Communication manual
Access software from 4.0-1-04

EN

Document in original language | 153831 · A009

systemair

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Chapter 1 About this document

Introduction

This document describes Access controller application communication possibilites in terms of integration as communication slave via EXOline, Modbus and BACnet.

Software version

Access version	*Available*
V4.0-1-04	Modbus are available
V4.0-1-05 later	EXOline, BACnet and Modbus are available
NaviPad 1.1.0.184 later	With Ethernet menu, static IP setting

Release column in register tables further down in this document tells from which software release variables was introduced or changed.

Signal types

All signals accessible from a SCADA system are declared in a spreadsheet referenced in **Tables of variables with register addresses**.

EXOL type

The EXOL type of the signals:

R = Real (-3.3E38 - 3.3E38)

I = Integer (-32768 - 32767)

X = Index (0 - 255)

L = Logic (0/1)

Modbus type

The Modbus type of the signals:

0x = Coil Status Register (1bit)

1x = Input Status Register (1bit)

4x = Holding Register (signed, 16bit or 32bit word)

3x = Input Register (signed, 16bit word or 32bit float)

Supported Modbus functions:

1 = Read Coils

2 = Read Discrete Input

3 = Read Holding Register

4 = Read Input Register

5 = Write Single Coil

6 = Write Single Register

15 = Write Multiple Coils

16 = Write Multiple Registers

BACnet type

The BACnet type of signals:

10XXX = Read and write binary

20XXX = Read binary

30XXX = Read and write analogue

40XXX = Read analogue

30XXX = Read and write multistate

40XXX = Read multistate

(Where XXX = Modbus address)

NOTE: In the variable lists contained in this manual, the following abbrevations are used:

AV = Analogue Value

BV = Binary Value

MSV = Multistate Value

Chapter 2 System integration

Modbus

Addresses

All addresses starts with 0, and due to that some Master devices starts address with 1 (equal to register) it's in that case necessary to add all addresses in this document with +1.

Communication limitations

The Modbus master must wait for a minimum of 3.5 character times (4 ms at 9600 bps) between two messages.

Baudrate

9600, 14 400, 19 200, 28 800, 38 400, 57 600, 76 800, 115 200 bps

Scale factor Modbus

Real signals could have scale factor according to Scale factor column in tables. In general 10 is used except for time setting signals which have scale factor 100, and air flow signals which have scale factor 1. Example, with a scale factor 10 of an temperature Integer value could then be interpreted as a value with one decimal. Integer, Index and Logic always have scale factor 1.

Unit

Real signal values could have an engineering unit according to Unit-column in tables, where T, Q and P represent temperature-, flow- and pressure unit according selected preference setting in the controller.

Modbus wiring, etc.

A protocol like Modbus consists of several layers (OSI-model). The bottom layer is always the physical layer; the number of wires and signal levels. The next layer describes the communication digits (number of data bits, stop-bits, parity etc). Next are the layers describing the Modbus-specific functions (number of digits per message, the meaning of different messages, etc.).

For Modbus, the bottom layer can be RS485, RS422, RS232 or Modbus TCP.

Max. 47 registers

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

Transmission mode

Access uses the RTU transmission mode for the communication ports. The transmission mode must be the same in the master unit and the slave units, since Modbus/RTU cannot understand Modbus/ASCII messages. The configuration parameter Word length is always 8 for Modbus/RTU.

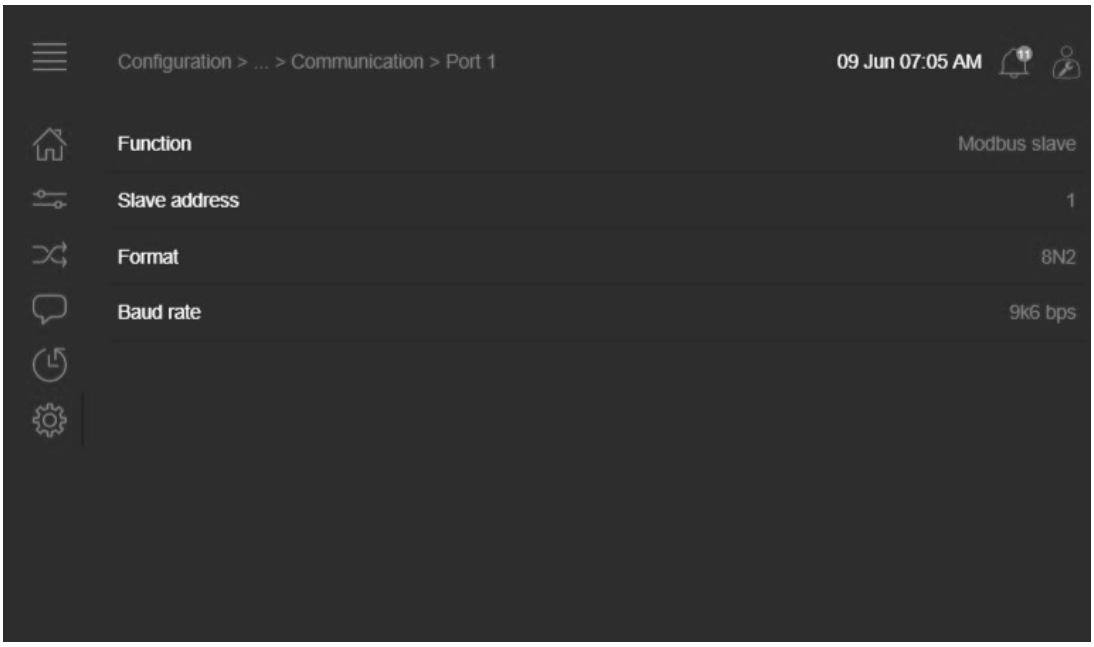
When using Modbus TCP the controller Ethernet port in combination with TCP port setting 502 should be used.

Writing values

To override the output values, set the output to manual mode using a Modbus signal. Then set the corresponding ..._ManSet signal to the wanted level. These signals are listed in Chapter 5: Holding Registers. Remember that only values with a default value are adjustable, you will find these in the chapters Coil Status Register and Holding Register.

Configuration

Modbus TCP/IP enabled as default. Modbus RTU is enabled via configuration of the communication ports.



The communication parameters for the Modbus line is the most important thing to configure first. These parameters must be identical in both the master unit and slave units, since they define the structure of messages and the transmission speed.

The default configuration values of a Access controller are

Slave address: 1

Word length: 8 bit

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 using the NaviPad.

NOTE To change the Modbus slave address when using Modbus TCP/IP a communication port must be temporarily configured as Modbus slave to access the slave address setting.

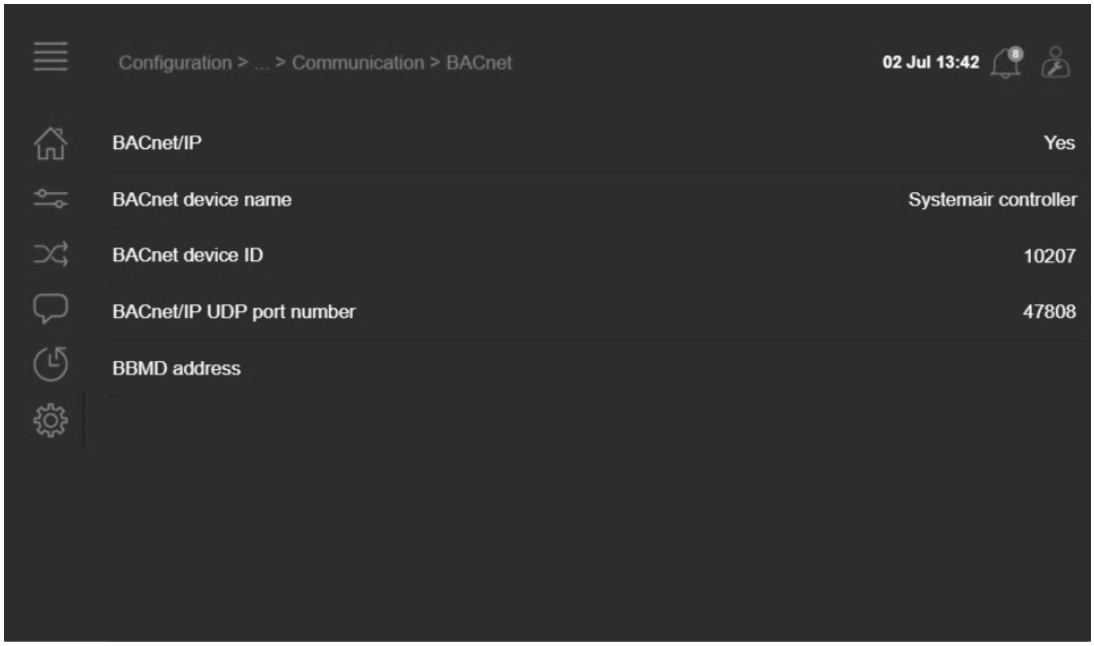
BACnet

Access from software version 4.0-1-05 is capable of communication via the BACnet-ASC (Application Specific Controller) protocol and from 4.3-1-00 with BACnet AAC (Advanced Application Controller).

In order to connect a Access application to a BMS (Building Management System) via BACnet/IP use the TCP/IP port.

BACnet/IP configuration (Activation status of BACnet/IP protocol)

Upon delivery, the BACnet/IP protocol is disabled as a default. To enable BACnet communication, simply change the setting “No” to “Yes”.



BACnet device name

This is the devices name that is shown on the BMS when a device is discovered.

BACnet device ID

The ID of a device, used to identify it on the BACnet network. This number **cannot** be duplicated **anywhere** on the BACnet network and must therefore be unique.

BBMD address and BACnet/IP port number

The BBMD address (BACnet/IP Broadcast Management Device) is used for discovering devices that are attached to different BACnet/IP subnets and separated by an IP router. The address is entered as **host:port**, where “host” can be the host’s name if DNS is configured. If DNS is not configured, the host address should be entered in the format “xxx.xxx.xxx.xxx”, followed by the port number (default setting 47808).

Example: mybbmd:47808 (with DNS configured) or 10.100.50.99:47808

Note! When BBMD address is configured in Access, will make the Access controller to a BACnet/IP Foreign Device, which then means that the Access will not answer any UDP broadcast in the net other than from that particular BBMD. When assigning BBMD, some BBMD vendors mentions that not only the Device ID must be unique but also the Device Name within the BACnet network. For further information, please consult the specific BBMD vendors and/or BACnet routers literature.

DHCP

The Dynamic Host Configuration Protocol (DHCP) is a network protocol used on Internet Protocol (IP) networks for dynamic distribution of network configuration parameters, such as IP addresses, DNS servers and other services. The Access controller can be configured to either obtain an IP address from a DHCP server (dynamic) or the address can be set manually (static).

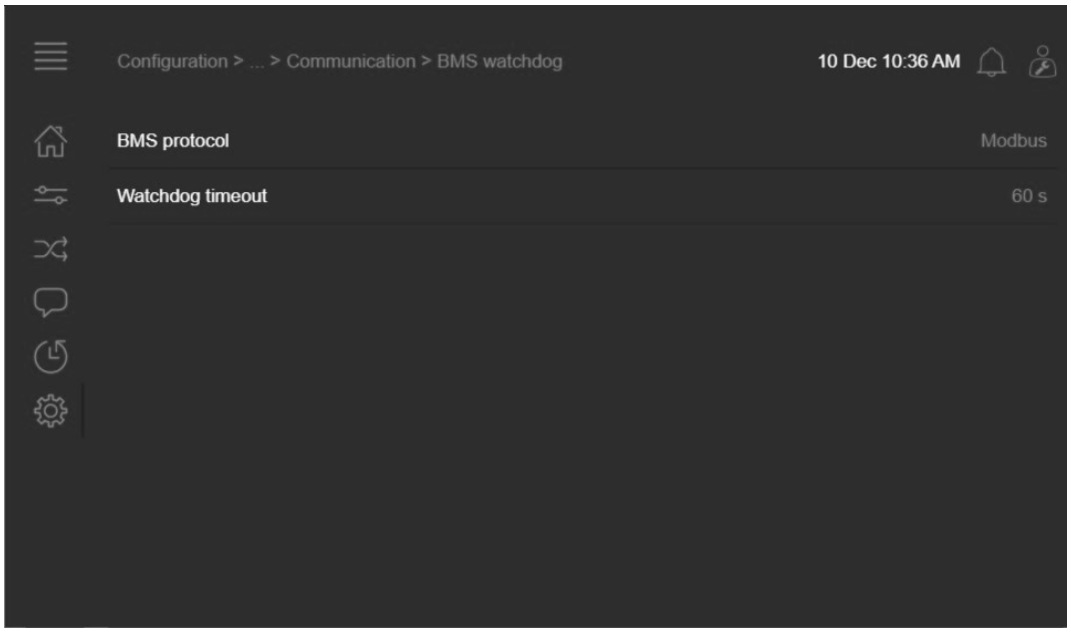
If static IP address needed for the Access cotroller, simply enter the IP address you wish to use along with the subnet mask, gateway address and DNS server address via the controller webinterface from version 4.0-1-04 [Ethernet setting].

Watchdog

Access from software version 4.1-1-00 is capable of supervising communication recieved from a BMS master. One slave communication protocol can be monitored at a time. If no active communication from the BMS master is detected before the watchdog timeout elapses, an alarm message is generated.

BMS watchdog (Activation of protocol)

Upon delivery, the BMS watchdog is disabled as default. Activation and configuration of BMS watchdog is done via controller web menu Configuration / System settings / Communication / BMS watchdog



BMS protocol

To enable BMS watchdog, change the setting “None” to the protocol used for BMS communication. Supported BMS slave protocols are EXOline, Modbus and BACnet.

Watchdog timeout

Configure the watchdog timeout setting between 10 to 3600 seconds (1 hour), default 60 seconds. A byte counter of received bytes is supposed to change since the last cycle. If counter has not been changed during the watchdog timeout setting the communication is considered faulty and an alarm message is generated.

Communication fault BMS master

When a communication fault with BMS is detected, values from BMS should be considered invalid. The alarm is configured default as Class C with no action.

Sensor value via BMS

Access from software version 4.6-1-00 is capable of… To be complemented!

Ethernet setting

When NaviPad and Control unit are connected directly to each other via switch module without any DHCP server they assign themselves with Auto-IP (Link-local) addresses and then randomly pick from address range 169.254.x.y (255.255.0.0).

The possibility of using a static IP address as alternative to a dynamic IP address (DHCP) is available from Access software version 4.0-1-04 and NaviPad software version 1.1.0.184. The system of an air handling unit together with a NaviPad require two individual IP addresses, requested from Your department responsible for the IP plan of the network!

For manually setting a static IP address, please follow below steps.

1. From NaviPad log in to the AHU web page
2. Select *Yes* to enable settings AHU to static IP via AHU web interface
3. Edit AHU control unit IP address, subnet mask, gateway and DNS according your IP plan
4. Select *Yes* for Save IP settings
5. Press home button on NaviPad to log out from AHU web page

   The NaviPad will then lose the connection to AHU since it's probably is assigned to a not valid IP address anymore
6. In NaviPad system select Advanced HMI setting and select Ethernet (default login password '1111')
7. Activate switch to enable Static IP setting
8. Edit NaviPad IP address, subnet mask and gateway according your IP plan
9. Use NaviPad to search for available devices and select AHU

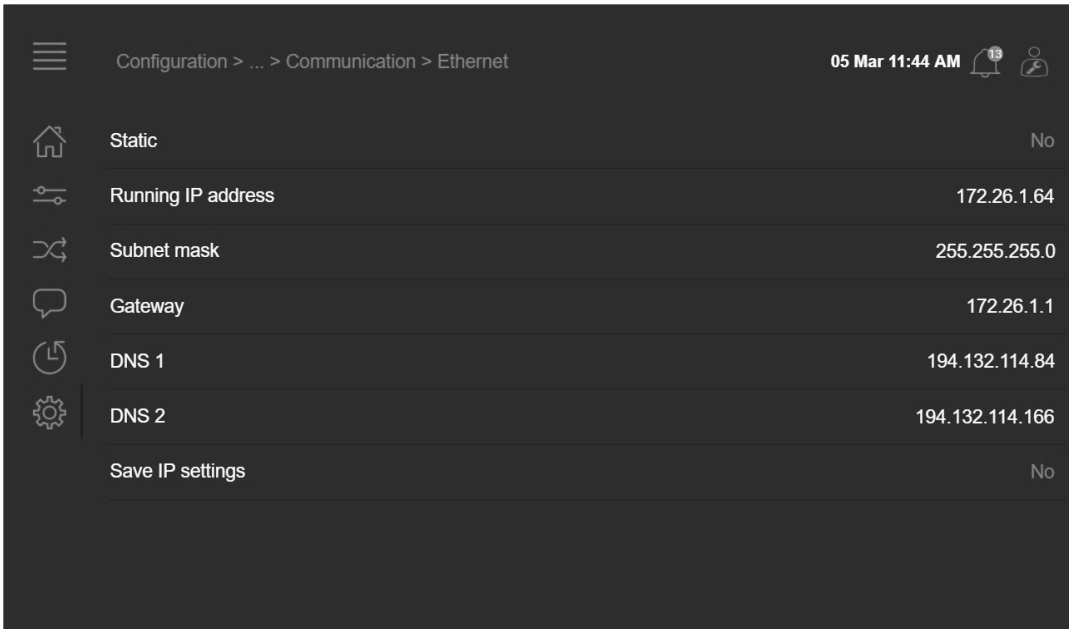
NOTE When integrating and configure static IP addresses its very **IMPORTANT** to follow above steps. Both the control unit of air handling unit and the NaviPad itself need to be assigned to individual IP addresses.

NOTE The air handling unit and the NaviPad as well as any computer has to be connected on a local network within the same IP subnet.

NOTE If no gateway is available use either 0.0.0.0 or equal to the IP address set for the device.

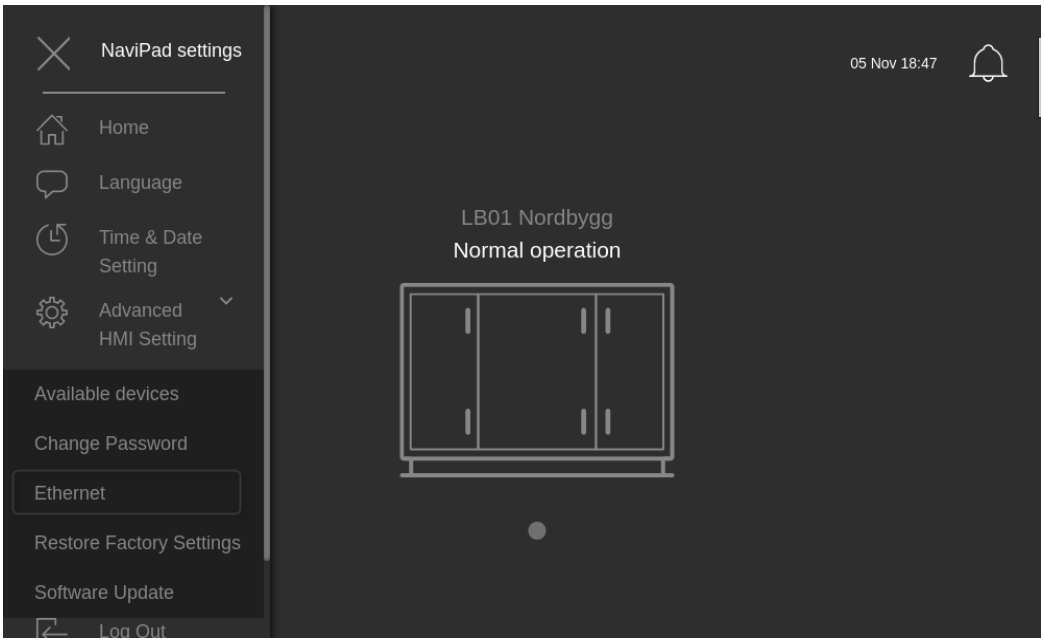
Access controller

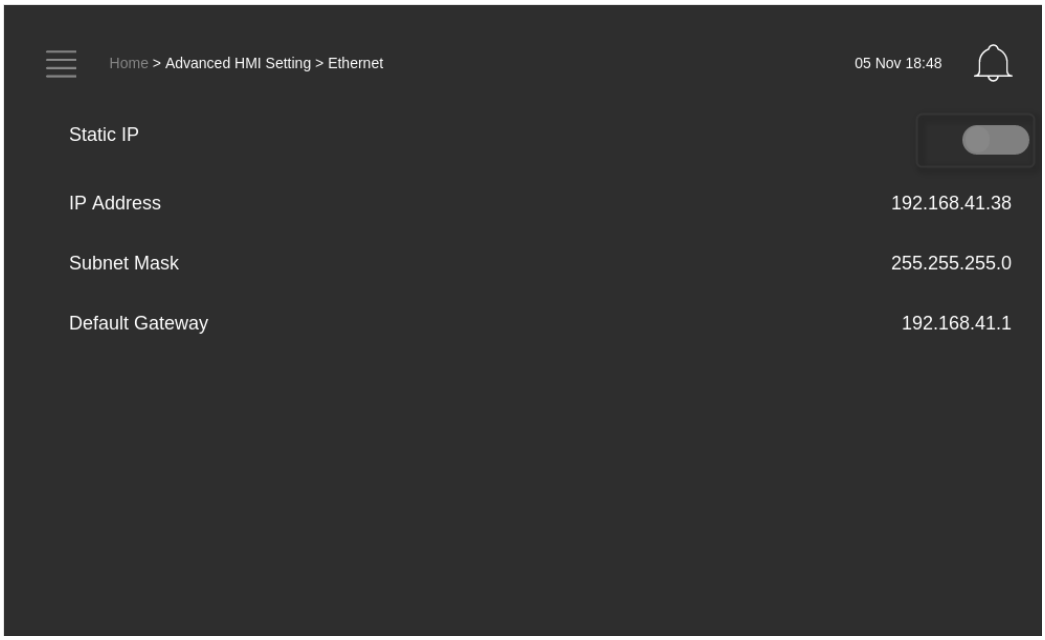
The below picture illustrates the appearance of Ethernet settings for controller in controller web menu from Access software version 4.0-1-04:

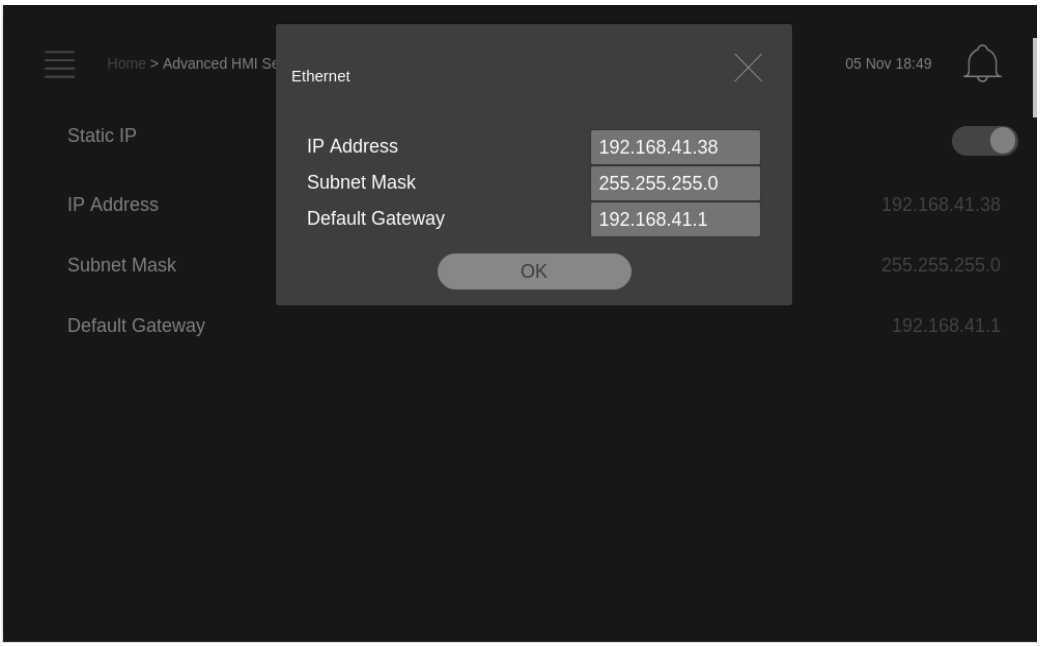


NaviPad

The below picture illustrates the appearance of Ethernet settings for the NaviPad from NaviPad software version 1.1.0.184:

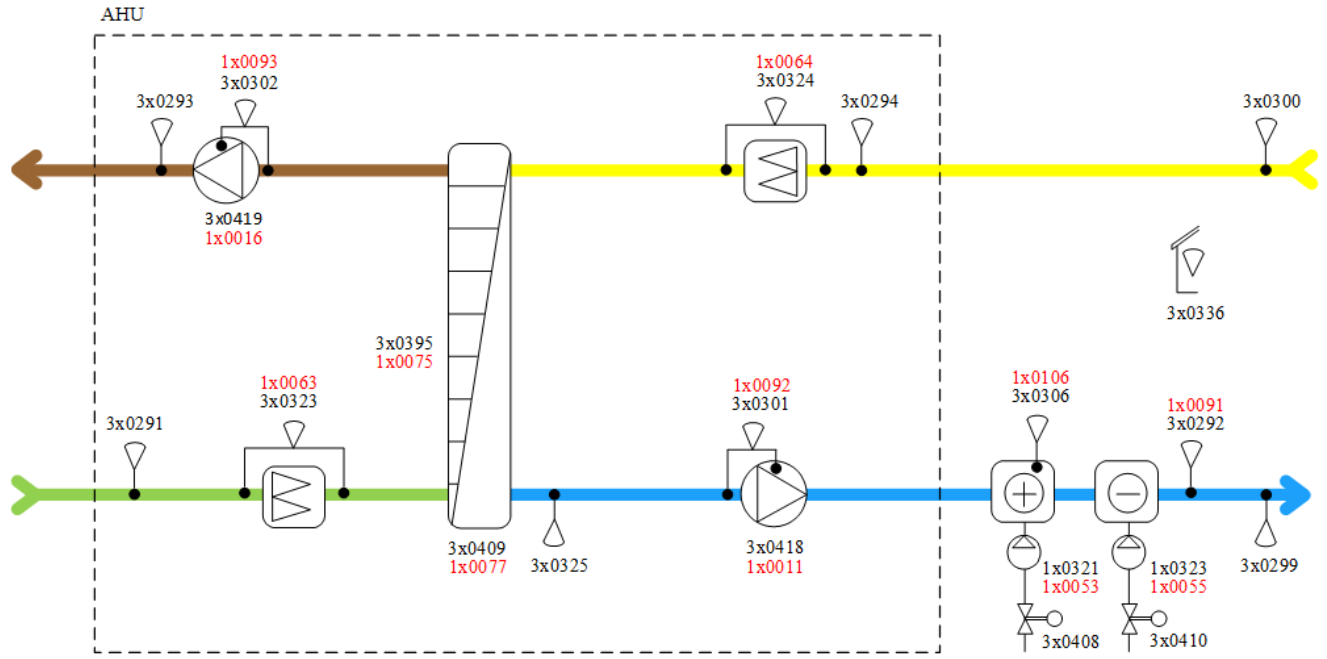



Home > Advanced HMI Setting > Ethernet
05 Nov 18:48
Static IP
IP Address
192.168.41.38
Subnet Mask
255.255.255.0
Default Gateway
192.168.41.1


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

Type example addresses

Example of useful register addresses in a flow chart for a AHU with rotary exchanger and a cooling unit.



Alarm points	
1x0011	Malfunction supply air fan
1x0016	Malfunction extract air fan
1x0053	Malfunction pump sequence-A
1x0055	Malfunction pump sequence-C
1x0063	Filter alarm supply air
1x0064	Filter alarm extract air
1x0075	Low efficiency exchanger
1x0077	Rotary exchanger alarm
1x0091	Deviation alarm supply air temperature
1x0092	Deviation alarm supply air fan
1x0093	Deviation alarm extract air fan
1x0106	Freeze protection alarm

Status/values	
1x0321	SEQ-A pump start
1x0323	SEQ-C pump start
3x0291	Actual value intake air temperature
3x0292	Actual value supply air temperature
3x0293	Actual value exhaust air temperature
3x0294	Actual value extract air temperature
3x0299	Actual value supply air pressure
3x0300	Actual value extract air pressure
3x0301	Actual value supply air flow
3x0302	Actual value extract air flow
3x0306	Actual value freeze protection temp
3x0323	Actual value supply air filter pressure
3x0324	Actual value extract air filter pressure
3x0325	Actual value efficiency temperature
3x0336	Calculated average room temperature
3x0395	Calculated temperature efficiency exchanger
3x0408	Control signal sequence-A
3x0409	Control signal sequence-B
3x0410	Control signal sequence-C
3x0418	Control signal supply air fan
3x0419	Control signal extract air fan

Commands/setpoints	
4x0573	External control
	0=None
	1=Extended run low
	2=Extended run normal
	3=Extended run high
	4=External stop
	5=External stop with support control
	6=Free cooling start
	7=Recirculation
Temperature setpoint according control type:	
4x0588	Setpoint supply air temperature
4x0589	Setpoint extract air temperature
4x0765	Setpoint room temperature

Tables of variables with register addresses

Tables with communication variables and register addresses are from this document version (A009) lifted out of the document and instead attached as a MS Excel file to this PDF.

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