1.016 | P1.016 | P1.016 |
| 16 | P2.07 | P2.01 | P1.017 | P1.017 |
| 17 | P2.08 | P2.02 | P1.018 | P1.018 |
| 18 | P2.09 | P2.03 | P1.019 | P1.019 |
| 19 | P2.010 | P2.04 | P1.020 | P1.020 |
| 20 | P3.01 | P2.05 | P1.021 | P1.021 |
| 21 | P3.02 | P2.06 | P1.022 | P1.022 |
| 22 | P3.03 | P2.07 | P1.023 | P1.023 |
| 23 | P3.04 | P2.08 | P1.024 | P1.024 |
| 24 | P3.05 | P2.09 | P1.025 | P1.025 |
| 25 | P3.06 | P2.010 | P1.026 | P1.026 |
| 26 | P3.07 | P2.011 | P1.027 | P1.027 |
| 27 | P3.08 | P2.012 | P1.028 | P1.028 |
| 28 | P3.09 | P2.013 | P1.029 | P1.029 |
| 29 | P3.010 | P2.014 | P1.030 | P1.030 |
| 30 | P4.01 | P2.015 | P1.031 | P1.031 |
| 31 | P4.02 | P2.016 | P1.032 | P1.032 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|---|--------|--------|--------|
| | x10 | x16 | x32 | x64 |
| 32 | P4.03 | P3.01 | P2.01 | P1.033 |
| 33 | P4.04 | P3.02 | P2.02 | P1.034 |
| 34 | P4.05 | P3.03 | P2.03 | P1.035 |
| 35 | P4.06 | P3.04 | P2.04 | P1.036 |
| 36 | P4.07 | P3.05 | P2.05 | P1.037 |
| 37 | P4.08 | P3.06 | P2.06 | P1.038 |
| 38 | P4.09 | P3.07 | P2.07 | P1.039 |
| 39 | P4.010 | P3.08 | P2.08 | P1.040 |
| 40 | P5.01 | P3.09 | P2.09 | P1.041 |
| 41 | P5.02 | P3.010 | P2.010 | P1.042 |
| 42 | P5.03 | P3.011 | P2.011 | P1.043 |
| 43 | P5.04 | P3.012 | P2.012 | P1.044 |
| 44 | P5.05 | P3.013 | P2.013 | P1.045 |
| 45 | P5.06 | P3.014 | P2.014 | P1.046 |
| 46 | P5.07 | P3.015 | P2.015 | P1.047 |
| 47 | P5.08 | P3.016 | P2.016 | P1.048 |
| 48 | P5.09 | P4.01 | P2.017 | P1.049 |
| 49 | P5.010 | P4.02 | P2.018 | P1.050 |
| 50 | P6.01 | P4.03 | P2.019 | P1.051 |
| 51 | P6.02 | P4.04 | P2.020 | P1.052 |
| 52 | P6.03 | P4.05 | P2.021 | P1.053 |
| 53 | P6.04 | P4.06 | P2.022 | P1.054 |
| 54 | P6.05 | P4.07 | P2.023 | P1.055 |
| 55 | P6.06 | P4.08 | P2.024 | P1.056 |
| 56 | P6.07 | P4.09 | P2.025 | P1.057 |
| 57 | P6.08 | P4.010 | P2.026 | P1.058 |
| 58 | P6.09 | P4.011 | P2.027 | P1.059 |
| 59 | P6.010 | P4.012 | P2.028 | P1.060 |
| 60 | P7.01 | P4.013 | P2.029 | P1.061 |
| 61 | P7.02 | P4.014 | P2.030 | P1.062 |
| 62 | P7.03 | P4.015 | P2.031 | P1.063 |
| 63 | P7.04 | P4.016 | P2.032 | P1.064 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|--------|--------|--------|
| | x10 | x16 | x32 | x64 |
| 64 | P7.05 | P5.01 | P3.01 | P2.01 |
| 65 | P7.06 | P5.02 | P3.02 | P2.02 |
| 66 | P7.07 | P5.03 | P3.03 | P2.03 |
| 67 | P7.08 | P5.04 | P3.04 | P2.04 |
| 68 | P7.09 | P5.05 | P3.05 | P2.05 |
| 69 | P7.010 | P5.06 | P3.06 | P2.06 |
| 70 | P8.01 | P5.07 | P3.07 | P2.07 |
| 71 | P8.02 | P5.08 | P3.08 | P2.08 |
| 72 | P8.03 | P5.09 | P3.09 | P2.09 |
| 73 | P8.04 | P5.010 | P3.010 | P2.010 |
| 74 | P8.05 | P5.011 | P3.011 | P2.011 |
| 75 | P8.06 | P5.012 | P3.012 | P2.012 |
| 76 | P8.07 | P5.013 | P3.013 | P2.013 |
| 77 | P8.08 | P5.014 | P3.014 | P2.014 |
| 78 | P8.09 | P5.015 | P3.015 | P2.015 |
| 79 | P8.010 | P5.016 | P3.016 | P2.016 |
| 80 | P9.01 | P6.01 | P3.017 | P2.017 |
| 81 | P9.02 | P6.02 | P3.018 | P2.018 |
| 82 | P9.03 | P6.03 | P3.019 | P2.019 |
| 83 | P9.04 | P6.04 | P3.020 | P2.020 |
| 84 | P9.05 | P6.05 | P3.021 | P2.021 |
| 85 | P9.06 | P6.06 | P3.022 | P2.022 |
| 86 | P9.07 | P6.07 | P3.023 | P2.023 |
| 87 | P9.08 | P6.08 | P3.024 | P2.024 |
| 88 | P9.09 | P6.09 | P3.025 | P2.025 |
| 89 | P9.010 | P6.010 | P3.026 | P2.026 |
| 90 | P10.01 | P6.011 | P3.027 | P2.027 |
| 91 | P10.02 | P6.012 | P3.028 | P2.028 |
| 92 | P10.03 | P6.013 | P3.029 | P2.029 |
| 93 | P10.04 | P6.014 | P3.030 | P2.030 |
| 94 | P10.05 | P6.015 | P3.031 | P2.031 |
| 95 | P10.06 | P6.016 | P3.032 | P2.032 |
| 96 | P10.07 | P7.01 | P4.01 | P2.033 |
| 97 | P10.08 | P7.02 | P4.02 | P2.034 |
| 98 | P10.09 | P7.03 | P4.03 | P2.035 |
| 99 | P10.010 | P7.04 | P4.04 | P2.036 |
| 100 | P11.01 | P7.05 | P4.05 | P2.037 |
| 101 | P11.02 | P7.06 | P4.06 | P2.038 |
| 102 | P11.03 | P7.07 | P4.07 | P2.039 |
| 103 | P11.04 | P7.08 | P4.08 | P2.040 |
| 104 | P11.05 | P7.09 | P4.09 | P2.041 |
| 105 | P11.06 | P7.010 | P4.010 | P2.042 |
| 106 | P11.07 | P7.011 | P4.011 | P2.043 |
| 107 | P11.08 | P7.012 | P4.012 | P2.044 |
| 108 | P11.09 | P7.013 | P4.013 | P2.045 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|--------|--------|
| | x10 | x16 | x32 | x64 |
| 109 | P11.010 | P7.014 | P4.014 | P2.046 |
| 110 | P12.01 | P7.015 | P4.015 | P2.047 |
| 111 | P12.02 | P7.016 | P4.016 | P2.048 |
| 112 | P12.03 | P8.01 | P4.017 | P2.049 |
| 113 | P12.04 | P8.02 | P4.018 | P2.050 |
| 114 | P12.05 | P8.03 | P4.019 | P2.051 |
| 115 | P12.06 | P8.04 | P4.020 | P2.052 |
| 116 | P12.07 | P8.05 | P4.021 | P2.053 |
| 117 | P12.08 | P8.06 | P4.022 | P2.054 |
| 118 | P12.09 | P8.07 | P4.023 | P2.055 |
| 119 | P12.010 | P8.08 | P4.024 | P2.056 |
| 120 | P13.01 | P8.09 | P4.025 | P2.057 |
| 121 | P13.02 | P8.010 | P4.026 | P2.058 |
| 122 | P13.03 | P8.011 | P4.027 | P2.059 |
| 123 | P13.04 | P8.012 | P4.028 | P2.060 |
| 124 | P13.05 | P8.013 | P4.029 | P2.061 |
| 125 | P13.06 | P8.014 | P4.030 | P2.062 |
| 126 | P13.07 | P8.015 | P4.031 | P2.063 |
| 127 | P13.08 | P8.016 | P4.032 | P2.064 |
| 128 | P13.09 | P9.01 | P5.01 | P3.01 |
| 129 | P13.010 | P9.02 | P5.02 | P3.02 |
| 130 | P14.01 | P9.03 | P5.03 | P3.03 |
| 131 | P14.02 | P9.04 | P5.04 | P3.04 |
| 132 | P14.03 | P9.05 | P5.05 | P3.05 |
| 133 | P14.04 | P9.06 | P5.06 | P3.06 |
| 134 | P14.05 | P9.07 | P5.07 | P3.07 |
| 135 | P14.06 | P9.08 | P5.08 | P3.08 |
| 136 | P14.07 | P9.09 | P5.09 | P3.09 |
| 137 | P14.08 | P9.010 | P5.010 | P3.010 |
| 138 | P14.09 | P9.011 | P5.011 | P3.011 |
| 139 | P14.010 | P9.012 | P5.012 | P3.012 |
| 140 | P15.01 | P9.013 | P5.013 | P3.013 |
| 141 | P15.02 | P9.014 | P5.014 | P3.014 |
| 142 | P15.03 | P9.015 | P5.015 | P3.015 |
| 143 | P15.04 | P9.016 | P5.016 | P3.016 |
| 144 | P15.05 | P10.01 | P5.017 | P3.017 |
| 145 | P15.06 | P10.02 | P5.018 | P3.018 |
| 146 | P15.07 | P10.03 | P5.019 | P3.019 |
| 147 | P15.08 | P10.04 | P5.020 | P3.020 |
| 148 | P15.09 | P10.05 | P5.021 | P3.021 |
| 149 | P15.010 | P10.06 | P5.022 | P3.022 |
| 150 | P16.01 | P10.07 | P5.023 | P3.023 |
| 151 | P16.02 | P10.08 | P5.024 | P3.024 |
| 152 | P16.03 | P10.09 | P5.025 | P3.025 |
| 153 | P16.04 | P10.010 | P5.026 | P3.026 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|--------|--------|
| | x10 | x16 | x32 | x64 |
| 154 | P16.05 | P10.011 | P5.027 | P3.027 |
| 155 | P16.06 | P10.012 | P5.028 | P3.028 |
| 156 | P16.07 | P10.013 | P5.029 | P3.029 |
| 157 | P16.08 | P10.014 | P5.030 | P3.030 |
| 158 | P16.09 | P10.015 | P5.031 | P3.031 |
| 159 | P16.010 | P10.016 | P5.032 | P3.032 |
| 160 | P17.01 | P11.01 | P6.01 | P3.033 |
| 161 | P17.02 | P11.02 | P6.02 | P3.034 |
| 162 | P17.03 | P11.03 | P6.03 | P3.035 |
| 163 | P17.04 | P11.04 | P6.04 | P3.036 |
| 164 | P17.05 | P11.05 | P6.05 | P3.037 |
| 165 | P17.06 | P11.06 | P6.06 | P3.038 |
| 166 | P17.07 | P11.07 | P6.07 | P3.039 |
| 167 | P17.08 | P11.08 | P6.08 | P3.040 |
| 168 | P17.09 | P11.09 | P6.09 | P3.041 |
| 169 | P17.010 | P11.010 | P6.010 | P3.042 |
| 170 | P18.01 | P11.011 | P6.011 | P3.043 |
| 171 | P18.02 | P11.012 | P6.012 | P3.044 |
| 172 | P18.03 | P11.013 | P6.013 | P3.045 |
| 173 | P18.04 | P11.014 | P6.014 | P3.046 |
| 174 | P18.05 | P11.015 | P6.015 | P3.047 |
| 175 | P18.06 | P11.016 | P6.016 | P3.048 |
| 176 | P18.07 | P12.01 | P6.017 | P3.049 |
| 177 | P18.08 | P12.02 | P6.018 | P3.050 |
| 178 | P18.09 | P12.03 | P6.019 | P3.051 |
| 179 | P18.010 | P12.04 | P6.020 | P3.052 |
| 180 | P19.01 | P12.05 | P6.021 | P3.053 |
| 181 | P19.02 | P12.06 | P6.022 | P3.054 |
| 182 | P19.03 | P12.07 | P6.023 | P3.055 |
| 183 | P19.04 | P12.08 | P6.024 | P3.056 |
| 184 | P19.05 | P12.09 | P6.025 | P3.057 |
| 185 | P19.06 | P12.010 | P6.026 | P3.058 |
| 186 | P19.07 | P12.011 | P6.027 | P3.059 |
| 187 | P19.08 | P12.012 | P6.028 | P3.060 |
| 188 | P19.09 | P12.013 | P6.029 | P3.061 |
| 189 | P19.010 | P12.014 | P6.030 | P3.062 |
| 190 | P20.01 | P12.015 | P6.031 | P3.063 |
| 191 | P20.02 | P12.016 | P6.032 | P3.064 |
| 192 | P20.03 | P13.01 | P7.01 | P4.01 |
| 193 | P20.04 | P13.02 | P7.02 | P4.02 |
| 194 | P20.05 | P13.03 | P7.03 | P4.03 |
| 195 | P20.06 | P13.04 | P7.04 | P4.04 |
| 196 | P20.07 | P13.05 | P7.05 | P4.05 |
| 197 | P20.08 | P13.06 | P7.06 | P4.06 |
| 198 | P20.09 | P13.07 | P7.07 | P4.07 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|--------|--------|
| | x10 | x16 | x32 | x64 |
| 199 | P20.010 | P13.08 | P7.08 | P4.08 |
| 200 | P21.01 | P13.09 | P7.09 | P4.09 |
| 201 | P21.02 | P13.010 | P7.010 | P4.010 |
| 202 | P21.03 | P13.011 | P7.011 | P4.011 |
| 203 | P21.04 | P13.012 | P7.012 | P4.012 |
| 204 | P21.05 | P13.013 | P7.013 | P4.013 |
| 205 | P21.06 | P13.014 | P7.014 | P4.014 |
| 206 | P21.07 | P13.015 | P7.015 | P4.015 |
| 207 | P21.08 | P13.016 | P7.016 | P4.016 |
| 208 | P21.09 | P14.01 | P7.017 | P4.017 |
| 209 | P21.010 | P14.02 | P7.018 | P4.018 |
| 210 | P22.01 | P14.03 | P7.019 | P4.019 |
| 211 | P22.02 | P14.04 | P7.020 | P4.020 |
| 212 | P22.03 | P14.05 | P7.021 | P4.021 |
| 213 | P22.04 | P14.06 | P7.022 | P4.022 |
| 214 | P22.05 | P14.07 | P7.023 | P4.023 |
| 215 | P22.06 | P14.08 | P7.024 | P4.024 |
| 216 | P22.07 | P14.09 | P7.025 | P4.025 |
| 217 | P22.08 | P14.010 | P7.026 | P4.026 |
| 218 | P22.09 | P14.011 | P7.027 | P4.027 |
| 219 | P22.010 | P14.012 | P7.028 | P4.028 |
| 220 | P23.01 | P14.013 | P7.029 | P4.029 |
| 221 | P23.02 | P14.014 | P7.030 | P4.030 |
| 222 | P23.03 | P14.015 | P7.031 | P4.031 |
| 223 | P23.04 | P14.016 | P7.032 | P4.032 |
| 224 | P23.05 | P15.01 | P8.01 | P4.033 |
| 225 | P23.06 | P15.02 | P8.02 | P4.034 |
| 226 | P23.07 | P15.03 | P8.03 | P4.035 |
| 227 | P23.08 | P15.04 | P8.04 | P4.036 |
| 228 | P23.09 | P15.05 | P8.05 | P4.037 |
| 229 | P23.010 | P15.06 | P8.06 | P4.038 |
| 230 | P24.01 | P15.07 | P8.07 | P4.039 |
| 231 | P24.02 | P15.08 | P8.08 | P4.040 |
| 232 | P24.03 | P15.09 | P8.09 | P4.041 |
| 233 | P24.04 | P15.010 | P8.010 | P4.042 |
| 234 | P24.05 | P15.011 | P8.011 | P4.043 |
| 235 | P24.06 | P15.012 | P8.012 | P4.044 |
| 236 | P24.07 | P15.013 | P8.013 | P4.045 |
| 237 | P24.08 | P15.014 | P8.014 | P4.046 |
| 238 | P24.09 | P15.015 | P8.015 | P4.047 |
| 239 | P24.010 | P15.016 | P8.016 | P4.048 |
| 240 | P25.01 | P16.01 | P8.017 | P4.049 |
| 241 | P25.02 | P16.02 | P8.018 | P4.050 |
| 242 | P25.03 | P16.03 | P8.019 | P4.051 |
| 243 | P25.04 | P16.04 | P8.020 | P4.052 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|--------|--------|
| | x10 | x16 | x32 | x64 |
| 244 | P25.05 | P16.05 | P8.021 | P4.053 |
| 245 | P25.06 | P16.06 | P8.022 | P4.054 |
| 246 | P25.07 | P16.07 | P8.023 | P4.055 |
| 247 | P25.08 | P16.08 | P8.024 | P4.056 |
| 248 | P25.09 | P16.09 | P8.025 | P4.057 |
| 249 | P25.010 | P16.010 | P8.026 | P4.058 |
| 250 | P26.01 | P16.011 | P8.027 | P4.059 |
| 251 | P26.02 | P16.012 | P8.028 | P4.060 |
| 252 | P26.03 | P16.013 | P8.029 | P4.061 |
| 253 | P26.04 | P16.014 | P8.030 | P4.062 |
| 254 | P26.05 | P16.015 | P8.031 | P4.063 |
| 255 | P26.06 | P16.016 | P8.032 | P4.064 |
| 256 | P26.07 | P17.01 | P9.01 | P5.01 |
| 257 | P26.08 | P17.02 | P9.02 | P5.02 |
| 258 | P26.09 | P17.03 | P9.03 | P5.03 |
| 259 | P26.010 | P17.04 | P9.04 | P5.04 |
| 260 | P27.01 | P17.05 | P9.05 | P5.05 |
| 261 | P27.02 | P17.06 | P9.06 | P5.06 |
| 262 | P27.03 | P17.07 | P9.07 | P5.07 |
| 263 | P27.04 | P17.08 | P9.08 | P5.08 |
| 264 | P27.05 | P17.09 | P9.09 | P5.09 |
| 265 | P27.06 | P17.010 | P9.010 | P5.010 |
| 266 | P27.07 | P17.011 | P9.011 | P5.011 |
| 267 | P27.08 | P17.012 | P9.012 | P5.012 |
| 268 | P27.09 | P17.013 | P9.013 | P5.013 |
| 269 | P27.010 | P17.014 | P9.014 | P5.014 |
| 270 | P28.01 | P17.015 | P9.015 | P5.015 |
| 271 | P28.02 | P17.016 | P9.016 | P5.016 |
| 272 | P28.03 | P18.01 | P9.017 | P5.017 |
| 273 | P28.04 | P18.02 | P9.018 | P5.018 |
| 274 | P28.05 | P18.03 | P9.019 | P5.019 |
| 275 | P28.06 | P18.04 | P9.020 | P5.020 |
| 276 | P28.07 | P18.05 | P9.021 | P5.021 |
| 277 | P28.08 | P18.06 | P9.022 | P5.022 |
| 278 | P28.09 | P18.07 | P9.023 | P5.023 |
| 279 | P28.010 | P18.08 | P9.024 | P5.024 |
| 280 | P29.01 | P18.09 | P9.025 | P5.025 |
| 281 | P29.02 | P18.010 | P9.026 | P5.026 |
| 282 | P29.03 | P18.011 | P9.027 | P5.027 |
| 283 | P29.04 | P18.012 | P9.028 | P5.028 |
| 284 | P29.05 | P18.013 | P9.029 | P5.029 |
| 285 | P29.06 | P18.014 | P9.030 | P5.030 |
| 286 | P29.07 | P18.015 | P9.031 | P5.031 |
| 287 | P29.08 | P18.016 | P9.032 | P5.032 |
| 288 | P29.09 | P19.01 | P10.01 | P5.033 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|--------|
| | x10 | x16 | x32 | x64 |
| 289 | P29.010 | P19.02 | P10.02 | P5.034 |
| 290 | P30.01 | P19.03 | P10.03 | P5.035 |
| 291 | P30.02 | P19.04 | P10.04 | P5.036 |
| 292 | P30.03 | P19.05 | P10.05 | P5.037 |
| 293 | P30.04 | P19.06 | P10.06 | P5.038 |
| 294 | P30.05 | P19.07 | P10.07 | P5.039 |
| 295 | P30.06 | P19.08 | P10.08 | P5.040 |
| 296 | P30.07 | P19.09 | P10.09 | P5.041 |
| 297 | P30.08 | P19.010 | P10.010 | P5.042 |
| 298 | P30.09 | P19.011 | P10.011 | P5.043 |
| 299 | P30.010 | P19.012 | P10.012 | P5.044 |
| 300 | P31.01 | P19.013 | P10.013 | P5.045 |
| 301 | P31.02 | P19.014 | P10.014 | P5.046 |
| 302 | P31.03 | P19.015 | P10.015 | P5.047 |
| 303 | P31.04 | P19.016 | P10.016 | P5.048 |
| 304 | P31.05 | P20.01 | P10.017 | P5.049 |
| 305 | P31.06 | P20.02 | P10.018 | P5.050 |
| 306 | P31.07 | P20.03 | P10.019 | P5.051 |
| 307 | P31.08 | P20.04 | P10.020 | P5.052 |
| 308 | P31.09 | P20.05 | P10.021 | P5.053 |
| 309 | P31.010 | P20.06 | P10.022 | P5.054 |
| 310 | P32.01 | P20.07 | P10.023 | P5.055 |
| 311 | P32.02 | P20.08 | P10.024 | P5.056 |
| 312 | P32.03 | P20.09 | P10.025 | P5.057 |
| 313 | P32.04 | P20.010 | P10.026 | P5.058 |
| 314 | P32.05 | P20.011 | P10.027 | P5.059 |
| 315 | P32.06 | P20.012 | P10.028 | P5.060 |
| 316 | P32.07 | P20.013 | P10.029 | P5.061 |
| 317 | P32.08 | P20.014 | P10.030 | P5.062 |
| 318 | P32.09 | P20.015 | P10.031 | P5.063 |
| 319 | P32.010 | P20.016 | P10.032 | P5.064 |
| 320 | P33.01 | P21.01 | P11.01 | P6.01 |
| 321 | P33.02 | P21.02 | P11.02 | P6.02 |
| 322 | P33.03 | P21.03 | P11.03 | P6.03 |
| 323 | P33.04 | P21.04 | P11.04 | P6.04 |
| 324 | P33.05 | P21.05 | P11.05 | P6.05 |
| 325 | P33.06 | P21.06 | P11.06 | P6.06 |
| 326 | P33.07 | P21.07 | P11.07 | P6.07 |
| 327 | P33.08 | P21.08 | P11.08 | P6.08 |
| 328 | P33.09 | P21.09 | P11.09 | P6.09 |
| 329 | P33.010 | P21.010 | P11.010 | P6.010 |
| 330 | P34.01 | P21.011 | P11.011 | P6.011 |
| 331 | P34.02 | P21.012 | P11.012 | P6.012 |
| 332 | P34.03 | P21.013 | P11.013 | P6.013 |
| 333 | P34.04 | P21.014 | P11.014 | P6.014 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|--------|
| | x10 | x16 | x32 | x64 |
| 334 | P34.05 | P21.015 | P11.015 | P6.015 |
| 335 | P34.06 | P21.016 | P11.016 | P6.016 |
| 336 | P34.07 | P22.01 | P11.017 | P6.017 |
| 337 | P34.08 | P22.02 | P11.018 | P6.018 |
| 338 | P34.09 | P22.03 | P11.019 | P6.019 |
| 339 | P34.010 | P22.04 | P11.020 | P6.020 |
| 340 | P35.01 | P22.05 | P11.021 | P6.021 |
| 341 | P35.02 | P22.06 | P11.022 | P6.022 |
| 342 | P35.03 | P22.07 | P11.023 | P6.023 |
| 343 | P35.04 | P22.08 | P11.024 | P6.024 |
| 344 | P35.05 | P22.09 | P11.025 | P6.025 |
| 345 | P35.06 | P22.010 | P11.026 | P6.026 |
| 346 | P35.07 | P22.011 | P11.027 | P6.027 |
| 347 | P35.08 | P22.012 | P11.028 | P6.028 |
| 348 | P35.09 | P22.013 | P11.029 | P6.029 |
| 349 | P35.010 | P22.014 | P11.030 | P6.030 |
| 350 | P36.01 | P22.015 | P11.031 | P6.031 |
| 351 | P36.02 | P22.016 | P11.032 | P6.032 |
| 352 | P36.03 | P23.01 | P12.01 | P6.033 |
| 353 | P36.04 | P23.02 | P12.02 | P6.034 |
| 354 | P36.05 | P23.03 | P12.03 | P6.035 |
| 355 | P36.06 | P23.04 | P12.04 | P6.036 |
| 356 | P36.07 | P23.05 | P12.05 | P6.037 |
| 357 | P36.08 | P23.06 | P12.06 | P6.038 |
| 358 | P36.09 | P23.07 | P12.07 | P6.039 |
| 359 | P36.010 | P23.08 | P12.08 | P6.040 |
| 360 | P37.01 | P23.09 | P12.09 | P6.041 |
| 361 | P37.02 | P23.010 | P12.010 | P6.042 |
| 362 | P37.03 | P23.011 | P12.011 | P6.043 |
| 363 | P37.04 | P23.012 | P12.012 | P6.044 |
| 364 | P37.05 | P23.013 | P12.013 | P6.045 |
| 365 | P37.06 | P23.014 | P12.014 | P6.046 |
| 366 | P37.07 | P23.015 | P12.015 | P6.047 |
| 367 | P37.08 | P23.016 | P12.016 | P6.048 |
| 368 | P37.09 | P24.01 | P12.017 | P6.049 |
| 369 | P37.010 | P24.02 | P12.018 | P6.050 |
| 370 | P38.01 | P24.03 | P12.019 | P6.051 |
| 371 | P38.02 | P24.04 | P12.020 | P6.052 |
| 372 | P38.03 | P24.05 | P12.021 | P6.053 |
| 373 | P38.04 | P24.06 | P12.022 | P6.054 |
| 374 | P38.05 | P24.07 | P12.023 | P6.055 |
| 375 | P38.06 | P24.08 | P12.024 | P6.056 |
| 376 | P38.07 | P24.09 | P12.025 | P6.057 |
| 377 | P38.08 | P24.010 | P12.026 | P6.058 |
| 378 | P38.09 | P24.011 | P12.027 | P6.059 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|--------|
| | x10 | x16 | x32 | x64 |
| 379 | P38.010 | P24.012 | P12.028 | P6.060 |
| 380 | P39.01 | P24.013 | P12.029 | P6.061 |
| 381 | P39.02 | P24.014 | P12.030 | P6.062 |
| 382 | P39.03 | P24.015 | P12.031 | P6.063 |
| 383 | P39.04 | P24.016 | P12.032 | P6.064 |
| 384 | P39.05 | P25.01 | P13.01 | P7.01 |
| 385 | P39.06 | P25.02 | P13.02 | P7.02 |
| 386 | P39.07 | P25.03 | P13.03 | P7.03 |
| 387 | P39.08 | P25.04 | P13.04 | P7.04 |
| 388 | P39.09 | P25.05 | P13.05 | P7.05 |
| 389 | P39.010 | P25.06 | P13.06 | P7.06 |
| 390 | P40.01 | P25.07 | P13.07 | P7.07 |
| 391 | P40.02 | P25.08 | P13.08 | P7.08 |
| 392 | P40.03 | P25.09 | P13.09 | P7.09 |
| 393 | P40.04 | P25.010 | P13.010 | P7.010 |
| 394 | P40.05 | P25.011 | P13.011 | P7.011 |
| 395 | P40.06 | P25.012 | P13.012 | P7.012 |
| 396 | P40.07 | P25.013 | P13.013 | P7.013 |
| 397 | P40.08 | P25.014 | P13.014 | P7.014 |
| 398 | P40.09 | P25.015 | P13.015 | P7.015 |
| 399 | P40.010 | P25.016 | P13.016 | P7.016 |
| 400 | P41.01 | P26.01 | P13.017 | P7.017 |
| 401 | P41.02 | P26.02 | P13.018 | P7.018 |
| 402 | P41.03 | P26.03 | P13.019 | P7.019 |
| 403 | P41.04 | P26.04 | P13.020 | P7.020 |
| 404 | P41.05 | P26.05 | P13.021 | P7.021 |
| 405 | P41.06 | P26.06 | P13.022 | P7.022 |
| 406 | P41.07 | P26.07 | P13.023 | P7.023 |
| 407 | P41.08 | P26.08 | P13.024 | P7.024 |
| 408 | P41.09 | P26.09 | P13.025 | P7.025 |
| 409 | P41.010 | P26.010 | P13.026 | P7.026 |
| 410 | P42.01 | P26.011 | P13.027 | P7.027 |
| 411 | P42.02 | P26.012 | P13.028 | P7.028 |
| 412 | P42.03 | P26.013 | P13.029 | P7.029 |
| 413 | P42.04 | P26.014 | P13.030 | P7.030 |
| 414 | P42.05 | P26.015 | P13.031 | P7.031 |
| 415 | P42.06 | P26.016 | P13.032 | P7.032 |
| 416 | P42.07 | P27.01 | P14.01 | P7.033 |
| 417 | P42.08 | P27.02 | P14.02 | P7.034 |
| 418 | P42.09 | P27.03 | P14.03 | P7.035 |
| 419 | P42.010 | P27.04 | P14.04 | P7.036 |
| 420 | P43.01 | P27.05 | P14.05 | P7.037 |
| 421 | P43.02 | P27.06 | P14.06 | P7.038 |
| 422 | P43.03 | P27.07 | P14.07 | P7.039 |
| 423 | P43.04 | P27.08 | P14.08 | P7.040 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|--------|
| | x10 | x16 | x32 | x64 |
| 424 | P43.05 | P27.09 | P14.09 | P7.041 |
| 425 | P43.06 | P27.010 | P14.010 | P7.042 |
| 426 | P43.07 | P27.011 | P14.011 | P7.043 |
| 427 | P43.08 | P27.012 | P14.012 | P7.044 |
| 428 | P43.09 | P27.013 | P14.013 | P7.045 |
| 429 | P43.010 | P27.014 | P14.014 | P7.046 |
| 430 | P44.01 | P27.015 | P14.015 | P7.047 |
| 431 | P44.02 | P27.016 | P14.016 | P7.048 |
| 432 | P44.03 | P28.01 | P14.017 | P7.049 |
| 433 | P44.04 | P28.02 | P14.018 | P7.050 |
| 434 | P44.05 | P28.03 | P14.019 | P7.051 |
| 435 | P44.06 | P28.04 | P14.020 | P7.052 |
| 436 | P44.07 | P28.05 | P14.021 | P7.053 |
| 437 | P44.08 | P28.06 | P14.022 | P7.054 |
| 438 | P44.09 | P28.07 | P14.023 | P7.055 |
| 439 | P44.010 | P28.08 | P14.024 | P7.056 |
| 440 | P45.01 | P28.09 | P14.025 | P7.057 |
| 441 | P45.02 | P28.010 | P14.026 | P7.058 |
| 442 | P45.03 | P28.011 | P14.027 | P7.059 |
| 443 | P45.04 | P28.012 | P14.028 | P7.060 |
| 444 | P45.05 | P28.013 | P14.029 | P7.061 |
| 445 | P45.06 | P28.014 | P14.030 | P7.062 |
| 446 | P45.07 | P28.015 | P14.031 | P7.063 |
| 447 | P45.08 | P28.016 | P14.032 | P7.064 |
| 448 | P45.09 | P29.01 | P15.01 | P8.01 |
| 449 | P45.010 | P29.02 | P15.02 | P8.02 |
| 450 | P46.01 | P29.03 | P15.03 | P8.03 |
| 451 | P46.02 | P29.04 | P15.04 | P8.04 |
| 452 | P46.03 | P29.05 | P15.05 | P8.05 |
| 453 | P46.04 | P29.06 | P15.06 | P8.06 |
| 454 | P46.05 | P29.07 | P15.07 | P8.07 |
| 455 | P46.06 | P29.08 | P15.08 | P8.08 |
| 456 | P46.07 | P29.09 | P15.09 | P8.09 |
| 457 | P46.08 | P29.010 | P15.010 | P8.010 |
| 458 | P46.09 | P29.011 | P15.011 | P8.011 |
| 459 | P46.010 | P29.012 | P15.012 | P8.012 |
| 460 | P47.01 | P29.013 | P15.013 | P8.013 |
| 461 | P47.02 | P29.014 | P15.014 | P8.014 |
| 462 | P47.03 | P29.015 | P15.015 | P8.015 |
| 463 | P47.04 | P29.016 | P15.016 | P8.016 |
| 464 | P47.05 | P30.01 | P15.017 | P8.017 |
| 465 | P47.06 | P30.02 | P15.018 | P8.018 |
| 466 | P47.07 | P30.03 | P15.019 | P8.019 |
| 467 | P47.08 | P30.04 | P15.020 | P8.020 |
| 468 | P47.09 | P30.05 | P15.021 | P8.021 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|--------|
| | x10 | x16 | x32 | x64 |
| 469 | P47.010 | P30.06 | P15.022 | P8.022 |
| 470 | P48.01 | P30.07 | P15.023 | P8.023 |
| 471 | P48.02 | P30.08 | P15.024 | P8.024 |
| 472 | P48.03 | P30.09 | P15.025 | P8.025 |
| 473 | P48.04 | P30.010 | P15.026 | P8.026 |
| 474 | P48.05 | P30.011 | P15.027 | P8.027 |
| 475 | P48.06 | P30.012 | P15.028 | P8.028 |
| 476 | P48.07 | P30.013 | P15.029 | P8.029 |
| 477 | P48.08 | P30.014 | P15.030 | P8.030 |
| 478 | P48.09 | P30.015 | P15.031 | P8.031 |
| 479 | P48.010 | P30.016 | P15.032 | P8.032 |
| 480 | P49.01 | P31.01 | P16.01 | P8.033 |
| 481 | P49.02 | P31.02 | P16.02 | P8.034 |
| 482 | P49.03 | P31.03 | P16.03 | P8.035 |
| 483 | P49.04 | P31.04 | P16.04 | P8.036 |
| 484 | P49.05 | P31.05 | P16.05 | P8.037 |
| 485 | P49.06 | P31.06 | P16.06 | P8.038 |
| 486 | P49.07 | P31.07 | P16.07 | P8.039 |
| 487 | P49.08 | P31.08 | P16.08 | P8.040 |
| 488 | P49.09 | P31.09 | P16.09 | P8.041 |
| 489 | P49.010 | P31.010 | P16.010 | P8.042 |
| 490 | P50.01 | P31.011 | P16.011 | P8.043 |
| 491 | P50.02 | P31.012 | P16.012 | P8.044 |
| 492 | P50.03 | P31.013 | P16.013 | P8.045 |
| 493 | P50.04 | P31.014 | P16.014 | P8.046 |
| 494 | P50.05 | P31.015 | P16.015 | P8.047 |
| 495 | P50.06 | P31.016 | P16.016 | P8.048 |
| 496 | P50.07 | P32.01 | P16.017 | P8.049 |
| 497 | P50.08 | P32.02 | P16.018 | P8.050 |
| 498 | P50.09 | P32.03 | P16.019 | P8.051 |
| 499 | P50.010 | P32.04 | P16.020 | P8.052 |
| 500 | P51.01 | P32.05 | P16.021 | P8.053 |
| 501 | P51.02 | P32.06 | P16.022 | P8.054 |
| 502 | P51.03 | P32.07 | P16.023 | P8.055 |
| 503 | P51.04 | P32.08 | P16.024 | P8.056 |
| 504 | P51.05 | P32.09 | P16.025 | P8.057 |
| 505 | P51.06 | P32.010 | P16.026 | P8.058 |
| 506 | P51.07 | P32.011 | P16.027 | P8.059 |
| 507 | P51.08 | P32.012 | P16.028 | P8.060 |
| 508 | P51.09 | P32.013 | P16.029 | P8.061 |
| 509 | P51.010 | P32.014 | P16.030 | P8.062 |
| 510 | P52.01 | P32.015 | P16.031 | P8.063 |
| 511 | P52.02 | P32.016 | P16.032 | P8.064 |
| 512 | P52.03 | P33.01 | P17.01 | P9.01 |
| 513 | P52.04 | P33.02 | P17.02 | P9.02 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|--------|
| | x10 | x16 | x32 | x64 |
| 514 | P52.05 | P33.03 | P17.03 | P9.03 |
| 515 | P52.06 | P33.04 | P17.04 | P9.04 |
| 516 | P52.07 | P33.05 | P17.05 | P9.05 |
| 517 | P52.08 | P33.06 | P17.06 | P9.06 |
| 518 | P52.09 | P33.07 | P17.07 | P9.07 |
| 519 | P52.010 | P33.08 | P17.08 | P9.08 |
| 520 | P53.01 | P33.09 | P17.09 | P9.09 |
| 521 | P53.02 | P33.010 | P17.010 | P9.010 |
| 522 | P53.03 | P33.011 | P17.011 | P9.011 |
| 523 | P53.04 | P33.012 | P17.012 | P9.012 |
| 524 | P53.05 | P33.013 | P17.013 | P9.013 |
| 525 | P53.06 | P33.014 | P17.014 | P9.014 |
| 526 | P53.07 | P33.015 | P17.015 | P9.015 |
| 527 | P53.08 | P33.016 | P17.016 | P9.016 |
| 528 | P53.09 | P34.01 | P17.017 | P9.017 |
| 529 | P53.010 | P34.02 | P17.018 | P9.018 |
| 530 | P54.01 | P34.03 | P17.019 | P9.019 |
| 531 | P54.02 | P34.04 | P17.020 | P9.020 |
| 532 | P54.03 | P34.05 | P17.021 | P9.021 |
| 533 | P54.04 | P34.06 | P17.022 | P9.022 |
| 534 | P54.05 | P34.07 | P17.023 | P9.023 |
| 535 | P54.06 | P34.08 | P17.024 | P9.024 |
| 536 | P54.07 | P34.09 | P17.025 | P9.025 |
| 537 | P54.08 | P34.010 | P17.026 | P9.026 |
| 538 | P54.09 | P34.011 | P17.027 | P9.027 |
| 539 | P54.010 | P34.012 | P17.028 | P9.028 |
| 540 | P55.01 | P34.013 | P17.029 | P9.029 |
| 541 | P55.02 | P34.014 | P17.030 | P9.030 |
| 542 | P55.03 | P34.015 | P17.031 | P9.031 |
| 543 | P55.04 | P34.016 | P17.032 | P9.032 |
| 544 | P55.05 | P35.01 | P18.01 | P9.033 |
| 545 | P55.06 | P35.02 | P18.02 | P9.034 |
| 546 | P55.07 | P35.03 | P18.03 | P9.035 |
| 547 | P55.08 | P35.04 | P18.04 | P9.036 |
| 548 | P55.09 | P35.05 | P18.05 | P9.037 |
| 549 | P55.010 | P35.06 | P18.06 | P9.038 |
| 550 | P56.01 | P35.07 | P18.07 | P9.039 |
| 551 | P56.02 | P35.08 | P18.08 | P9.040 |
| 552 | P56.03 | P35.09 | P18.09 | P9.041 |
| 553 | P56.04 | P35.010 | P18.010 | P9.042 |
| 554 | P56.05 | P35.011 | P18.011 | P9.043 |
| 555 | P56.06 | P35.012 | P18.012 | P9.044 |
| 556 | P56.07 | P35.013 | P18.013 | P9.045 |
| 557 | P56.08 | P35.014 | P18.014 | P9.046 |
| 558 | P56.09 | P35.015 | P18.015 | P9.047 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|---------|
| | x10 | x16 | x32 | x64 |
| 559 | P56.010 | P35.016 | P18.016 | P9.048 |
| 560 | P57.01 | P36.01 | P18.017 | P9.049 |
| 561 | P57.02 | P36.02 | P18.018 | P9.050 |
| 562 | P57.03 | P36.03 | P18.019 | P9.051 |
| 563 | P57.04 | P36.04 | P18.020 | P9.052 |
| 564 | P57.05 | P36.05 | P18.021 | P9.053 |
| 565 | P57.06 | P36.06 | P18.022 | P9.054 |
| 566 | P57.07 | P36.07 | P18.023 | P9.055 |
| 567 | P57.08 | P36.08 | P18.024 | P9.056 |
| 568 | P57.09 | P36.09 | P18.025 | P9.057 |
| 569 | P57.010 | P36.010 | P18.026 | P9.058 |
| 570 | P58.01 | P36.011 | P18.027 | P9.059 |
| 571 | P58.02 | P36.012 | P18.028 | P9.060 |
| 572 | P58.03 | P36.013 | P18.029 | P9.061 |
| 573 | P58.04 | P36.014 | P18.030 | P9.062 |
| 574 | P58.05 | P36.015 | P18.031 | P9.063 |
| 575 | P58.06 | P36.016 | P18.032 | P9.064 |
| 576 | P58.07 | P37.01 | P19.01 | P10.01 |
| 577 | P58.08 | P37.02 | P19.02 | P10.02 |
| 578 | P58.09 | P37.03 | P19.03 | P10.03 |
| 579 | P58.010 | P37.04 | P19.04 | P10.04 |
| 580 | P59.01 | P37.05 | P19.05 | P10.05 |
| 581 | P59.02 | P37.06 | P19.06 | P10.06 |
| 582 | P59.03 | P37.07 | P19.07 | P10.07 |
| 583 | P59.04 | P37.08 | P19.08 | P10.08 |
| 584 | P59.05 | P37.09 | P19.09 | P10.09 |
| 585 | P59.06 | P37.010 | P19.010 | P10.010 |
| 586 | P59.07 | P37.011 | P19.011 | P10.011 |
| 587 | P59.08 | P37.012 | P19.012 | P10.012 |
| 588 | P59.09 | P37.013 | P19.013 | P10.013 |
| 589 | P59.010 | P37.014 | P19.014 | P10.014 |
| 590 | P60.01 | P37.015 | P19.015 | P10.015 |
| 591 | P60.02 | P37.016 | P19.016 | P10.016 |
| 592 | P60.03 | P38.01 | P19.017 | P10.017 |
| 593 | P60.04 | P38.02 | P19.018 | P10.018 |
| 594 | P60.05 | P38.03 | P19.019 | P10.019 |
| 595 | P60.06 | P38.04 | P19.020 | P10.020 |
| 596 | P60.07 | P38.05 | P19.021 | P10.021 |
| 597 | P60.08 | P38.06 | P19.022 | P10.022 |
| 598 | P60.09 | P38.07 | P19.023 | P10.023 |
| 599 | P60.010 | P38.08 | P19.024 | P10.024 |
| 600 | P61.01 | P38.09 | P19.025 | P10.025 |
| 601 | P61.02 | P38.010 | P19.026 | P10.026 |
| 602 | P61.03 | P38.011 | P19.027 | P10.027 |
| 603 | P61.04 | P38.012 | P19.028 | P10.028 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|---------|
| | x10 | x16 | x32 | x64 |
| 604 | P61.05 | P38.013 | P19.029 | P10.029 |
| 605 | P61.06 | P38.014 | P19.030 | P10.030 |
| 606 | P61.07 | P38.015 | P19.031 | P10.031 |
| 607 | P61.08 | P38.016 | P19.032 | P10.032 |
| 608 | P61.09 | P39.01 | P20.01 | P10.033 |
| 609 | P61.010 | P39.02 | P20.02 | P10.034 |
| 610 | P62.01 | P39.03 | P20.03 | P10.035 |
| 611 | P62.02 | P39.04 | P20.04 | P10.036 |
| 612 | P62.03 | P39.05 | P20.05 | P10.037 |
| 613 | P62.04 | P39.06 | P20.06 | P10.038 |
| 614 | P62.05 | P39.07 | P20.07 | P10.039 |
| 615 | P62.06 | P39.08 | P20.08 | P10.040 |
| 616 | P62.07 | P39.09 | P20.09 | P10.041 |
| 617 | P62.08 | P39.010 | P20.010 | P10.042 |
| 618 | P62.09 | P39.011 | P20.011 | P10.043 |
| 619 | P62.010 | P39.012 | P20.012 | P10.044 |
| 620 | P63.01 | P39.013 | P20.013 | P10.045 |
| 621 | P63.02 | P39.014 | P20.014 | P10.046 |

| Modbus Register Address | Essential Data Object Reference (Objects configured per page) | | | |
|-------------------------|--|---------|---------|---------|
| | x10 | x16 | x32 | x64 |
| 622 | P63.03 | P39.015 | P20.015 | P10.047 |
| 623 | P63.04 | P39.016 | P20.016 | P10.048 |
| 624 | P63.05 | P40.01 | P20.017 | P10.049 |
| 625 | P63.06 | P40.02 | P20.018 | P10.050 |
| 626 | P63.07 | P40.03 | P20.019 | P10.051 |
| 627 | P63.08 | P40.04 | P20.020 | P10.052 |
| 628 | P63.09 | P40.05 | P20.021 | P10.053 |
| 629 | P63.010 | P40.06 | P20.022 | P10.054 |
| 630 | P64.01 | P40.07 | P20.023 | P10.055 |
| 631 | P64.02 | P40.08 | P20.024 | P10.056 |
| 632 | P64.03 | P40.09 | P20.025 | P10.057 |
| 633 | P64.04 | P40.010 | P20.026 | P10.058 |
| 634 | P64.05 | P40.011 | P20.027 | P10.059 |
| 635 | P64.06 | P40.012 | P20.028 | P10.060 |
| 636 | P64.07 | P40.013 | P20.029 | P10.061 |
| 637 | P64.08 | P40.014 | P20.030 | P10.062 |
| 638 | P64.09 | P40.015 | P20.031 | P10.063 |
| 639 | P64.010 | P40.016 | P20.032 | P10.064 |

Extra Data

Extra Data contains 1024 values. These values are arranged in 16 pages of 64 objects.

Once the interface is started, the values may be accessed using any of the supported Modbus function codes. These values appear in registers that follow on from the existing Essential Value registers – i.e. Registers 640...1663 on Commander, or 1280...2303 on ObSys.

For a complete list of Modbus registers and the Extra Data page/object reference, download the spreadsheet from http://resource.northbt.com/driver/Modbus_RegisterList.xlsx

Driver Versions

| Version | Build Date | Details |
|---------|------------|--|
| 1.0 | 19/05/2014 | Driver released |
| 2.0 | 01/09/2015 | Compatibility with ExtraData added |
| 2.0 | 27/02/2017 | Added support for Modbus functions 15 (Write multiple coils) and 16 (Write multiple registers) |

Next Steps...

If you require help, contact support on 01273 694422 or visit www.northbt.com/support



North Building Technologies Ltd
+44 (0) 1273 694422
support@northbt.com
www.northbt.com

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Author: JF
Checked by: BS

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