EN

# Access 5 communication manual

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# *Chapter 1* About this document

## Introduction

This document describes the communication capabilities of the Access Controller application when it is used as an integrated communication slave via BACnet and Modbus.

## Software version

| ***Access version*** | ***Available*** |
|---|---|
| V5.0-1-00 | BACnet and Modbus available, not fully register/object combability with later releases. |
| V5.1-1-02<br>later | BACnet and Modbus are available |
| | |

The Access variable list (release-column) states from which the software release variables are introduced or changed. Refer to APPENDIX with references to BACnet objects and Modbus registers.

# *Chapter 2* System integration

## BACnet IP

From version 5.0-1-00 Access application is based on B-BC (BACnet Building Controller) protocol.

Use the TCP/IP port to connect an Access application to a Building Management System (BMS) via BACnet/IP.

### Configuration

Upon delivery, the BACnet/IP protocol is disabled as a default. To enable BACnet communication, login with 'Service' credentials, enable by changing the configuration for BACnet/IP from "No" to "Yes". Then configure BACnet basic settings.


### BACnet device name

In the Building Management System (BMS), the names of all located units are listed under. The Device name must be unique within the BACnet network.

### BACnet device ID

The identification number (ID) of a unit identifies it on the BACnet network. The ID must be unique within the BACnet network.

### BBMD address and BACnet/IP port number

The BACnet/IP Broadcast Management Device (BBMD) address to identify units that are connected to different BACnet/IP subnets and separated by an IP-router.

Enter the BBMD address as host:port. The host's name can be entered as "host" if the Domain System Name (DNS) is configured.

If the DNS is not configured, enter the host address in the format "xxx.xxx.xxx.xxx" followed by the communication port number (default: 47808).

**Example:** mybbmd:47808 (DNS configured), 10.100.50.99:47808.

**Note!** BACnet Broadcast Management Device (BBMD), are necessary to distribute broadcasts if BACnet/IP network uses several subnets.

# Objects

Objects are available according to configured activated functions.

## BACnet type

Abbreviations for objects used in the Access variable list:

| | | |
|---|---|---|
| AI = Analog Input | BI = Binary Input | MS = Schedule |
| AO = Analog Output | BO = Binary Output | MSV = Multistate Value |
| AV = Analog Value | BV = Binary Value | |

## Properties

Following typically properties are writable: Cov Increment, Time Delay and limits. Typically used readable properties are Present Value, Event State, Time Delay, Low Limit, High Limit and Units.

### COV subscriptions

COV property of objects are editable. Simultaneus COV subscriptions maximum is 100.

### Out of service

BACnet objects for Analog Input and Binary Input has function "OutOfService" enabled.

With object out of service, it's possible to manually set Present Value with a value and this is equivalent to setting an input to "Manual" with NaviPad.

**Note!** With the out of service function AHU can run to infinity, depending on alarm configuration. User need to have knowledge about reasonable setting of manual set present values with regard to prevent any consequential damage to the machine, person or environment.

In order to continuously highlight for the user to remedy any defective sensor, an "input in manual" alarm is presented in alarm list in addition to sensor error alarm.

### Priority array

Out-of-service is disabled on outputs, which instead uses priority array to determine the present value property. Priority array consists of 16 values where 1 has highest priority. For example when priority level 1 contains the value 25 and priority level 2 the value 40, the present value will be 25.

Access priority levels for outputs according to the following table:

| Priority level | Usage | Remark |
|---|---|---|
| **1** | Manual life safety | |
| **2** | Automatic life safety | |
| **3** | Available | |
| **4** | Available | |
| **5** | Critical equipment control | |
| **6** | Minimum on/off | |
| **7** | Available | |
| **8** | Manual operator | Manual control |
| **9** | Manual operator | |
| **10** | Manual operator | |
| **11** | Manual operator | |
| **12** | Standard | From application |
| **13** | Available | |
| **14** | Available | |
| **15** | Available | |
| **16** | Available | |

When priority level higher than 8 is used (1 – 7) it will be indicated in output status mode column with “BACnet”.

## EDE files

EDE = "Engineering Data Exchange" is the format recommended by the BACnet Interest Group Europe to exchange data between BACnet server and BACnet client.

For offline integration there are EDE files containing information on the BACnet objects available for the Access control application.

## Alarms

Alarm system is based on BACnet where alarming object, beyond alarm, can have high, low and fault depending on object type.

## Time schedule

Function time schedule together with special days (holidays and exception days) is based on BACnet.

# Modbus RTU/TCP

## Configuration

### TCP/IP

For Modbus TCP/IP communication, configure Modbus/TCP from “No” to “Yes” and set Modbus slave address.


For Modbus TCP, use the controller ethernet port combined with its IP address and the TCP port 502. The port number is not changeable.

## RTU

For Modbus RTU, set Modbus slave address via the menu Modbus slave, configure communication settings via the menu for actual used communication port.


Configure the communication parameters for the Modbus-line first. The parameters defines the structure of messages and of the transmission speed. The parameters must be identical in both master and slave units.

The default configuration values of an Access controller are:

Slave address: 1

Word length: 8 bits

Parity: none

Stop bits: 2 bits

Baud rate: 9600 bps

### Slave address

A new Modbus slave address can be set for each air handling unit (AHU) via the menu Modbus slave with the NaviPad.

### Communication limitations

There must be a minimum of 3.5 character times (4 ms at 9600 bps) between messages for the Modbus master unit.

### Baud rate

Access application Control Unit supports following baud rates on RS485: 9600, 14 400, 19 200, 28 800, 38 400, 57 600, 76 800, 115 200 bps. The greater the transmission rate, the shorter the possible cable length is.

### RS485

As Modbus RTU is based on RS485 bus following must be observed:

- Baud rate, parity and stop bits must match network and master.
- The bus wires A/B must not be crossed.
- In case of long distances or high baud rates, consider using end termination. See Modbus.org specification and implementation guide.

### Transmission mode

Access uses the RTU transmission mode for the communication ports. However, the Modbus RTU transmission mode cannot understand messages using Modbus ASCII transmission mode. Therefore, the transmission mode must configure to be RTU in both the master unit and in the slave units.

The word parameter for the Modbus RTU transmission mode is 8 bits.

## Address and registers

All Modbus addresses start with 0 except some Master-unit addresses that start with 1 (equal to register). For these Master-unit addresses it is necessary to add 1 to address.

## Modbus type

Modbus register type and supported Modbus functions:

| Register type | Functions | Register | Data type |
|---|---|---|---|
| Coil status | 01=Read coils<br>05=Write single coil<br>15= Write multiple coils | 0x | 1 bit |
| Input status | 02=Read discrete inputs | 1x | 1 bit |
| Input register | 04=Read input register | 3x | 16-bit, 32-bit signed or unsigned |
| Holding register | 03=Read holding register<br>06=Write single register<br>16=Write multiple registers | 4x | 16-bit, 32-bit signed or unsigned |

## Maximum 47 registers

A maximum of 47 registers can be read in one message.

## Formats

Values and states are:

- Temperature, pressure, and flow — 16- or 32-bit signed word
- States and statuses — 16-bit unsigned word

32-bit word presented as huge or float consists of two 16-bit registers. Double word, where Register 0 is most significant (MSW) and Register 1 is least significant (LSW).

States are presented as a number, enumerated type. Texts for each state are presented in the description's column for the first object in a series of same enumerated type.

## Scale factor

Most real variables have scale factor 10. Exceptions are time setting (scale factor 100) and air flow (scale factor 1). Also, Integer, Index and Logic always have scale factor 1.

For example, a temperature value with scale factor 10 can be interpreted to be a value with 1 decimal, while a temperature integer value with scale factor 1 will have no decimal.

Scale factors for real variables are listed in the Scale factor column.

## Units

Values of real variables each have an engineering unit as per selected preference setting in the controller. Character in table represents preference dependent unit for:

P (pressure) = Pa, in.wg

T (temperature) = °C, °F

Q (flow) = m3/h, CFM, m3/s, l/s

SFP=kW/m3/s

## Alarms

Alarm system is based on BACnet. Alarming objects are available on Modbus registers with alarm status. Alarm status as enumerated types, available depending on object type.

Alarm acknowledgement can be done with two different registers. Either acknowledge all alarms with a Coil register or individual, writing the alarm id/number in a Holding register.

## Time schedule

Function time schedule is based on BACnet. Local time schedule settings for Monday – Sunday is available on Modbus.

Each day can be defined with maximum 8 events per day where events, as enumerated types, depending on configured fan levels.

# Watchdog

The Access application (from version 5.0-1-00) can supervise communication received from a Building Management System (BMS) master unit.

A single slave communication protocol can be monitored at a time.

An alarm message generates if there is no active communication from the Building Management System (BMS) master unit is detected before the watchdog timeout runs out.

## BMS watchdog (Activation of protocol)

Upon delivery, the Building Management System (BMS) watchdog is disabled as default.

To activate and configure the BMS watchdog go to Configuration > System settings > Communication > BMS watchdog in the web controller menu. The below screen displays:


### BMS protocol

The default setting for BMS protocol is “None”.

To activate the BMS watchdog, change the BMS protocol setting to the protocol used for BMS communication. Supported protocols are Modbus and BACnet.

### Watchdog timeout

The BMS watchdog timeout period can be set between 10-3600 seconds. The BMS watchdog timeout is by default set to 60 seconds.

If the byte counter of received bytes does not change during the watchdog timeout, the communication is considered faulty and an alarm message generates.

### Communication fault BMS master

When a communication fault is detected, all values generated by the BMS are considered invalid. By default, the alarm is set to “Class C with no action”.

# BMS outdoor temperature

The Access application (from software version 5.0-1-00) is capable of receiving external outdoor air temperature reference from BMS via Modbus and BACnet.

## Function

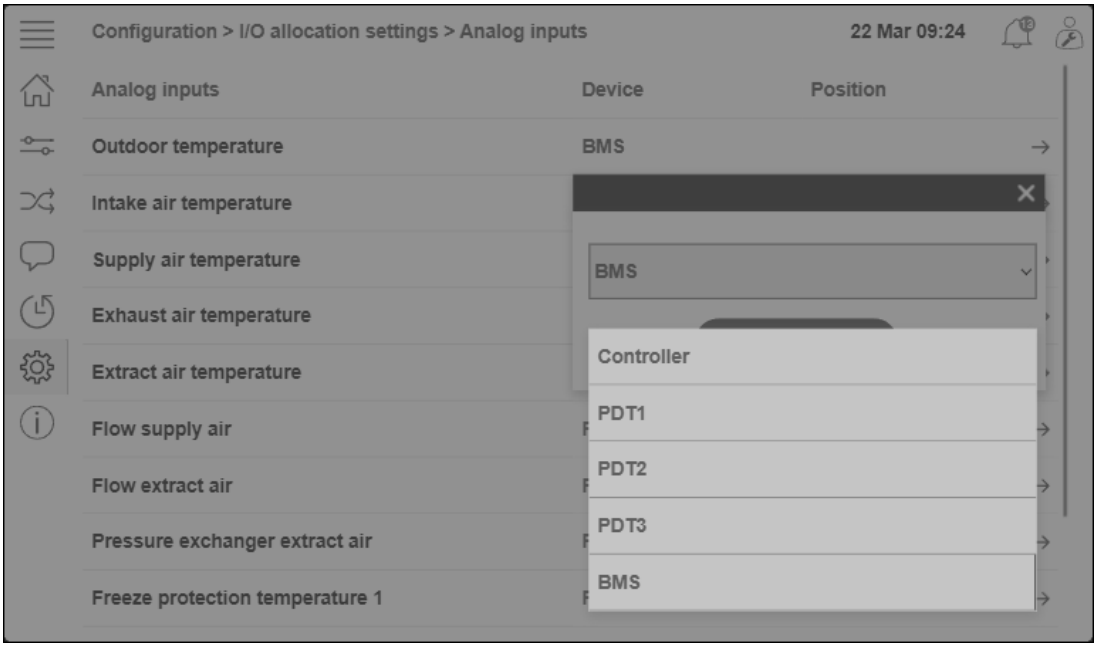
When BMS outdoor temperature is used the application uses the value from the Modbus Holding register or BACnet object.

The BMS watchdog in the application supervises that value is valid and updated. In case of communication fault according the BMS watchdog both a sensor error alarm for BMS Outdoor temperature and a watchdog alarm are generated.

When BMS outdoor temperature is not valid the control functions consider it as an <Invalid> value until BMS values is updated and sensor error and watchdog alarm returned.

## Configuration

Allocate the analog input for outdoor temperature to the Device=BMS.



# Ethernet settings

The NaviPad and Access control unit can be connected without a DHCP server via a switch module or the dedicated HMI port on the control unit. Auto-IP (link-local) addresses are automatically assigned to the NaviPad and control unit. Addresses are randomly assigned from within the range: 169.254.x.y (255.255.0.0).

Static IP-addresses, as opposed to dynamic (DHCP), can be used in Access (from version 4.0-1-04) and in NaviPad (from version 1.1.0.184).

Two individual IP-addresses are required when an the control unit of an air handling unit (AHU) is linked with a NaviPad. One IP-address must be assigned to each unit. Refer to applicable IT Department for addresses.

The below steps MUST be followed when static IP-addresses are integrated and configured.

To manually set a static IP-address (between NaviPad and an air handling unit (AHU)):

1. From NaviPad, log in to the AHU web page.
2. Click to enable the static IP-addresses to be set via the AHU web interface.
3. Enter the IP, subnet mask, gateway and DNS-address in the AHU control unit as applicable.
4. Click to save new settings.
5. Press the NaviPad home button to log out of AHU web page. The NaviPad loses the connection with the AHU.
6. Go to the NaviPad settings. In the NaviPad settings, go to Advanced HMI > Ethernet. Log in (default password: 1111).
7. Activate the switch function to enable static IP-address setting.
8. Edit the IP-address, subnet mask and gateway as applicable.
9. Use NaviPad to search for available units if needed.

**NOTE:** The air handling unit (AHU), the NaviPad and any additional devices must be connected to a local network within the same IP-subnet.

**NOTE:** If no gateway is available, use either 0.0.0.0 or same as the IP-address set for the unit.

## DHCP

The Dynamic Host Configuration Protocol (DHCP) is a network protocol used for dynamic distribution of network configuration parameters, for example IP-addresses and DNS servers. The control unit of the Access application can be configured to receive an IP-address from a DHCP-server (dynamic) or have the address configured manually (static).

To configure the Access controller unit with a static IP-address use the controller web-interface (from Access version 4.0-1-04):

1) Enter applicable IP-address.

2) Enter applicable subnet mask.

3) Enter applicable gateway address.

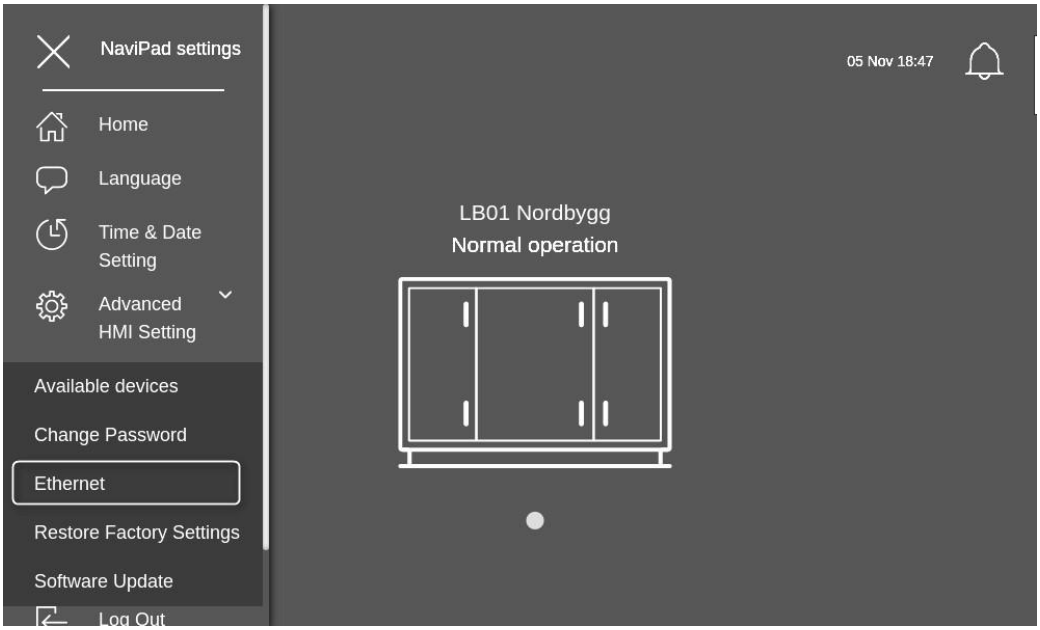
4) Enter applicable XXX (DNS) server address.

## Access application control unit

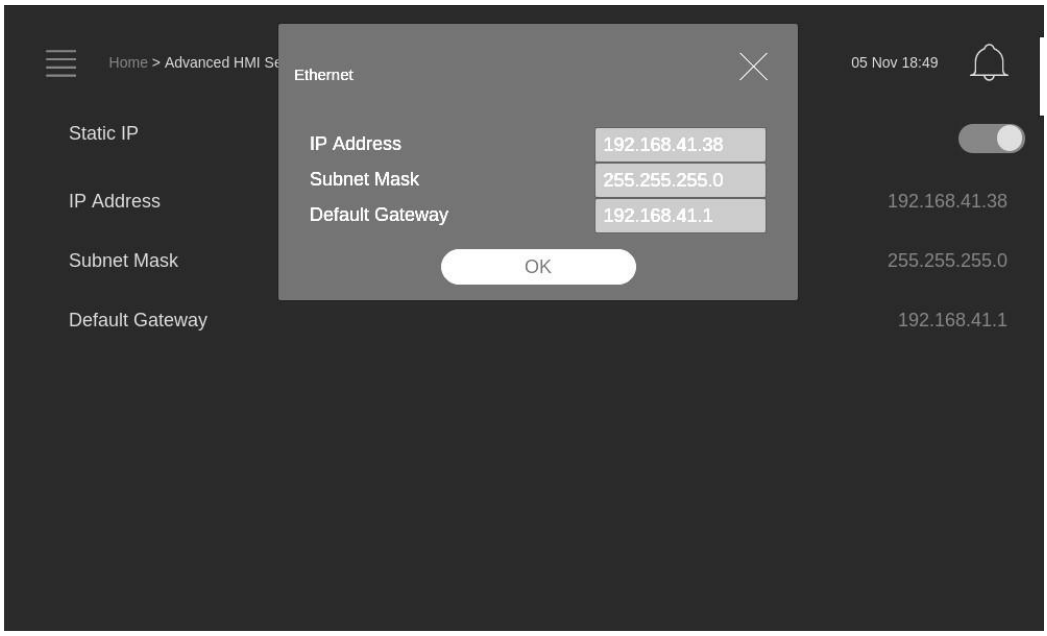
The ethernet settings display in the Access web menu (from version 5.0-1-00):


## NaviPad

The ethernet NaviPad settings display in the NaviPad web menu (from version 1.1.0.184):

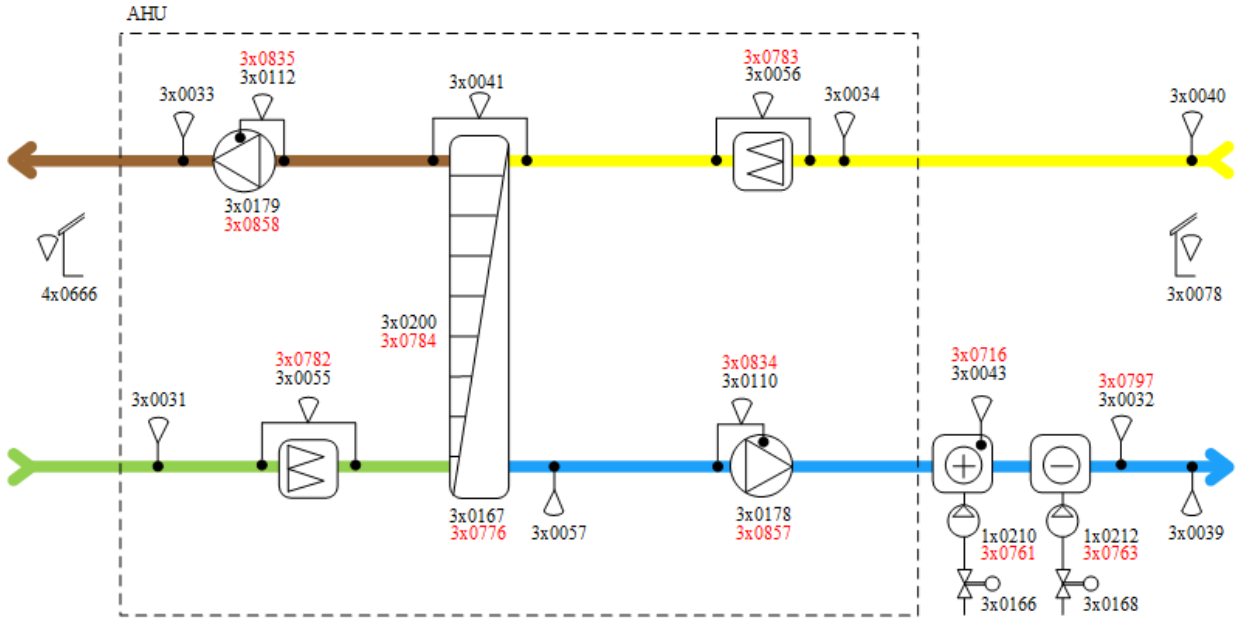



Home > Advanced HMI Setting > Ethernet
05 Nov 18:48
Static IP
IP Address
192.168.41.38
Subnet Mask
255.255.255.0
Default Gateway
192.168.41.1


Home > Advanced HMI Se
Ethernet
05 Nov 18:49
Static IP
IP Address
192.168.41.38
Subnet Mask
255.255.255.0
Default Gateway
192.168.41.1
OK

# Example of register addresses

Example of useful register addresses in a flow chart for an air handling unit (AHU) with a rotary exchanger, heater, and a cooling unit.




Alarm point-status — event-state

| Modbus | Description | BACnet |
|---|---|---|
| 3x0716 | Freeze protection alarm | AI:17 |
| 3x0754 | Control unit battery error | BV:48 |
| 3x0755 | Communication fault device | BV:49 |
| 3x0756 | Internal error | BV:50 |
| 3x0761 | Malfunction pump sequence-A | BV:65 |
| 3x0763 | Malfunction pump sequence-C | BV:47 |
| 3x0776 | Rotary exchanger alarm | BV:47 |
| 3x0782 | Filter alarm supply air | BI:30 |
| 3x0783 | Filter alarm extract air | BI:31 |
| 3x0784 | Low efficiency exchanger | AV:427 |
| 3x0797 | Deviation alarm supply air temperature | AV:425 |
| 3x0810 | Fire alarm | BV:63 |
| 3x0834 | Deviation alarm supply air fan | AV:428 |
| 3x0835 | Deviation alarm extract air fan | AV:429 |
| 3x0836 | Service stop | BV:38 |
| 3x0837 | Warning freeze protection | BV:39 |
| 3x0847 | Defrosting guard exchanger | BI:24 |
| 3x0856 | Defrosting alarm | BV:62 |
| 3x0857 | Malfunction supply air fan | BV:82 |
| 3x0858 | Malfunction extract air fan | BV:8 |

Status/values — present-value

| Modbus | Description | BACnet |
|---|---|---|
| 1x0000 | Unacknowledged alarm | BV:9 |
| 1x0001 | Unacknowledged A-alarm | BV:10 |
| 1x0002 | Unacknowledged B-alarm | BV:11 |
| 1x0003 | Unacknowledged C-alarm | BV:12 |
| 3x0201 | Actual unit mode | MSV:15 |
| 3x0202 | Indication triggering run mode | MSV:16 |
| 3x0243 | Actual SFP | AV:283 |
| 3x0244 | Average SFP (day) | AV:284 |
| 3x0245 | Average SFP (30 days) | AV:285 |

Status/values — present-value

| Modbus | Description | BACnet |
|---|---|---|
| 1x0210 | Sequence-A/heating pump start | BO:11 |
| 1x0212 | Sequence-C/cooling pump start | BO:13 |
| 1x0220 | Supply air fan start | BO:21 |
| 1x0221 | Extract air fan start | BO:22 |
| 3x0031 | Actual value intake air temperature | AI:2 |
| 3x0032 | Actual value supply air temperature | AI:3 |
| 3x0033 | Actual value exhaust air temperature | AI:4 |
| 3x0034 | Actual value extract air temperature | AI:5 |
| 3x0039 | Actual value supply air pressure | AI:10 |
| 3x0040 | Actual value extract air pressure | AI:11 |
| 3x0041 | Actual value exch.extract pressure | AI:15 |
| 3x0043 | Actual value freeze protection temp | AI:17 |
| 3x0055 | Actual value supply air filter pressure | AI:34 |
| 3x0056 | Actual value extract air filter pressure | AI:35 |
| 3x0057 | Actual value efficiency temperature | AI:36 |
| 3x0078 | Calculated average room temperature | AV:257 |
| 3x0110 | Actual value supply air flow | AI:12 |
| 3x0112 | Actual value extract air flow | AI:13 |
| 3x0166 | Actual output sequence-A | AO:1 |
| 3x0167 | Actual output sequence-B | AO:2 |
| 3x0168 | Actual output sequence-C | AO:3 |
| 3x0178 | Actual output supply air fan | AO:13 |
| 3x0179 | Actual output extract air fan | AO:14 |
| 3x0200 | Calculated temp efficiency exchanger | AV:427 |

Commands/setpoints — present-value

| Modbus | Description | BACnet |
|---|---|---|
| 0x0000 | Acknowledge all alarms | BV:8 |
| 0x0001 | Reset filter alarm counter | BV:6 |
| 4x0699 | Acknowledge alarm no. | |
| 4x0510 | External control | MSV:31 |
| 4x0521 | Temperature control type | MSV:14 |
| 4x0524 | Max limit supply air (cascade ctrl.) | AV:41 |
| 4x0525 | Min limit supply aur (cascade ctrl.) | AV:42 |
| 4x0586 | Alarm limit freeze protection 1 | AV:206 |
| 4x0600 | Alarm low limit exchanger efficiency | AV:427 |
| 4x0666 | Outdoor temperature from BMS | AV:466 |
| Temperature setpoint according control type: | | |
| 4x0522 | Supply air temperature | AV:39 |
| 4x0523 | Extract air temperature | AV:40 |
| 4x0585 | Room temperature | AV:184 |
| 4x0587 | Freeze protection 1 standby | AV:188 |
| 4x0660 | Supply air temp setpoint summer time | AV:45 |
| 4x0661 | Outdoor temp summer/winter mode | AV:46 |
| Fan level air flow setpoint: | | |
| 4x0900 | Flow setpoint supply air fan low speed | AV:53 |
| 4x0902 | Flow setpoint supply air fan normal sp | AV:54 |
| 4x0904 | Flow setpoint supply air fan high sp | AV:55 |
| 4x0906 | Flow setpoint extract air fan low speed | AV:56 |
| 4x0908 | Flow setpoint extract air fan normal sp | AV:57 |
| 4x0910 | Flow setpoint extract air fan high sp | AV:58 |
| Fan level air pressure setpoint: | | |
| 4x0536 | Pressure setpoint supply air fan low.sp | AV:47 |
| 4x0537 | Pressure setpoint supply air fan normal | AV:48 |
| 4x0538 | Pressure setpoint supply air fan high.sp | AV:49 |
| 4x0539 | Pressure setpoint extract air fan low.sp | AV:50 |
| 4x0540 | Pressure setpoint extract air fan normal | AV:51 |
| 4x0541 | Pressure setpoint extract air fan high.sp | AV:52 |

# Table of variables, objects and register addresses

The most used within a SCADA in a flow chart together with local time channel settings system, refer to the Access variable list under APPENDIX. This and a full unfiltered Access list together with EDE files can be delivered upon request. Contact Technical Support.

# APPENDIX

systemair

## Access variable list

Access version: 5.2-1-00 rev. 1

| Function | Description | Data Type | Modbus type | Modbus address | RW | Bacnet | Scale factor | Unit | Release |
|---|---|---|---|---|---|---|---|---|---|
| Actual values | Sum alarm: Unacknowledged A-, B- or C-alarm | Digital | Input Status Register (1x) | 0000 | R | BV:9 | 1 | | |
| Actual values | Sum alarm: Unacknowledged A-alarm | Digital | Input Status Register (1x) | 0001 | R | BV:10 | 1 | | |
| Actual values | Sum alarm: Unacknowledged B-alarm | Digital | Input Status Register (1x) | 0002 | R | BV:11 | 1 | | |
| Actual values | Sum alarm: Unacknowledged C-alarm | Digital | Input Status Register (1x) | 0003 | R | BV:12 | 1 | | |
| Actual values | SEQ-A pump start | Digital | Input Status Register (1x) | 0210 | R | BO:11 | 1 | | |
| Actual values | SEQ-B pump start | Digital | Input Status Register (1x) | 0211 | R | BO:12 | 1 | | |
| Actual values | SEQ-C pump start | Digital | Input Status Register (1x) | 0212 | R | BO:13 | 1 | | |
| Actual values | SEQ-D pump start | Digital | Input Status Register (1x) | 0213 | R | BO:14 | 1 | | |
| Actual values | SEQ-E pump start | Digital | Input Status Register (1x) | 0214 | R | BO:15 | 1 | | |
| Actual values | SEQ-F pump start | Digital | Input Status Register (1x) | 0215 | R | BO:16 | 1 | | |
| Actual values | SEQ-G pump start | Digital | Input Status Register (1x) | 0216 | R | BO:17 | 1 | | |
| Actual values | SEQ-H pump start | Digital | Input Status Register (1x) | 0217 | R | BO:18 | 1 | | |
| Actual values | SEQ-I pump start | Digital | Input Status Register (1x) | 0218 | R | BO:19 | 1 | | |
| Actual values | SEQ-J pump start | Digital | Input Status Register (1x) | 0219 | R | BO:20 | 1 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Actual values | Supply air fan start | Digital | Input Status Register (1x) | 0220 | R | BO:21 | 1 | | |
| Actual values | Extract air fan start | Digital | Input Status Register (1x) | 0221 | R | BO:22 | 1 | | |
| Actual values | Actual value outdoor temperature | 16-bit | Input Register (3x) | 0030 | R | AI:1 | 10 | T | |
| Actual values | Actual value intake air temperature | 16-bit | Input Register (3x) | 0031 | R | AI:2 | 10 | T | |
| Actual values | Actual value supply air temperature | 16-bit | Input Register (3x) | 0032 | R | AI:3 | 10 | T | |
| Actual values | Actual value exhaust air temperature | 16-bit | Input Register (3x) | 0033 | R | AI:4 | 10 | T | |
| Actual values | Actual value extract air temperature | 16-bit | Input Register (3x) | 0034 | R | AI:5 | 10 | T | |
| Actual values | Actual value supply air pressure | 16-bit | Input Register (3x) | 0039 | R | AI:10 | 10 | T | |
| Actual values | Actual value extract air pressure | 16-bit | Input Register (3x) | 0040 | R | AI:11 | 10 | T | |
| Actual values | Actual value exchanger extract pressure | 16-bit | Input Register (3x) | 0041 | R | AI:15 | 10 | T | |
| Actual values | Actual value freeze protection temperature 1 | 16-bit | Input Register (3x) | 0043 | R | AI:17 | 10 | T | |
| Actual values | Actual value $CO_2$ room/extract air | 16-bit | Input Register (3x) | 0046 | R | AI:20 | 10 | ppm | |
| Actual values | Actual value supply air filter pressure | 16-bit | Input Register (3x) | 0055 | R | AI:34 | 10 | P | |
| Actual values | Actual value extract air filter pressure | 16-bit | Input Register (3x) | 0056 | R | AI:35 | 10 | P | |
| Actual values | Actual value efficiency temperature | 16-bit | Input Register (3x) | 0057 | R | AI:36 | 10 | T | |
| Actual values | Calculated average temperature of room sensor 1 to 4 | 16-bit | Input Register (3x) | 0078 | R | AV:257 | 10 | T | |
| Actual values | Actual value supply air flow | 32-bit | Input Register (3x) | 0110 | R | AI:12 | 1 | Q | |
| Actual values | Actual value extract air flow | 32-bit | Input Register (3x) | 0112 | R | AI:13 | 1 | Q | |
| Actual values | Actual value SEQ-A | 16-bit | Input Register (3x) | 0166 | R | AO:1 | 10 | % | |
| Actual values | Actual value SEQ-B | 16-bit | Input Register (3x) | 0167 | R | AO:2 | 10 | % | |
| Actual values | Actual value SEQ-C | 16-bit | Input Register (3x) | 0168 | R | AO:3 | 10 | % | |
| Actual values | Actual value SEQ-D | 16-bit | Input Register (3x) | 0169 | | AO:4 | 10 | % | |
| Actual values | Actual value SEQ-E | 16-bit | Input Register (3x) | 0170 | | AO:5 | 10 | % | |
| Actual values | Actual value SEQ-F | 16-bit | Input Register (3x) | 0171 | | AO:6 | 10 | % | |
| Actual values | Actual value SEQ-G | 16-bit | Input Register (3x) | 0172 | | AO:7 | 10 | % | |
| Actual values | Actual value SEQ-H | 16-bit | Input Register (3x) | 0173 | | AO:8 | 10 | % | |
| Actual values | Actual value SEQ-I | 16-bit | Input Register (3x) | 0174 | | AO:9 | 10 | % | |
| Actual values | Actual value SEQ-J | 16-bit | Input Register (3x) | 0175 | | AO:10 | 10 | % | |
| Actual values | Actual value supply air fan | 16-bit | Input Register (3x) | 0178 | R | AO:13 | 10 | % | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Actual values | Actual value extract air fan | 16-bit | Input Register (3x) | 0179 | R | AO:14 | 10 | % | |
| Actual values | Calculated temperature efficiency exchanger | 16-bit | Input Register (3x) | 0200 | R | AV:427 | 10 | % | |
| Actual values | Actual unit modeModbus0= Stop1= Starting up2= Low speed3= Normal speed4= High speed5= Support heating6= Support cooling7= CO28= Free cooling9= Cool down10= Fire11= Smoke12= Recirculation13= DefrostingBacnet present-value+1 offset for corresponding Modbus | 16-bit | Input Register (3x) | 0201 | R | MSV:15 | 1 | | |
| Actual values | Indicates what is triggering the current run modeModbus0= Time schedule1= Manual run2= Digital input3= Alarm4= External control5= Service stopBacnet present-value+1 offset for corresponding Modbus | 16-bit | Input Register (3x) | 0202 | R | MSV:16 | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| Actual values | Control PID signal SEQ-A | 16-bit | Input Register (3x) | 0214 | R | AV:467 | 10 | % | |
| Actual values | Control PID signal SEQ-B | 16-bit | Input Register (3x) | 0215 | R | AV:468 | 10 | % | |
| Actual values | Control PID signal SEQ-C | 16-bit | Input Register (3x) | 0216 | R | AV:469 | 10 | % | |
| Actual values | Control PID signal supply air fan | 16-bit | Input Register (3x) | 0224 | R | AV:265 | 10 | % | |
| Actual values | Control PID signal extract air fan | 16-bit | Input Register (3x) | 0225 | R | AV:266 | 10 | % | |
| Actual values | Actual setpoint supply air temperature | 16-bit | Input Register (3x) | 0234 | R | AV:273 | 10 | T | |
| Actual values | Actual setpoint supply air fan | 16-bit | Input Register (3x) | 0235 | R | AV:274 | 10 | T | |
| Actual values | Actual setpoint extract air fan | 16-bit | Input Register (3x) | 0236 | R | AV:275 | 10 | P/Q | |
| Actual values | Actual SFP | 16-bit | Input Register (3x) | 0243 | R | AV:283 | 10 | SFP | |
| Actual values | Average SFP (day) | 16-bit | Input Register (3x) | 0244 | R | AV:284 | 10 | SFP | |
| Actual values | Average SFP (30 days) | 16-bit | Input Register (3x) | 0245 | R | AV:285 | 10 | SFP | |
| Alarm status | Alarm 2085 freeze protection temperature 1Modbus alarm-status0= normal1= fault2= alarm3= high limit4= low limit6= acknowledged7= blocked 8= returned | 16-bit | Input Register (3x) | 0716 | R | AI:17 | 1 | | |
| Alarm status | Alarm 3075 internal battery error | 16-bit | Input Register (3x) | 0754 | R | BV:48 | 1 | | |
| Alarm status | Alarm 3080 communication fault with device | 16-bit | Input Register (3x) | 0755 | R | BV:49 | 1 | | |
| Alarm status | Alarm 3090 internal error | 16-bit | Input Register (3x) | 0756 | R | BV:50 | 1 | | |
| Alarm status | Alarm 3020 malfunction sequence-A | 16-bit | Input Register (3x) | 0761 | R | BV:65 | 1 | | |
| Alarm status | Alarm 3025 malfunction sequence-B | 16-bit | Input Register (3x) | 0762 | R | BV:66 | 1 | | |
| Alarm status | Alarm 3030 malfunction sequence-C | 16-bit | Input Register (3x) | 0763 | R | BV:67 | 1 | | |
| Alarm status | Alarm 3035 malfunction sequence-D | 16-bit | Input Register (3x) | 0764 | R | BV:68 | 1 | | |
| Alarm status | Alarm 3040 malfunction sequence-E | 16-bit | Input Register (3x) | 0765 | R | BV:69 | 1 | | |
| Alarm status | Alarm 3045 malfunction sequence-F | 16-bit | Input Register (3x) | 0766 | R | BV:70 | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| Alarm status | Alarm 3050 malfunction sequence-G | 16-bit | Input Register (3x) | 0767 | R | BV:71 | 1 | | |
| Alarm status | Alarm 3055 malfunction sequence-H | 16-bit | Input Register (3x) | 0768 | R | BV:72 | 1 | | |
| Alarm status | Alarm 3060 malfunction sequence-I | 16-bit | Input Register (3x) | 0769 | R | BV:73 | 1 | | |
| Alarm status | Alarm 3065 malfunction sequence-J | 16-bit | Input Register (3x) | 0770 | R | BV:74 | 1 | | |
| Alarm status | Alarm 3070 rotary exchanger alarm | 16-bit | Input Register (3x) | 0776 | R | BV:47 | 1 | | |
| Alarm status | Alarm 1000 filter guard supply air | 16-bit | Input Register (3x) | 0782 | R | BI:30 | 1 | | |
| Alarm status | Alarm 1005 filter guard extract air | 16-bit | Input Register (3x) | 0783 | R | BI:31 | 1 | | |
| Alarm status | Alarm 1070 low efficiency exchanger | 16-bit | Input Register (3x) | 0784 | R | AV:427 | 1 | | |
| Alarm status | Alarm 1080 deviation supply air temperature | 16-bit | Input Register (3x) | 0797 | R | AV:425 | 1 | | |
| Alarm status | Alarm 6010 fire alarm | 16-bit | Input Register (3x) | 0810 | R | BV:63 | 1 | | |
| Alarm status | Alarm 1015 deviation supply air fan | 16-bit | Input Register (3x) | 0834 | R | AV:428 | 1 | | |
| Alarm status | Alarm 1020 deviation extract air fan | 16-bit | Input Register (3x) | 0835 | R | AV:429 | 1 | | |
| Alarm status | Alarm 7015 service stop | 16-bit | Input Register (3x) | 0836 | R | BV:38 | 1 | | |
| Alarm status | Alarm 7020 warning freeze protection | 16-bit | Input Register (3x) | 0837 | R | BV:39 | 1 | | |
| Alarm status | Alarm 1060 defrosting guard exchanger | 16-bit | Input Register (3x) | 0847 | R | BI:24 | 1 | | |
| Alarm status | Alarm 1105 defrosting alarm | 16-bit | Input Register (3x) | 0856 | R | BV:62 | 1 | | |
| Alarm status | Alarm 3145 malfunction supply air fan | 16-bit | Input Register (3x) | 0857 | R | BV:82 | 1 | | |
| Alarm status | Alarm 3150 malfunction extract air fan | 16-bit | Input Register (3x) | 0858 | R | BV:83 | 1 | | |
| Commands & setpoints | Acknowledge all alarms | Digital | Coil Status Register (0x) | 0000 | RW | BV:8 | 1 | | |
| Commands & setpoints | Reset the alarm service interval counter | Digital | Coil Status Register (0x) | 0001 | RW | BV:6 | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| Commands & setpoints | External control<br>Modbus<br>0= None<br>1= Extended run low<br>2= Extended run normal<br>3= Extended run high<br>4= External stop<br>5= External stop with support control<br>6= Free cooling start<br>7= Recirculation<br>Bacnet present-value<br>+1 offset for corresponding Modbus | 16-bit | Holding Register (4x) | 0510 | RW | MSV:31 | 1 | | |
| Commands & setpoints | Temperature control typeModbus0= Supply air1= Supply air outdoor compensated2= Room cascade3= Extract air cascade4= Room (summer) else supply air5= Extract air (summer) else supply air6= Room cascade outdoor compensated7= Extract air cascade outdoor comp.8= Extract air dependent supply air temp.Bacnet present-value+1 offset for corresponding Modbus | 16-bit | Holding Register (4x) | 0521 | RW | MSV:14 | 1 | | |
| Commands & setpoints | Temperature setpoint according control type: supply air | 16-bit | Holding Register (4x) | 0522 | RW | AV:39 | 10 | T | |
| Commands & setpoints | Temperature setpoint according control type: extract air | 16-bit | Holding Register (4x) | 0523 | RW | AV:40 | 10 | T | |
| Commands & setpoints | Temperature setpoint cascade control: max limit supply air | 16-bit | Holding Register (4x) | 0524 | RW | AV:41 | 10 | T | |
| Commands & setpoints | Temperature setpoint cascade control: min limit supply | 16-bit | Holding Register (4x) | 0525 | RW | AV:42 | 10 | T | |
| Commands & setpoints | Fan level air pressure setpoint: supply low speed | 16-bit | Holding Register (4x) | 0536 | RW | AV:47 | 10 | P | |

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|---|---|---|---|---|---|---|---|---|---|
| Commands & setpoints | Fan level air pressure setpoint: supply normal speed | 16-bit | Holding Register (4x) | 0537 | RW | AV:48 | 10 | P | |
| Commands & setpoints | Fan level air pressure setpoint: supply high speed | 16-bit | Holding Register (4x) | 0538 | RW | AV:49 | 10 | P | |
| Commands & setpoints | Fan level air pressure setpoint: extract low speed | 16-bit | Holding Register (4x) | 0539 | RW | AV:50 | 10 | P | |
| Commands & setpoints | Fan level air pressure setpoint: extract normal speed | 16-bit | Holding Register (4x) | 0540 | RW | AV:51 | 10 | P | |
| Commands & setpoints | Fan level air pressure setpoint: extract high speed | 16-bit | Holding Register (4x) | 0541 | RW | AV:52 | 10 | P | |
| Commands & setpoints | Temperature settting: min limit outdoor during day to allow start free cooling | 16-bit | Holding Register (4x) | 0563 | RW | AV:164 | 10 | T | |
| Commands & setpoints | Temperature setting: max limit outdoor during night to stop free cooling | 16-bit | Holding Register (4x) | 0564 | RW | AV:165 | 10 | T | |
| Commands & setpoints | Temperature setting: min limit outdoor during night to stop free cooling | 16-bit | Holding Register (4x) | 0565 | RW | AV:166 | 10 | T | |
| Commands & setpoints | Temperature setting: min limit room temperature during night to stop free cooling | 16-bit | Holding Register (4x) | 0566 | RW | AV:167 | 10 | T | |
| Commands & setpoints | $CO_2$ setpoint mixing damper function | 16-bit | Holding Register (4x) | 0571 | RW | AV:170 | 10 | ppm | |
| Commands & setpoints | Temperature setpoint according control type: room temperature | 16-bit | Holding Register (4x) | 0585 | RW | AV:184 | 10 | T | |
| Commands & setpoints | Alarm limit freeze protection 1 | 16-bit | Holding Register (4x) | 0586 | RW | AV:206 | 10 | T | |
| Commands & setpoints | Temperature setpoint according control type: freeze protection 1 if standby | 16-bit | Holding Register (4x) | 0587 | RW | AV:188 | 10 | T | |
| Commands & setpoints | Alarm low limit exchanger efficiency | 16-bit | Holding Register (4x) | 0600 | RW | AV:427 | 10 | T | |
| Commands & setpoints | Temperature setpoint: supply air temperature summer | 16-bit | Holding Register (4x) | 0660 | RW | AV:45 | 10 | T | |
| Commands & setpoints | Temperature setpoint: outdoor temp. summer/winter switch | 16-bit | Holding Register (4x) | 0661 | RW | AV:46 | 10 | T | |
| Actual values | Outdoor temperature sent from BMS system | 16-bit | Holding Register (4x) | 0666 | RW | AV:466 | 10 | T | |
| Commands & setpoints | Acknowledge alarm number | 16-bit | Holding Register (4x) | 0699 | RW | | 1 | | |
| Commands & setpoints | Time setting: minutes to block heat output after free cooling | 32-bit | Holding Register (4x) | 0800 | RW | PIV:1 | 1 | m | |
| Commands & setpoints | Time setting: start hour free cool function | 32-bit | Holding Register (4x) | 0828 | RW | PIV:73 | 1 | h | |
| Commands & setpoints | Time setting: stop hour free cool function | 32-bit | Holding Register (4x) | 0830 | RW | PIV:74 | 1 | h | |
| Commands & setpoints | Fan level air flow setpoint: supply low speed | 32-bit | Holding Register (4x) | 0900 | RW | AV:53 | 1 | Q | |
| Commands & setpoints | Fan level air flow setpoint: supply normal speed | 32-bit | Holding Register (4x) | 0902 | RW | AV:54 | 1 | Q | |
| Commands & setpoints | Fan level air flow setpoint: supply high speed | 32-bit | Holding Register (4x) | 0904 | RW | AV:55 | 1 | Q | |

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| Commands & setpoints | Fan level air flow setpoint: extract low speed | 32-bit | Holding Register (4x) | 0906 | RW | AV:56 | 1 | Q | |
| Commands & setpoints | Fan level air flow setpoint: extract normal speed | 32-bit | Holding Register (4x) | 0908 | RW | AV:57 | 1 | Q | |
| Commands & setpoints | Fan level air flow setpoint: extract high speed | 32-bit | Holding Register (4x) | 0910 | RW | AV:58 | 1 | Q | |
| Time channel | Real time clock: Minute 0-59 | 16-bit | Holding Register (4x) | 0000 | RW | | 1 | | |
| Time channel | Real time clock: Hour 0-23 | 16-bit | Holding Register (4x) | 0001 | RW | | 1 | | |
| Time channel | Real time clock: Day of Week 1-7, 1=Monday | 16-bit | Holding Register (4x) | 0002 | RW | | 1 | | |
| Time channel | Real time clock: Week number 1-53 | 16-bit | Holding Register (4x) | 0003 | RW | | 1 | | |
| Time channel | Real time clock: Day of month 1-31 | 16-bit | Holding Register (4x) | 0004 | RW | | 1 | | |
| Time channel | Real time clock: Month 1-12 | 16-bit | Holding Register (4x) | 0005 | RW | | 1 | | |
| Time channel | Real time clock: Year 0-99 | 16-bit | Holding Register (4x) | 0006 | RW | | 1 | | |
| Time channel | Monday: event 1<br>Modbus<br>1: stop<br>2: low speed<br>3: normal speed<br>4: high speed | 16-bit | Holding Register (4x) | 0007 | RW | MS:2 | 1 | | |
| Time channel | Monday: event 2 | 16-bit | Holding Register (4x) | 0008 | RW | MS:2 | 1 | | |
| Time channel | Monday: event 3 | 16-bit | Holding Register (4x) | 0009 | RW | MS:2 | 1 | | |
| Time channel | Monday: event 4 | 16-bit | Holding Register (4x) | 0010 | RW | MS:2 | 1 | | |
| Time channel | Monday: event 1 time of day (HH:MM) | 16-bit | Holding Register (4x) | 0063 | RW | MS:2 | 100 | | |
| Time channel | Monday: event 2 time of day | 16-bit | Holding Register (4x) | 0064 | RW | MS:2 | 100 | | |
| Time channel | Monday: event 3 time of day | 16-bit | Holding Register (4x) | 0065 | RW | MS:2 | 100 | | |
| Time channel | Monday: event 4 time of day | 16-bit | Holding Register (4x) | 0066 | RW | MS:2 | 100 | | |
| Time channel | Tuesday: event 1 | 16-bit | Holding Register (4x) | 0015 | RW | MS:2 | 1 | | |
| Time channel | Tuesday: event 2 | 16-bit | Holding Register (4x) | 0016 | RW | MS:2 | 1 | | |
| Time channel | Tuesday: event 3 | 16-bit | Holding Register (4x) | 0017 | RW | MS:2 | 1 | | |
| Time channel | Tuesday: event 4 | 16-bit | Holding Register (4x) | 0018 | RW | MS:2 | 1 | | |
| Time channel | Tuesday: event 1 time of day | 16-bit | Holding Register (4x) | 0071 | RW | MS:2 | 100 | | |
| Time channel | Tuesday: event 2 time of day | 16-bit | Holding Register (4x) | 0072 | RW | MS:2 | 100 | | |

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| Time channel | Tuesday: event 3 time of day | 16-bit | Holding Register (4x) | 0073 | RW | MS:2 | 100 | | |
| Time channel | Tuesday: event 4 time of day | 16-bit | Holding Register (4x) | 0074 | RW | MS:2 | 100 | | |
| Time channel | Wednesday: event 1 | 16-bit | Holding Register (4x) | 0023 | RW | MS:2 | 1 | | |
| Time channel | Wednesday: event 2 | 16-bit | Holding Register (4x) | 0024 | RW | MS:2 | 1 | | |
| Time channel | Wednesday: event 3 | 16-bit | Holding Register (4x) | 0025 | RW | MS:2 | 1 | | |
| Time channel | Wednesday: event 4 | 16-bit | Holding Register (4x) | 0026 | RW | MS:2 | 1 | | |
| Time channel | Wednesday: event 1 time of day | 16-bit | Holding Register (4x) | 0079 | RW | MS:2 | 100 | | |
| Time channel | Wednesday: event 2 time of day | 16-bit | Holding Register (4x) | 0080 | RW | MS:2 | 100 | | |
| Time channel | Wednesday: event 3 time of day | 16-bit | Holding Register (4x) | 0081 | RW | MS:2 | 100 | | |
| Time channel | Wednesday: event 4 time of day | 16-bit | Holding Register (4x) | 0082 | RW | MS:2 | 100 | | |
| Time channel | Thursday: event 1 | 16-bit | Holding Register (4x) | 0035 | RW | MS:2 | 1 | | |
| Time channel | Thursday: event 2 | 16-bit | Holding Register (4x) | 0036 | RW | MS:2 | 1 | | |
| Time channel | Thursday: event 3 | 16-bit | Holding Register (4x) | 0037 | RW | MS:2 | 1 | | |
| Time channel | Thursday: event 4 | 16-bit | Holding Register (4x) | 0038 | RW | MS:2 | 1 | | |
| Time channel | Thursday: event 1 time of day | 16-bit | Holding Register (4x) | 0087 | RW | MS:2 | 100 | | |
| Time channel | Thursday: event 2 time of day | 16-bit | Holding Register (4x) | 0088 | RW | MS:2 | 100 | | |
| Time channel | Thursday: event 3 time of day | 16-bit | Holding Register (4x) | 0089 | RW | MS:2 | 100 | | |
| Time channel | Thursday: event 4 time of day | 16-bit | Holding Register (4x) | 0090 | RW | MS:2 | 100 | | |
| Time channel | Friday: event 1 | 16-bit | Holding Register (4x) | 0043 | RW | MS:2 | 1 | | |
| Time channel | Friday: event 2 | 16-bit | Holding Register (4x) | 0044 | RW | MS:2 | 1 | | |
| Time channel | Friday: event 3 | 16-bit | Holding Register (4x) | 0045 | RW | MS:2 | 1 | | |
| Time channel | Friday: event 4 | 16-bit | Holding Register (4x) | 0046 | RW | MS:2 | 1 | | |
| Time channel | Friday: event 1 time of day | 16-bit | Holding Register (4x) | 0095 | RW | MS:2 | 100 | | |
| Time channel | Friday: event 2 time of day | 16-bit | Holding Register (4x) | 0096 | RW | MS:2 | 100 | | |
| Time channel | Friday: event 3 time of day | 16-bit | Holding Register (4x) | 0097 | RW | MS:2 | 100 | | |
| Time channel | Friday: event 4 time of day | 16-bit | Holding Register (4x) | 0098 | RW | MS:2 | 100 | | |
| Time channel | Saturday: event 1 | 16-bit | Holding Register (4x) | 0051 | RW | MS:2 | 1 | | |
| Time channel | Saturday: event 2 | 16-bit | Holding Register (4x) | 0052 | RW | MS:2 | 1 | | |
| Time channel | Saturday: event 3 | 16-bit | Holding Register (4x) | 0053 | RW | MS:2 | 1 | | |

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|---|---|---|---|---|---|---|---|---|---|
| Time channel | Saturday: event 4 | 16-bit | Holding Register (4x) | 0054 | RW | MS:2 | 1 | | |
| Time channel | Saturday: event 1 time of day | 16-bit | Holding Register (4x) | 0103 | RW | MS:2 | 100 | | |
| Time channel | Saturday: event 2 time of day | 16-bit | Holding Register (4x) | 0104 | RW | MS:2 | 100 | | |
| Time channel | Saturday: event 3 time of day | 16-bit | Holding Register (4x) | 0105 | RW | MS:2 | 100 | | |
| Time channel | Saturday: event 4 time of day | 16-bit | Holding Register (4x) | 0106 | RW | MS:2 | 100 | | |
| Time channel | Sunday: event 1 | 16-bit | Holding Register (4x) | 0059 | RW | MS:2 | 1 | | |
| Time channel | Sunday: event 2 | 16-bit | Holding Register (4x) | 0060 | RW | MS:2 | 1 | | |
| Time channel | Sunday: event 3 | 16-bit | Holding Register (4x) | 0061 | RW | MS:2 | 1 | | |
| Time channel | Sunday: event 4 | 16-bit | Holding Register (4x) | 0062 | RW | MS:2 | 1 | | |
| Time channel | Sunday: event 1 time of day | 16-bit | Holding Register (4x) | 0111 | RW | MS:2 | 100 | | |
| Time channel | Sunday: event 2 time of day | 16-bit | Holding Register (4x) | 0112 | RW | MS:2 | 100 | | |
| Time channel | Sunday: event 3 time of day | 16-bit | Holding Register (4x) | 0113 | RW | MS:2 | 100 | | |
| Time channel | Sunday: event 4 time of day | 16-bit | Holding Register (4x) | 0114 | RW | MS:2 | 100 | | |

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