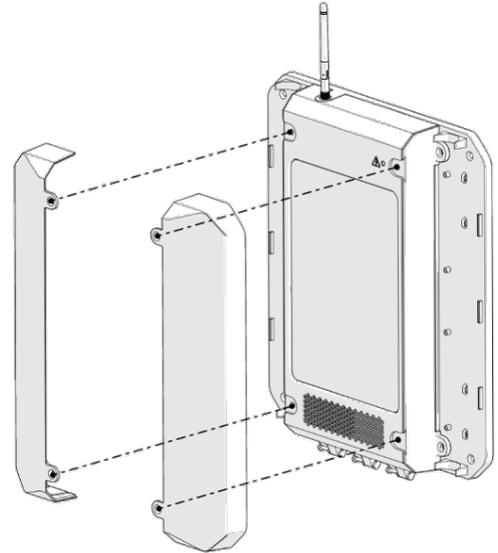


Acuity

Central Control System for Range Zero Products

Product Specification Sheet



Product Description

Acuity is Monodraught's central connectivity system that links seamlessly and securely with the HVR Zero systems. This class leading control system has been developed from the ground up and integrates Internet of Things (IoT) connectivity. Utilising automated continuous monitoring software, the control system remotely monitors and diagnoses potential issues before they occur.

Touchscreen Control

Building Management Systems (BMS) are intrinsically linked to the operation of building services. However, they are often considered overly complex for users. The Acuity with its 10" touch screen provides an elegant system that is easy to use.

Remote Monitoring

Acuity securely uploads operational data of all systems to the cloud via its 4G connection. The data is then autonomously analysed, allowing performance to be reviewed and any issues flagged, allowing Monodraught to pro-actively support and address any issues on site.

Email Notifications

Daily feedback is available to facility managers ensuring that any maintenance requirements or opportunities for energy saving is understood.

Features and Benefits

Management and control of HVR Zero units

At a glance readout of zone status & performance

ModBus and BACnet support

Interface and control of heating & cooling systems

Monitoring and control of up to 55 rooms*

External temperature sensor support

General Digital and Analog I/O for future functionality

Includes:

- 10.1" Touchscreen
- 1280x800 Resolution
- 4G Connectivity
- Data logging and monitoring via the Cloud

*BACnet module limitation allows up to 45 room connections only on a HVR-INV-AC-55 Acuity system

For more information on this product visit, contact:

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www.monodraught.com | info@monodraught.com | +44 (0)1494 897 700

Variable	Value		
Model reference	HVR-INV-AC-10	HVR-INV-AC-25	HVR-INV-AC-55
Number of rooms supported	10 rooms	25 rooms	55 rooms*
Dimensions (mm)	350 (w) x 400 (h) x 60 (d) (excluding antenna)		
Weight (Kg)	2.1		
Materials	ABS		
Touchscreen	10.1" LCD Touchscreen		
Mounting	Unit is designed to be wall mounted in a decentralised location within the building, close to the zones it is controlling, like storage cupboard or plant room		
Power consumption (W)	35 (Max)		
Electrical requirements	230V AC mains with 1A switched fused spur		
Connectivity	4G, MonoComms, Modbus RTU, BACnet/IP, Analog 0-10V I/O, Digital I/O		
Guarantee	5 years for electronics		

*BACnet module limitation allows up to 45 room connections only on a HVR-INV-AC-55 Acuity system

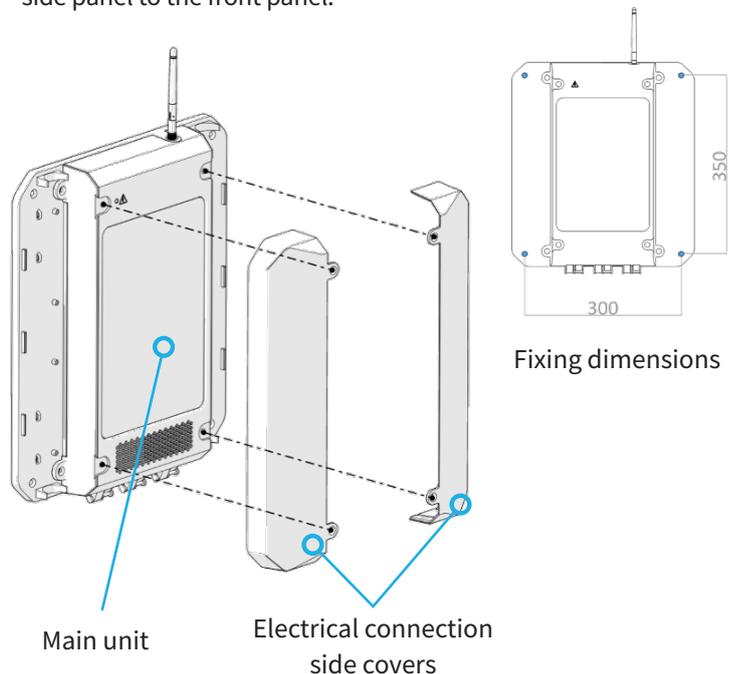
Dimensions



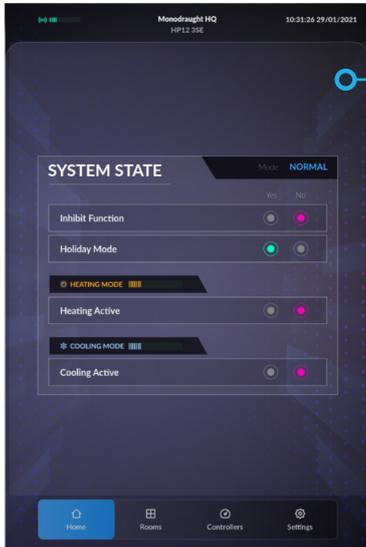
Fitting Instructions

The Acuity housing is to be fixed into position straight to the wall via four countersunk screws (M5 Metric or No10 Imperial) as detailed above. If using wall plugs, the screws need to be plug length + 15mm.

2x M5x10 countersunk hex socket screws are used to attach each side panel to the front panel.



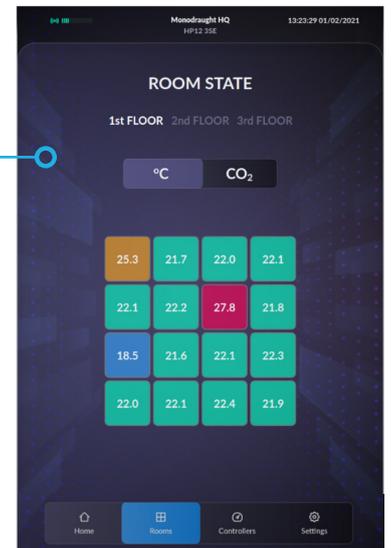
User Interface



Home View

The Home view displays the current system state and allows the user to easily choose between preset modes.

Holiday Mode: Building wide holiday mode disables systems when not needed for a long time.



Rooms View

The Rooms View displays the current temperature and CO₂ levels of all the rooms within each zone. The user can click on an individual room to display more detailed information about that room.

Up to 55* rooms can be connected into the controller and are accessible from this view. With up to 4 HVR units per room, a maximum of 220 HVR units can be linked using a single Acuity controller.

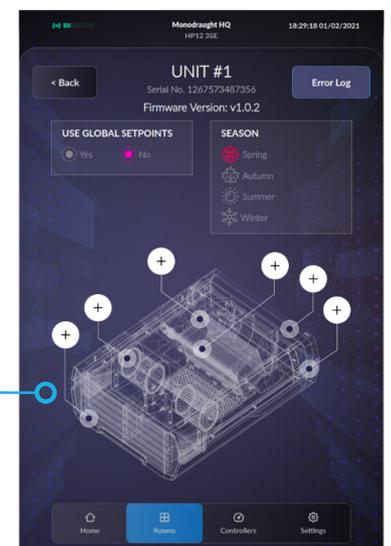


Room Details

The Room Details page gives full details on the room environment and monitoring of the HVR units present within that room.

The user can configure which setpoints profile the room should operate with, or customise the setpoints individually for the room.

The user can also select an individual HVR unit to be taken to its specific status page.



HVR Details

The HVR Details page gives full details of the status of the HVR unit.

*BACnet module limitation allows up to 45 room connections only on a HVR-INV-AC-55 Acuity system



Acuity

Located in plant room or store cupboard

ZONE 1

Mains



Modena
User
Interface



Parent HVR Zero APX

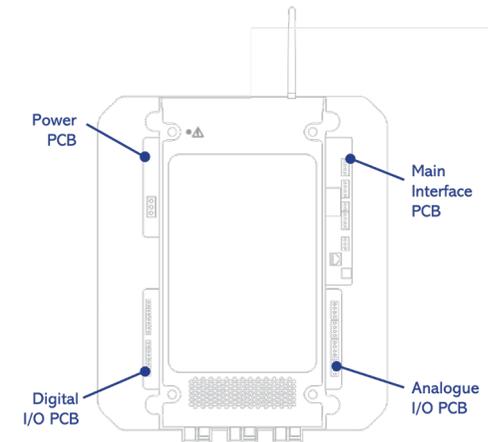


Child HVR Zero APX

(Up to 3 child systems can be linked.
Total of 4 systems per room)



POWER TO BE ISOLATED BEFORE
REMOVING LEFT HAND COVER



ZONE 2



Parent HVR Zero APX

ZONE 3



Parent HVR Zero APX

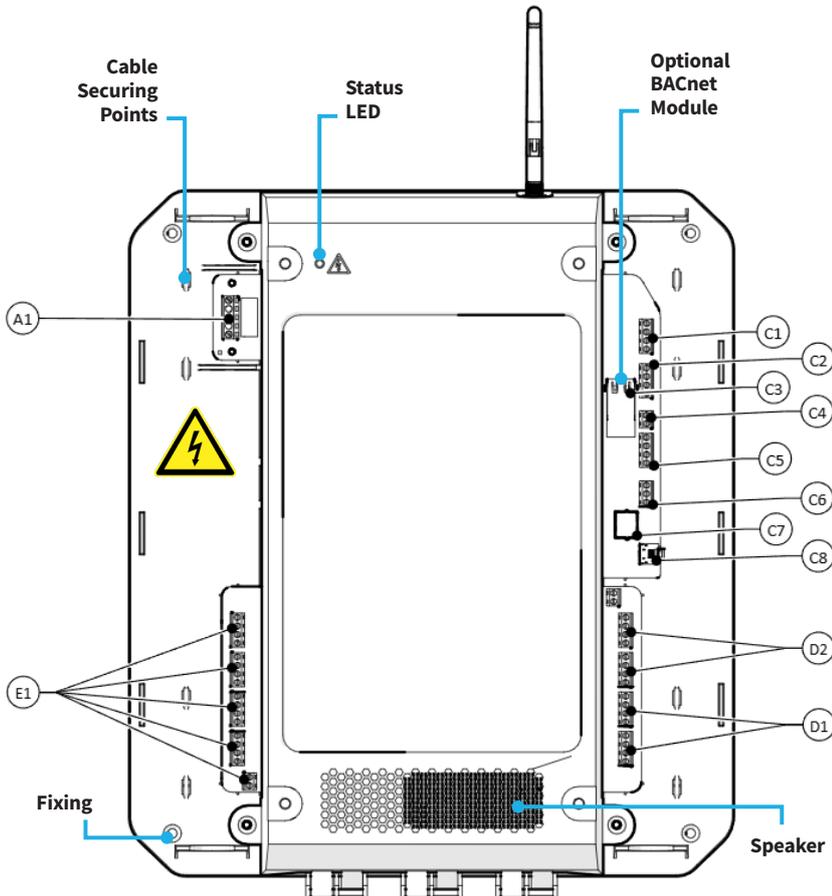
ZONE 4



Parent HVR Zero APX

Connections Overview

Connector	Description
A1	3-way Screw Terminal Mains power to unit - Must be secured with cable ties (or equivalent)
C1	4-way Screw Terminal Building-wide network to Monodraught units
C2	4-way Screw Terminal BMS monitoring port (Modbus)
C3	RJ45 Connector BMS monitoring port (BACnet)
C4	2-way Screw Terminal Fire alarm interlock to disable systems in case of fire (normally closed)
C5	4-way Screw Terminal Rain sensor connection
C6	3-way Screw Terminal External temperature sensor connection
C7	RJ45 Connector Ethernet Port (for use when 4G signal is not available)
C8	3.5mm TRS Socket UART port for debugging purposes
D1	4 2-Way Screw Terminal Volt-free Digital Inputs
D2	4 2-Way Screw Terminal Volt-free Digital Outputs
E1	8 2-Way Screw Terminal Analog Inputs and Outputs





POWER TO BE ISOLATED BEFORE REMOVING LEFT HAND COVER

Building Management System Connection - Optional MODBUS Module

Interconnection with Building Management Systems (BMS) is an important part of modern building services for heating and ventilation solutions. Acuity incorporates Modbus connectivity as standard. The information collated by Acuity can be passed across to BMS systems for inclusion within reporting requirements.

Input Registers

Entity #	Address #	Name	Units	Scaling Factor	Range	Description	Data Type
Date/Time							
30001	0	Year	Years		2020 - 9999	Year	16-bit Unsigned Integer
30002	1	Month	Months		1 - 12	Month	16-bit Unsigned Integer
30003	2	Day	Days		1 - 31	Day	16-bit Unsigned Integer
30004	3	Hour	Hours		0 - 23	Hour	16-bit Unsigned Integer
30005	4	Minute	Minutes		0 - 59	Minute	16-bit Unsigned Integer
Acuity Status							
30006	5	Status	N/A (See #)		See #	Overall Status of Acuity	16-bit Unsigned Integer
30008	7	External Temperature	°C	x10 (215 = 21.5°C)	-100 to +400 (-10 to +40°C)	External Temperature	16-bit Signed Integer
Room Status (x10)							
30011 + (N * 10)	10 + (N * 10)	Operating Mode	N/A (See @)		See @	Operating mode	16-bit Unsigned Integer
30012 + (N * 10)	11 + (N * 10)	Fault Code	N/A (See %)		See %	Code indicating any faults that are present	16-bit Unsigned Integer
30013 + (N * 10)	12 + (N * 10)	Room Temperature	°C	x10 (215 = 21.5°C)	-200 to +1000 (-20 to +100°C)	Temperature of the room	16-bit Signed Integer
30014 + (N * 10)	13 + (N * 10)	Room CO ₂	ppm		400 to 2000	CO ₂ level in the room	16-bit Unsigned Integer
30015 + (N * 10)	14 + (N * 10)	Supply Fan Speed	%		0 to 100	Supply fan speed in percent	16-bit Unsigned Integer

30016 + (N * 10)	15 + (N * 10)	Extract Fan Speed	%		0 to 100	Extract fan speed in percent	16-bit Unsigned Integer
30017 + (N * 10)	16 + (N * 10)	Intake Temperature	°C	x10 (215 = 21.5°C)	-200 to +1000 (-20 to +100°C)	Temperature of air brought in from outside	16-bit Signed Integer
30018 + (N * 10)	17 + (N * 10)	Recirc Temperature	°C	x10 (215 = 21.5°C)	-200 to +1000 (-20 to +100°C)	Temperature of air recirculated from the room	16-bit Signed Integer
30019 + (N * 10)	18 + (N * 10)	Supply Air Temperature	°C	x10 (215 = 21.5°C)	-200 to +1000 (-20 to +100°C)	Temperature of air supplied to the room	16-bit Signed Integer
30020 + (N * 10)	19 + (N * 10)	Heating Coil Temperature	°C	x10 (215 = 21.5°C)	-200 to +1000 (-20 to +100°C)	Temperature of the hot water supply pipe to the heating coil (If fitted)	16-bit Signed Integer
30561 + (N * 10)	560 + (N * 10)	Room Fault Code (MSB)	N/A		See %	High 16-bits of 32-bit fault code	16-bit Unsigned Integer
30562 + (N * 10)	561 + (N * 10)	Room Fault Code (LSB)	N/A		See %	Low 16-bits of 32-bit fault code	16-bit Unsigned Integer

Please Note:

- Where N is the BMS Room Index, as set on Acuity (From 1 to Number of Rooms), so the first Room (N=1) would report to input register addresses 20 to 29 (30021-30030), the 2nd room (N=2) would report to input register addresses 30 to 39 (30031-30040) etc.
- The number of rooms is dependent upon the Model of acuity (i.e. HVR-INV-AC-10 = 10 Rooms, HVR-INV-AC-25 = 25 Rooms, and HVR-INV-AC-55 = 55 Rooms)
- If a temperature reading is outside the range specified, then it is invalid.

Coils

Entity #	Address #	Name	Description
Acuity Coils			
00001	0	Global Enable	Setting this to 0 puts all Rooms into "Off" mode
Room Coils			
00011 + (N * 10)	10 + (N * 10)	Call for Heating	Setting this to 1 enables an override mode (BMS Heating) on the systems that support it. Setting it to 0 disables the override mode.
00012 + (N * 10)	11 + (N * 10)	Call for Max Heating	Setting this to 1 enables an override mode (BMS Max Heating) on the systems that support it. Setting it to 0 disables the override mode.

Please Note:

- Where N is the BMS Room Index, as set on Acuity (From 1 to Number of Rooms), so the first Room (N=1) would report to coils 20 and 21 (00021, 00022), the 2nd room (N=2) would report to coils 30 and 31 (00031, 00032) etc.
- The number of rooms is dependent upon the Model of acuity (i.e. HVR-INV-AC-10 = 10 Rooms, HVR-INV-AC-25 = 25 Rooms, and HVR-INV-AC-55 = 55 Rooms)

Discrete Inputs

Entity #	Address #	Name	Description
10001	0	Fire Interlock	State of Fire Interlock Input
10002	1	Rain Sensor	State of Rain Sensor Input
10003	2	Heating Needed	True if at least one of the systems is in a “Heating” mode
10004	3	Cooling Needed	True if at least one of the systems is in a “Cooling” mode

Holding Registers

Entity #	Address #	Name	Units	Scaling Factor	Valid Range	Description	Data Type
Room Configuration							
40017 + (N * 10)	16 + (N * 10)	Temperature Setpoint	°C	x10 (215 = 21.5°C)	150 - 300 (15°C to 30°C)	Target Temperature for the room	16-bit Signed Integer
40019 + (N * 10)	18 + (N * 10)	Day Start	decimal "hhmm"		0000 to 2359	Normal Daytime operation start	16-bit Unsigned Integer
40020 + (N * 10)	19 + (N * 10)	Day End	decimal "hhmm"		0000 to 2359	Normal Daytime operation end	16-bit Unsigned Integer

Please Note:

- Where N is the BMS Room Index, as set on Acuity (From 1 to Number of Rooms), so the first Room (N=1) would report to holding register addresses 26, 28 and 29 (40027, 40029, 40030), the 2nd room (N=2) would report to holding register addresses 36, 38 and 39 (40037, 40039, 40040) etc.

- The number of rooms is dependent upon the Model of acuity (i.e. HVR-INV-AC-10 = 10 Rooms, HVR-INV-AC-25 = 25 Rooms, and HVR-INV-AC-55 = 55 Rooms)

(#) Acuity Status Value Description

Number	Mode
0	Unknown
1	Off
2	Normal
3	Fire Interlock

(@) Room Operating Mode Value Description

Number	HVR Zero Mode	Windcatcher Zero Mode	APX Mode
0	Off	Off	Off
1	Mix	UNUSED	Mix
2	Boost	Boost	Boost
3	Natural Ventilation	Natural Ventilation	Natural Ventilation
4	Manual Fan Speed	Manual Fan Speed	Manual Fan Speed
5	Reserved	Reserved	Reserved
6	Night Cooling	Night Cooling	Night Cooling
7	Science	UNUSED	Science
8	Heating	UNUSED	Heating
9	Heating + Ventilation	UNUSED	Heating + Ventilation
10	Acoustic Test	Acoustic Test	Acoustic Test
11	Self-Test	Self-Test	Self-Test
12	Pre-heat	UNUSED	Pre-heat
13	Heat-Pump Cooling	UNUSED	Cooling
14	Purge	Purge	Purge
15	Inhibit	Inhibit	Inhibit
16	Reserved	Reserved	Reserved
17	Holiday	Holiday	Holiday
18	UNUSED	Heat Recovery	UNUSED
19	UNUSED	Cool Recovery	UNUSED
20	Fire	Fire	Fire
21	UNUSED	Idle	UNUSED
22	Heating Test	UNUSED	Heating Test
23	Frost Protect	Competition Switch Open	Frost Protect
24	Maintenance	Competition Switch Close	Maintenance
25	Reserved	Acuity Inhibit	Acuity Inhibit
26	Acuity Inhibit	UNUSED	UNUSED
27	Setback Mode	UNUSED	Free Cooling
28	BMS Heating	UNUSED	Min Temp Check
29	BMS Max Heating	UNUSED	Reserved
30	Cooling Test	UNUSED	Setback Mode

31	Valve Test	UNUSED	Air Test
32	UNUSED	UNUSED	Cooling Test
33	UNUSED	UNUSED	Valve Test

(%) Room Fault Code Value Description

The fault code is a numeric value that indicates any fault present on the system. Each fault has a unique code allocated to it (2(n-1) where n is the fault number) which are added together to form the fault code. So if there was a fault with the RTC, External Damper and Supply Fan, the fault code would be 1029 (1 + 4 + 1024). The actual fault code meaning will depend upon whether the room contains HVR Zero or Windcatcher Zero units.

Fault Number	Hex Code	Decimal Code	HVR Zero Fault	Windcatcher Zero Fault	APX Fault
1	0x00000001	1	RTC	RTC	RTC
2	0x00000002	2	FLASH	FLASH	FLASH
3	0x00000004	4	External Damper	UNUSED	External Damper
4	0x00000008	8	Exhaust Damper	UNUSED	Bypass Damper
5	0x00000010	16	Air Mixing Damper	UNUSED	Recirculation Damper
6	0x00000020	32	Grille Actuator	UNUSED	Grille Actuator
7	0x00000040	64	Intake Temperature Sensor	Intake Temperature Sensor	External Temperature Sensor
8	0x00000080	128	Recirculation Temperature Sensor	Extract Temperature Sensor	Extract Temperature Sensor
9	0x00000100	256	Supply Air Temperature Sensor	Supply Temperature Sensor	Recirc. Temperature Sensor
10	0x00000200	512	Heating Coil Temperature Sensor	Exhaust Temperature Sensor	Coil Temperature Sensor
11	0x00000400	1024	Supply Fan	Supply Fan	Supply Fan
12	0x00000800	2048	Extract Fan	Extract Fan	Extract Fan
13	0x00001000	4096	User Interface	User Interface	User Interface
14	0x00002000	8192	Heating	Heating	Heating
15	0x00004000	16384	Cooling	Cooling	Cooling
16	0x00008000	32768	Parent/Child Communications	Parent/Child Communications	Parent/Child Communications
The faults below can only be read from the 32-bit Room Fault code					
17	0x00010000	65536	Condensate Fault	Nat Vent Temp Sensor 1	Supply Airflow Sensor
18	0x00020000	131072	UNUSED	Nat Vent Temp Sensor 2	Extract Airflow Sensor
19	0x00040000	262144	UNUSED	Supply Damper	Internal CO2 Sensor
20	0x00080000	524288	UNUSED	Extract Damper	Four-in-one Sensor
21	0x00100000	1048576	UNUSED	Nat Vent Damper	I2C Fault
22	0x00200000	2097152	UNUSED	Active Louvre	Coil 2 Temperature Sensor
23	0x00400000	4194304	UNUSED	UNUSED	Heat Exchanger Temperature Sensor
24	0x00800000	8388608	UNUSED	UNUSED	Intake Temperature Sensor

25	0x01000000	16777216	UNUSED	UNUSED	Condensate Fault
26	0x02000000	33554432	UNUSED	UNUSED	UNUSED
27	0x04000000	67108864	UNUSED	UNUSED	UNUSED
28	0x08000000	134217728	UNUSED	UNUSED	UNUSED
29	0x10000000	268435456	UNUSED	UNUSED	UNUSED
30	0x20000000	536870912	UNUSED	UNUSED	UNUSED
31	0x40000000	1073741824	UNUSED	UNUSED	UNUSED
32	0x80000000	2147483648	UNUSED	UNUSED	UNUSED



Monodraught

We are pioneers in the design and manufacture of advanced sustainable ventilation, cooling, heating and lighting solutions for new and refurbished commercial and public buildings. We deliver outstanding temperature-control and indoor air quality whilst minimising the consumption of both electricity and refrigerants so as to reduce our carbon footprint. Monodraught have over 50 years' experience and our products have saved the equivalent of nearly 540,000 tonnes CO₂ over the last two decades.

ACCPC/11.2025

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