TECHNICAL MANUAL

AERO

From monitoring performance, status and effectiveness of a single air compressor through to an entire local eco-system of air compressors, AIRMATICS™ provides up-to-the-minute intelligence that enables businesses to reduce power consumption, save energy costs and improve sustainability performance.

The future of compressed air monitoring, performance and control.

EMPOWERING THE COMPRESSED AIR USER.

AIRMATICS

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2.Revision and Chapter Overview

Version	Date	Description	Author(s)	
V1.0	23 FEB 20	Initial	TVE	
V1.1	1 MAY 29	Corrections	TVE	
V1.2	24 APR 20	Merge	GC	
V2.0	30 AUG 21	Enhanced AirMatics configuration and system explanations	TVE	

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10   Introduction to Configuring AERO   AERO architecture for understanding configuration process
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17   Functionalities on Local AERO Screen   Brief explanation of the functionalities provided on the local AERO screen
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3.Safety Precautions

ALWAYS EMPLOY SAFE WORKING PRACTICE AND
PROCEDURES

When installing, commissioning, operating or carrying
out service or maintenance on a product, personnel
must use safe working practise and observe all
relevant local health and safety requirements and
regulations.

Electricity and compressed air have the potential to
cause severe personal injury or property damage.

Operators of equipment should use common sense
and good working practices while operating and
maintaining this product and the associated system.

Installation & Maintenance must be performed by
adequately qualified personnel that are equipped with
the appropriate tools and personal protective
equipment (PPE).

It is not possible to anticipate every circumstance that
might represent a potential hazard. If the reader
employs an operating procedure, an item of
equipment or a method of working which is not
specifically recommended the reader must ensure
the product will not be damaged or made unsafe and
that there is no risk to persons or property.
Failure to observe safety precautions or implement
safe working practises may be considered dangerous
practice or misuse of the product.

4.Installation

Installation work must only be carried out by a
competent person under qualified supervision.

A fused isolation switch must be fitted between the
main power supply and the product.

The product should be mounted in such a location as
to allow operational and maintenance access without
obstruction or hazard and to allow clear visibility of
indicators at all times.

If raised platforms are required to provide access to
the product they must not interfere with normal
operation or obstruct access. Platforms and stairs
should be of grid or plate construction with safety
rails on all open sides.

5.Operation

The product must only be operated by competent
personnel under qualified supervision.

Never remove or tamper with safety devices, guards
or insulation materials fitted to the unit.

The product must only be operated at the supply
voltage and frequency for which it is designed.

When mains power is switched on, lethal voltages are
present in the electrical circuits and extreme caution
must be exercised whenever it is necessary to carry
out any work on the unit.

Do not open access panels or touch electrical
components while voltage is applied unless it is
necessary for measurements, tests or adjustments.
This work must only be carried out by a qualified
personnel equipped with the correct tools and
appropriate protection against electrical hazards.

All air compressors and/or other machine equipment
connected too, and controlled by, the product should
have a warning sign attached stating 'THIS UNIT MAY
START WITHOUT WARNING' next to the
display panel.

If an air compressor and/or other device connected
too, and controlled by, the product is to be started
remotely, attach warning signs to the device stating
'THIS UNIT CAN BE STARTED REMOTELY' in
a prominent location, one on the outside of the
machine, the other inside the machine control
compartment.

6.Service, Maintenance and Repair

Service, maintenance, repairs or modifications must
only be carried out by qualified personnel.

If replacement parts are required use only genuine
parts from the original equipment manufacturer, or
an alternative approved source.

Carry out the following operations before opening or
removing any access panels or carrying out any work
on the product:

- · Isolate from the main electrical power
  supply. Lock the isolator in the 'OFF'
  position and remove the fuses.

- Attach a label to the isolator switch and to the product stating 'WORK IN PROGRESS - DO NOT APPLY VOLTAGE'. Do not switch on electrical power or attempt to start the unit if such a warning label is attached.

Ensure that all instructions concerning operation and maintenance are strictly followed and that the complete product, with all accessories and safety devices, is kept in good working order.

The accuracy of sensor devices must be checked on a regular basis. They must be renewed when acceptable tolerances are exceeded. Always ensure any pressure within a compressed air system is safely vented to atmosphere before attempting to remove or install a sensor device.

The product must only be cleaned with a damp cloth, using mild detergents if necessary. Avoid the use of any substances containing corrosive acids or alkalis.

Do not paint the control facial or obscure any indications, controls, instructions or warnings.

7. About this Publication

The AIRMATICS™ product discussed in this publication forms part of an 'AIRMATICS™ System' which in turn, forms part a wider 'Compressed Air System'. These Systems will vary and thus It is not possible to anticipate every circumstance that can exist.

This publication makes reference to other AIRMATICS™ Products, AIRMATICS™ Services and other items of equipment associated with a Compressed Air System (e.g. Air compressor assets). These products, services and items may be necessary to install, operate, service, maintain and repair the product.

This publication has been arranged in synchronous order. It may be necessary to carry out installation of other AIRMATICS™ products before, during or after completing installation of the Product discussed herein.

8. Concepts, terminology

8.1 About AIRMATICS™

AIRMATICS™ is a simple cloud-based air compressor monitoring, performance and control solution that provides real time data, analytics and insights at the push of a button.

AERO is the brain behind AIRMATICS™, which is locally installed and can be connected via the cloud. Capable of managing a large number of interconnected fixed speed, variable speed or variable output air compressors, AERO responds to real time feedback and adjusts settings and performance levels automatically – 24 hours a day, 365 days a year.

AERO provides operators with 3 distinct and password protected ways to access the Product and System. Locally, the AERO Product features a 12.1" integrated colour touch display with 'display / power saving' provided via its door mounted proximity sensor.

Remote LAN connectivity is provided via a dedicated RJ45 Industrial connector that's connected to the local LAN.   Operators with LAN access may remotely sign in to AERO using a suitable device and browser

Remote INTERNET (Cloud) connectivity is provided via a second dedicated RJ45 Industrial connector that's connected to the Airmatics™ network gateway. In turn, the network gateway establishes a connection with the internet and Cloud, passing data to the AIRMATICS™ Aircloud server. Operators with internet access may sign in to the Aircloud server using a suitable device and browser.

Certain features and functions of the AERO product can only be accessed locally. This is intended to establish 'a physical barrier' between inaccessible features or functions used by AERO to 'Control' the compressed air system and accessible features or functions used by AERO that merely 'Monitor' the performance and health of the compressed air system.

8.2 Legacy – Compatibility

For over 30 years, CMC has been designing and manufacturing compressed air control, performance and monitoring solutions and is internationally recognised as an architect of world-class application software. With thousands of product in use worldwide, legacy compatibility is important.

AERO is legacy compatible with any AIRMASTER™ product that features AIRBUS 485™ communications.

AERO is also legacy compatible with any METACENTRE™ air compressor interface product that features AIRBUS 485™ communications.

Contact Support to enquire about specific legacy compatibility matters.

8.3 Assets

The term 'Assets' is used to describe air compressors controlled by AERO.

8.4 Compressed Air System

The term 'compressed air system' is used to describe the compressed air pipework, compressed air tank(s) sometimes referred to as a compressed air receiver(s) or reservoir(s) and compressed air filtration located prior to the compressed air pipework distribution network.

The terms 'supply side' and 'demand side' is used to distinguish between the 'compressed air system' and the 'pipework distribution network'.

A larger compressed air system can have multiple 'supply side' locations, however the pipework distribution network must be common.

AIRMATICS™ targets the compressed air system and is not intended for use as a Demand Side monitoring product.
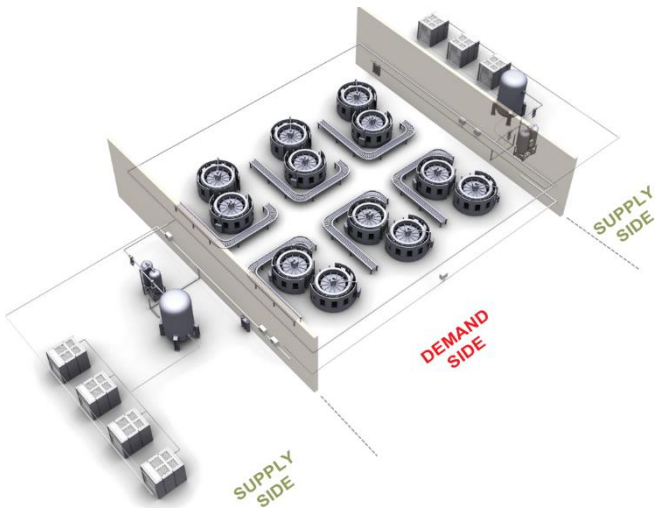
Figure 1 - Supply Side vs Demand Side

8.5   Local Area Network (LAN)

A local area network (LAN) is a computer network that interconnects devices (e.g. a PC) within Aircloud is a dedicated environment that consists of a Device Management and Data Transportation Layer, a durable, secure and scale-able Data Storage and Management Layer and an Operator interface Layer accessible using a suitable platform and browser.

AERO can be connected to a LAN. Operators with LAN access may remotely sign in to AERO using a suitable platform and browser.
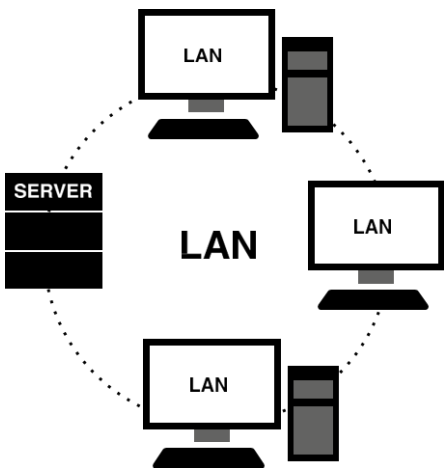
Figure 2 - LAN

8.6   Wide Area Network (WAN)

A wide area network (WAN) covers a larger geographic distance.

AERO can be connected to a dedicated WAN using an AIRMATICS™ network gateway. The AIRMATICS™ network gateway establishes
a dedicated connection with the internet and Cloud, passing data to the AIRMATICS™ AirCloud server. Operators with internet access may sign in to the AirCloud server using a suitable platform and browser.
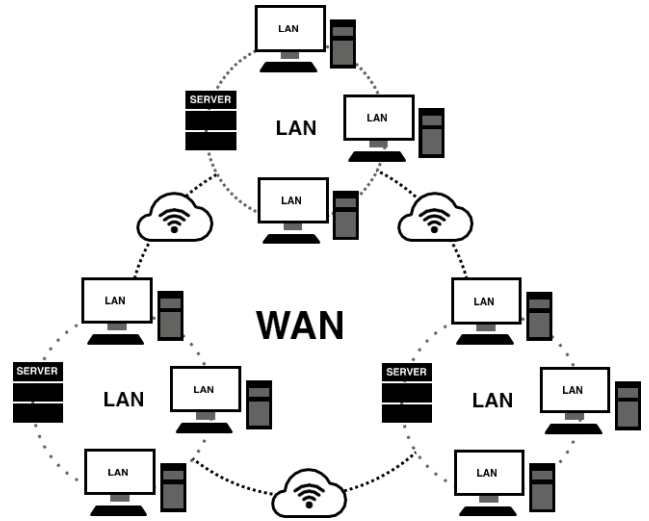
Figure 3 - WAN

8.7   AirCloud

AirCloud is a dedicated environment that consists of a Device Management and Data Transportation Layer, a durable, secure and scale-able Data Storage and Management Layer and an Operator interface Layer accessible using a suitable platform and browser.

The term 'AirCloud' is used to describe the Operator interface Layer. Other layers relate to 'background services' that support Operator Interface Layer and are not discussed in this publication.

Figure 4 - Screenshot of AirCloud user interface

9. Installing AERO

9.1   What is in the box

The AERO is shipped in a self contained enclosure. Inside the enclosure a zip-lock bag containing 13 x 13.5mm (0.53 inch) cable entry glands and locknut, 3 x Industrial 10G plug assemblies and 1 x enclosure door key.

For transport and safe keeping, the zip-lock bag has been secured internally. When required to do so, remove the zip-lock bag from the enclosure, taking care not to damage any cables.

Figure 5 - Package of AERO

9.2   Enclosure

The AERO enclosure is a Totally insulated Poly-carbonate enclosure with front access door, Polyurethane door gasket and 2-point locking system finished in RAL7035 (light grey)

·   Length: 500 mm (19.7 inch)
·   Height: 220 mm (8.66 inch)
·   Depth: 400 mm without glands (15.7 inch)
·   Weight: 15.6 kg (34.4lb)

A larger enclosure diagram is annexed at the rear of this publication.
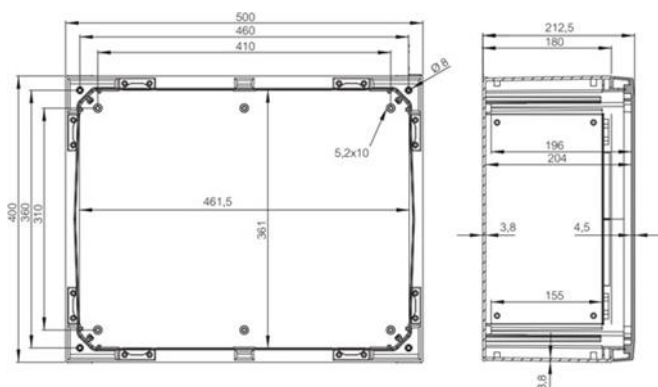
Figure 6 - AERO dimensions

9.3   Exterior

The AERO operator interface features a 12.1" Integrated colour touch display, a proximity sensor used for display power saving and a 2-point locking system

Cable entry points can be found at the bottom of the enclosure.

Figure 7 - AERO enclosure, exterior

9.4   Interior

AERO components are arranged along its backplate or door mounted.

9.4.1 Interior back-plate

AERO's back-plate contains the AERO's 'UNITAG', 'Di8R4', 'T1' and 'TERMINAL BLOCK RAIL' conveniently arranged alongside AERO's cable entry points.

These component terms are used throughout this publication.
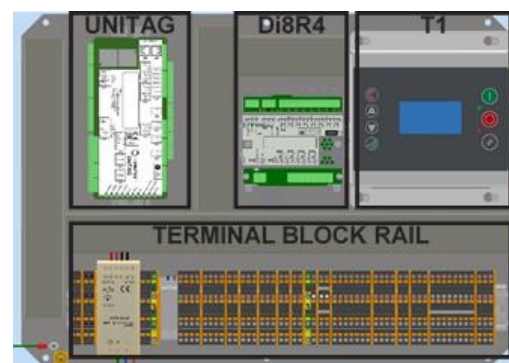
Figure 8 - Components located on the back-plate

9.4.2 Interior door

AERO's hinged door carries a diagnostic LED panel and an information label describing electrical terminal

connections, LED diagnostic information and other useful information.

Components that support the 12.1" colour touch display, proximity sensor as well as the LED diagnostics are concealed behind the door cover.

Figure 9 - AERO front - interior door

9.4.3 Identification Labels

AERO features a number of important hardware and software parts. The following table is provided to annotate your AERO's identification. Labels are located on the interior or exterior of your AERO and may be necessary when seeking support.

AERO ID LABEL   PN:
                       SN:
                       DOM:
UNITAG ID LABEL   PN:
                       SN:
                       SW:
                       DOM:
T1 ID LABEL   PN:
                       SN:
                       SW:
                       DOM:
Di8R4 ID LABEL   PN:
                       SN:
                       SW:
                       DOM:

PN: Part number
SN: Serial number
SW: Software version
DOM: Date of manufacture

9.1   Location

Before locating the AERO, consider the following:

- ·   AERO product and it's enclosure specification
- ·   The suitability of the environment where the AERO is to be location (dust, dirt or other airborne containments)
- ·   AERO's ambient temperature rating range of 0°C to + 40°C (32 °F to 104 °F)
- ·   Do not locate AERO in direct sunlight!
- ·   The provision of supply power to AERO
- ·   The provision of signal and data cables to and from AERO
- ·   AERO can be located remote from assets
- ·   AERO must be located within 100 metres (328ft) 'signal wire cable length' of any control pressure sensor that's connected directly to AERO's TERMINAL BLOCK RAIL.

AERO is wall mounted using conventional wall plugs and screw fixings (not supplied).

4 x 0.8 Ø (0.3 inch) diameter holes exist within a cavity at each corner of the enclosure. The cavities are revealed with the enclosure door open!

Mount the AERO taking care to support the products weight and shape with the enclosure door open!
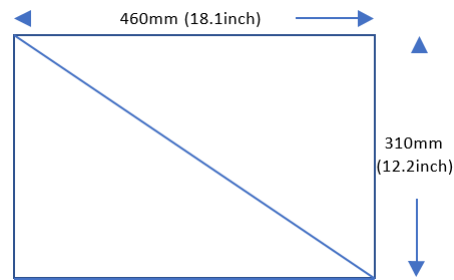

Figure 10 - Size occupied by AERO enclosure on wall

9.2   Cable Management

Use the provided cable entry holes, glands and lock-nuts to route external cable towards AERO's terminal block rail.

Use the provided industrial 10G plug assemblies to route data cables to and from AERO!

High voltage power cables and high voltage switching devices are surrounded by electromagnetic fields and radiated interference. Radiated interference obeys an inverse square law; if the distance from an interference source is
doubled the interference level will reduce by a factor of four. Locate electronic control devices as far away as possible from strong sources of electromagnetic interference.
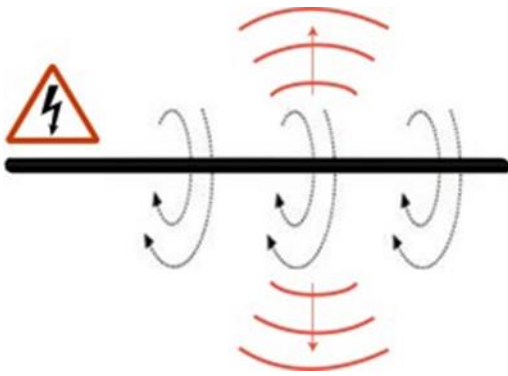
Figure 11 - Radiation emitted by cables

Electromagnetic interference from high voltage cables, switchgear and high frequency switching components, in particular variable speed/frequency drives (VSD / VFD), can disrupt the operation of electronic equipment. Care should be taken when locating electronic control devices and routing signal, data and low voltage control cabling.

Never route signal, data or control cables together with high voltage power cables. Never route signal or data cables together with control cables.
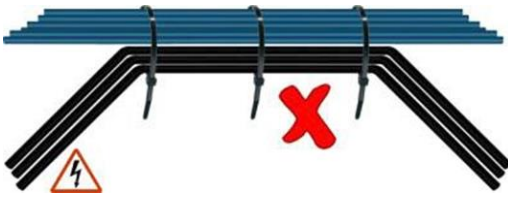
Figure 12 - How not to place cables

Never route an electronic device ground (earth) cable with high voltage power cables. Always ensure the electronic device ground (earth) cable is connected directly to the package main ground (earth) point and not looped from a ground (earth) terminal of another component.

Figure 13 - How not to place cables part 2

If it is necessary for a signal, data or control cable(s) to cross the path of a high voltage power cable(s), always cross at a right angle.
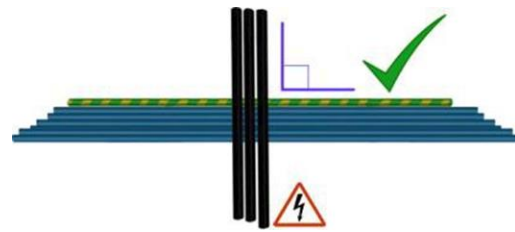
Figure 14 - A better way

9.3   Cable Preparation

All connections with AERO's Terminal Block Rail must be done using ferrules appropriately sized for the cable and crimped using a crimping tool.

See also 18 Connection with typical sensors for an overview of the connection of sensors, power and communication on the Terminal Block Rail

Figure 15 - Cable tooling

9.4   Supply Power

A source of supply power (100 - 240vAC, 50 / 60Hz) is required.

A fused switching isolator must be installed to the main incoming power supply, external to the AERO. The isolator must be fitted with a fuse of the correct rating to provide adequate protection to the power supply cable used (in accordance with local electrical and safety regulations).

AERO is internally fused. Fuses are located in fuse holders along the terminal block rail.

Fuses rating: 3.15A, 250V AC 'slow blow'
Fuse dimensions: 5mm (0.2inch) x 20mm (0.8inch)

Connect the source of supply power to the TERMINAL BLOCK RAIL.
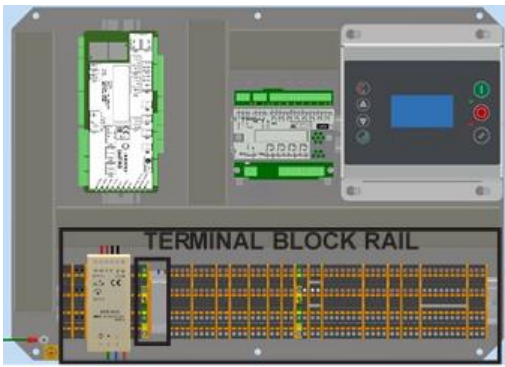
Figure 16 - power supply connection location

9.5 Data Communication

9.5.1 Serial RS485 'AirBUS'

The AERO is equipped with AIRBUS serial communications port using the RS485 standard.

Assets (e.g. Air compressor controllers) and legacy Metacentre equipment (e.g. compressor interface products such as the Airbus485 compressor connector) that support AIRBUS serial communications can be connected to AERO using this communications method.

Note:

- Polarity is important!
- Only use earth shielded 'twisted pair' cable to improve electromagnetic compatibility.
- Always securely bond to a good Earth at one end
- Refer to the asset manufacturers Operating manual for support relating to the configuration of Asset controllers
- Refer to the respective products Technical Manual for support relating to the configuration of legacy Metacentre products

9.5.2 LAN

The AERO is equipped with 3 dedicated LAN connections which in turn support 2 dedicated communication networks:

- PRIVATE LAN (IN and OUT)
- LOCAL LAN

Observe that assignment of the 3 industrial 10G LAN plugs is shown on the door information label. Additionally, cable markers mounted on internal cables assist with identification. To avoid any confusion, do not change the assignment of the industrial 10G plugs!
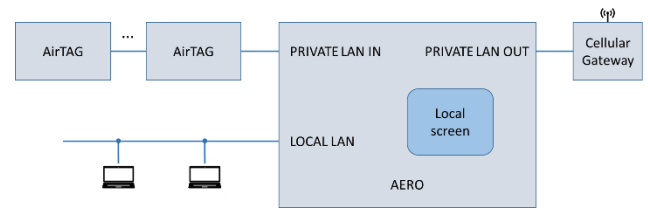
Figure 17 - LAN connections on the AERO

9.5.2.1 Private LAN In

Airmatics equipment (e.g. compressor interface products such as AirTAG and SmartTAG) can be connected to AERO using the PRIVATE LAN IN connection.

Refer to the respective products Technical Manual for support relating to the configuration of other Airmatics equipment.

9.5.2.2 Private LAN Out

Airmatics Cellular Gateways can be connected to AERO using the PRIVATE LAN OUT connection.

9.5.2.3 Local LAN

Use this connection to connect the AERO to the customer's LAN.

9.6 Signal Wire

A variety of signal wire connections can be made to AERO's TERMINAL BLOCK RAIL...

ANALOGUE DEVICES
(E.G. 'CONTROL' PRESSURE SENSOR(S))
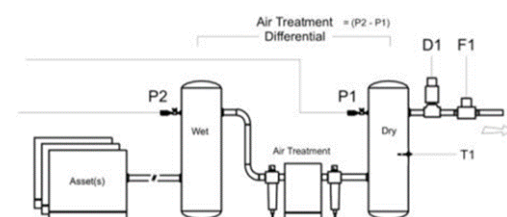
Figure 18 - Location of major analogue sensors

ID	Function	Signal type
P1	'Control' System pressure 1	4-20mA
P2	'Differential' System pressure 2	4-20mA

F1	System flow	4-20mA
D1	System dewpoint	4-20mA
T1	System temperature	PT1000
T2	Ambient temperature	PT1000

Other signal types are NOT SUPPORTED!

A 'Control' System pressure sensor must be connected to AERO. Differential System Pressure 2 is also recommended.

The 'Control' System pressure sensor range must be appropriate for the compressed air system that AERO will monitor (e.g. 0 - 16 bar / 0 - 232psi is most common).

Connect pressure sensors to AERO'S TERMINAL BLOCK RAIL. Check signal wire polarity!

Other analogue devices are optional (e.g. FLOW). Connect devices to AERO'S TERMINAL BLOCK RAIL as necessary. Again, check signal wire polarity!

9.6.1 Control Pressure Sensor Location

The 'Control' System pressure sensor (P) must be located in a position that will continuously experience pressure that is common to all assets.

Supply Side Pressure Control:
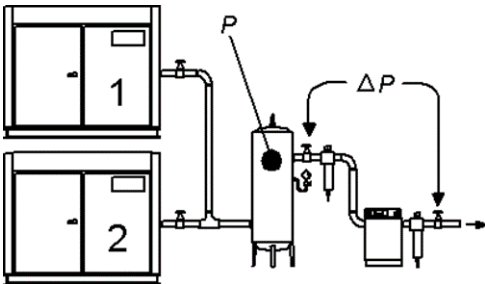
Figure 19 - Control Pressure Sensor Location, Supply side

System pressure will be lower than the set 'supply' pressure due to pressure differential losses across air treatment equipment. The nominal system pressure will reduce as the air treatment differential pressure increases.

System (Demand Side) Pressure Control:
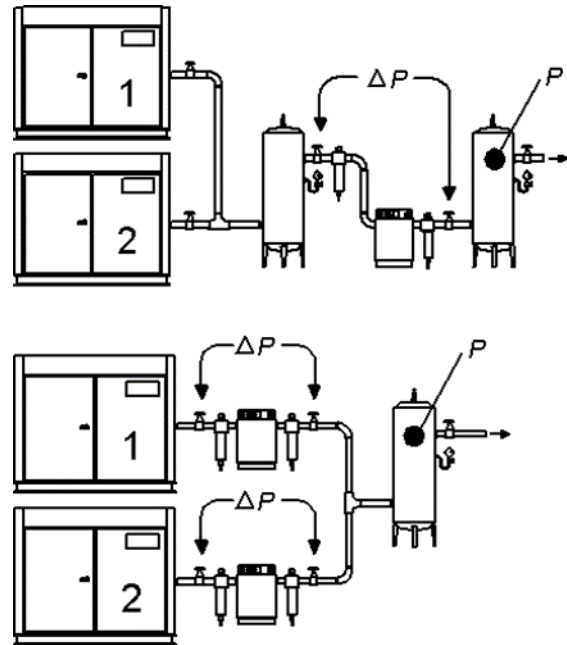
Figure 20 - Control Pressure Sensor Location, Demand side

Ensure each asset is equipped with independent excess pressure shut-down; an increase in pressure differential across air treatment equipment can result in excess asset discharge pressure.

Monitoring of Differential pressure across air treatment equipment is highly recommended.

9.7 Connecting Assets to AERO

Each asset to be managed by AERO is connected using data communications. Options are:

· RS485 SERIAL 'AIRBUS'
· Airmatics 'PRIVATE LAN'

Assets (e.g. Air compressor controllers) and legacy Metacentre equipment (e.g. compressor interface products such as the Airbus485 compressor connector) that support AIRBUIS serial communications can be connected to AERO using this communications method.

Refer to the asset manufacturers Operating manual for support relating to the configuration of Asset controllers

Refer to the respective products Technical Manual for support relating to the configuration of legacy Metacentre equipment

Establish an RS485 SERIAL 'AIRBUS' network between AERO, Assets and / or legacy Metacentre equipment

Wire polarity is important!

Figure 21 - RS485 - polarity of wire

Assets equipped with AirMatics interface (such as AirTAG and SmartTAG) need to be connected to AERO using the PRIVATE LAN IN & PRIVATE LAN OUT connections.

See also Figure 17 - LAN connections on the AERO

9.8 Remote Input Signals (optional)

AERO'S Terminal Block Rail is equipped with a number of remote 'digital' inputs.

The inputs are designed to detect a remote 'volt-free' switching contact (rated for a minimum 24VDC @ 10mA).

The 'ID' mentioned hereunder correspond with the connection number on the Terminal Block Rail.

Each input has a defined function:

ID	FUNCTION
103 - 104	Activates Table #1 when held closed
101 - 102	Activates Table #2 when held closed
99 - 100	Activates Table #3 when held closed
97 - 98	Activates Table #4 when held closed
77 - 78	Activates Table #5 when held closed
75 - 76	Activates Table #6 when held closed

Note: If more than one 'Table' input is held closed the lowest number Table will have priority. For example: Table #1 has priority over Table #2.

Standby has priority over any Table.

Remote inputs have priority over Pressure Schedule.

ID	FUNCTION
109 - 112	Start / Stop

Change in state from open to closed will simulate a Start button being pressed

Change in state from closed to open will simulate a Stop button being pressed

ID	FUNCTION

ID	FUNCTION
107 - 108	Force Sequence change

To force a change in sequence arrangement, close for 1 second minimum then open.

ID	FUNCTION
105 - 106	Standby

Closed: All assets will be forced to unload and remain offload.

Open: normal operation

9.9 Remote 'Virtual Relay' Function Inputs

AERO'S Terminal Block Rail is equipped with remote 'digital' inputs that can be used as 'input functions' for any Virtual Relay - local or remote.

ID	FUNCTION
71 - 72	Virtual Relay (Digital) Input 1
69 - 70	Virtual Relay (Digital) input 2
67 - 68	Virtual Relay (Digital) input 3
65 - 66	Virtual Relay (Digital) input 4

The inputs are designed to detect a remote 'volt-free' switching contact (rated for a minimum 24VDC @ 10mA).

9.10 Remote Output Signals (optional)

AERO'S Terminal Block Rail is equipped with 10 remote relay contact outputs

The function of each relay output is determined by the set-up of the equivalent 'Virtual Relay' (R01 to R10).

ID	FUNCTION
96	Output Relay 1
94	Output Relay 2
93	Output Relay 3
95	Output Relay 1, 2, 3, RC

Remote output relay 1,2,3 contacts are rated for 24Vac/dc @ 4A maximum

The maximum current on 'RC' must not exceed 8A.

The design and location of R1, R2 and R3 is ideally suited to enable 'Virtual Relay' outputs to directly activate function inputs.

For example:

Output Relay 1 can activate Table #3 by connecting the output terminals of R1 to the 'Force Table #3' inputs.

Output Relay 2 can activate standby mode by connecting the output to the 'Standby' input

ID	FUNCTION
91 - 92	Output Relay 4
89 - 90	Output Relay 5
87 - 88	Output Relay 6
85 - 86	Output Relay 7
83 – 84	Output Relay 8
81 - 82	Output Relay 9
79 - 80	Output Relay 10

R4 to R10 remote output relay contacts are rated for 240V 'CE' / 115V 'UL' @ 4A maximum.

As standard AERO is supplied with the following relay output defaults:

Relay 1 **Unit RUNNING**
ON: Standby or Start Time or Pre-Fill or Normal
        Operation
OFF: Stopped or Shut-down

Relay 2 **Control ON**
ON: Start Time or Pre-Fill or Normal Operation
OFF: Standby or Stopped or Shut-down

Relay 3 **General Trip (normally closed)**
ON: OK
OFF: System Trip or Compressor Trip

Relay 4 **Unit RUNNING**
ON: Standby or Start Time or Pre-Fill or Normal
        Operation
OFF: Stopped or Shut-down

Relay 5 **Control ON**
ON: Start Time or Pre-Fill or Normal Operation
OFF: Standby or Stopped or Shut-down

Relay 6 **General Trip**
ON: System Trip or Compressor Trip
OFF: OK

Relay 7 **General Fault**
ON: System Alarm/Trip or Compressor
        Alarm/Trip
OFF: OK

Relay 8 **Auxiliary Start Time Output**
ON: Start Time or Pre-Fill or Normal Operation
OFF: Stopped or Standby or Shut-down

Relay 9 **Low Pressure Alarm**
ON: Low Pressure Alarm
OFF: OK

Relay 10   **Differential Pressure Alarm**
ON: High Differential Pressure Alarm
OFF: OK

9.11   Terminal Block Rail

ID	Assignment	ID	Assignment
1	V+	2	NOT USED
3	V+	4	NOT USED
5	V-	6	NOT USED
7	V-	8	NOT USED
9	LIVE (L)	10	LIVE (L)
11	NEUTRAL (N)	12	NEUTRAL (N)
13	PROTECTIVE EARTH (PE)	14	PROTECTIVE EARTH (PE)
15	SINGLE PHASE LINE (L)	16	NEUTRAL (N)
17	UNI, X01, RELAY 1, C	18	UNI, X01, RELAY 1, NC
19	UNI, X01, RELAY 1, NO / RELAY 2, C	20	UNI, X02, RELAY 2, NC
21	UNI, X01, RELAY 2, NO	22	UNI, X01, RELAY 3, C
23	UNI, X01, RELAY 3, NO	24	NOT USED
24	UNI, X02, DIGITAL INPUT 1, + (+V)	26	UNI, X02, DIGITAL INPUT 1, - (0V)
27	UNI, X03, DIGITAL INPUT 2, + (+V)	28	UNI, X03, DIGITAL INPUT 2, - (0V)
29	UNI, X04, DIGITAL INPUT 3, + (+V)	30	UNI, X04, DIGITAL INPUT 3, - (0V)
31	UNI, X05, DIGITAL INPUT 4, + (+V)	32	UNI, X05, DIGITAL INPUT 4, - (0V)
33	UNI, X06, GROUND (FLOW SENSOR)	34	UNI, X06, 24V DC OUT (FLOW SENSOR)
35	UNI, X07, GROUND (GATEWAY)	36	UNI, X07, 24V DC OUT (GATEWAY)
37	NOT USED	38	NOT USED
39	UNI, X11, IIN1, SYSTEM PRESSURE 1 (CONTROL), -	40	NOT USED
41	NOT USED	42	UNI, X11, SYSTEM PRESSURE 1 (CONTROL), SCREEN
43	NOT USED	44	NOT USED
45	UNI, X12, IIN2, SYSTEM PRESSURE 2 (DIFFERENTIAL), -	46	NOT USED
47	NOT USED	48	UNI, X12, SYSTEM PRESSURE 1 (DIFFERENTIAL), SCREEN
49	UNI, X13, SYSTEM AIR FLOW +	50	UNI, X13, SYSTEM AIR FLOW, -
51	UNI, X13, SYSTEM DEW POINT, +	52	UNI, X13, SYSTEM DEW POINT, -
53	UNI, X16, SYSTEM TEMPERATURE, +	54	UNI, X16, SYSTEM TEMPERATURE, -
55	UNI, X16, AMBIENT TEMPERATURE, +	56	UNI, X16, AMBIENT TEMPERATURE, -
57	UNI, X17, SCREEN	58	UNI, X18, SCREEN
59	UNI, X18, L2 MODBUS	60	UNI, X18, L1 MODBUS
61	UNI, X17, L2 AIRBUS	62	UNI, X17, L1 AIRBUS
63	AERO, T1, X07, L2 AIRBUS	64	AERO, T1, X07, L1 AIRBUS
65	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 4, C+	66	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 4
67	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 3, C+	68	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 3
69	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 2, C+	70	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 2
71	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 1, C+	72	AERO, Di8R4, X03, VIRTUAL RELAY INPUT 1
73	AERO, Di8R4, X03, START FEEDBACK, C+	74	AERO, Di8R4, X03, START FEEDBACK
75	AERO, Di8R4, X03, TABLE 6, C+	76	AERO, Di8R4, X03, TABLE 6
77	AERO, Di8R4, X03, TABLE 5, C+	78	AERO, Di8R4, X03, TABLE 5
79	AERO, Di8R4, X02 (R1), RELAY 10	80	AERO, Di8R4, X02 (R1), RELAY 10, C
81	AERO, Di8R4, X02 (R2), RELAY 9	82	AERO, Di8R4, X02 (R2), RELAY 9, C
83	AERO, Di8R4, X02 (R3), RELAY 8	84	AERO, Di8R4, X02 (R3), RELAY 8, C
85	AERO, Di8R4, X02 (R4), RELAY 7	86	AERO, Di8R4, X02 (R4), RELAY 7, C
87	AERO, T1, X02, RELAY 6	88	AERO, T1, X02, RELAY 6, C
89	AERO, T1, X02, RELAY 5	90	AERO, T1, X02, RELAY 5, C
91	AERO, T1, X03, RELAY 4	92	AERO, T1, X03, RELAY 4, C
93	AERO, T1, X03, RELAY 3	94	AERO, T1, X03, RELAY 2
95	AERO, T1, X03, RELAY 1, 2, 3 C	96	AERO, T1, X03, RELAY 1
97	AERO, T1, X04, TABLE 4, C+	98	AERO, T1, X04, TABLE 4
99	AERO, T1, X04, TABLE 3, C+	100	AERO, T1, X04, TABLE 3
101	AERO, T1, X04, TABLE 2, C+	102	AERO, T1, X04, TABLE 2
103	AERO, T1, X04, TABLE 1, C+	104	AERO, T1, X04, TABLE 1
105	AERO, T1, X04, STANDBY, C+	106	AERO, T1, X04, STANDBY
107	AERO, T1, X04, SEQUENCE CHANGE, C+	108	AERO, T1, X04, SEQUENCE CHANGE
109	AERO, T1, X04, REMOTE START, C+	110	AERO, T1, X04, REMOTE START
111	AERO, T1, X04, REMOTE STOP, C+	112	AERO, T1, X04, REMOTE STOP
113	AERO, T1, X05, SYSTEM PRESSURE 2 (DIFFERENTIAL), +	114	NOT USED
115	NOT USED	116	NOT USED
117	AERO, T1, X05, SYSTEM PRESSURE 1 (CONTROL), +	118	NOT USED

10. Introduction to Configuring AERO

This chapter provides an introduction for the configuration of AERO installations. It serves as background information to better understand the steps to take while configuring the AERO.

Part of the content of this chapter is already provided above, this chapter is seen as a recapitulation.
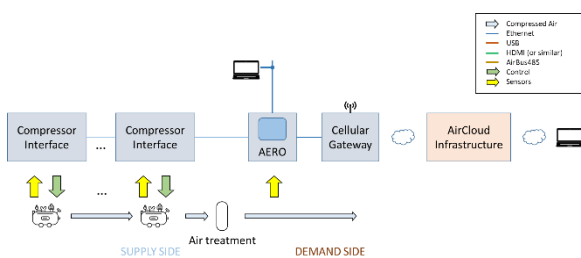
10.1 View on total system

Figure 22 - Generic overview of total system

Hereby the following elements:

· Multiple compressors
Also referred to as "assets"
Essential parameters of these assets are monitored:

- o Asset Power consumption
- o Asset Delivery Pressure
- o Asset Delivery Temperature
- o Asset Output Air Flow
- o Asset Status
- o etc

Monitoring is done using Metacentre interfaces, optionally combined with AirTAGs, or SmartTAGs.

By controlling (on/off, % load, ...) these assets, the Compressed Air system is behaving optimally. Controlling is done using Metacentre interfaces or SmartTags.

· Air Treatment / demand side
These are vessels, filters, dryers, etc.
In this domain Essential System Parameters are monitored:

- o Generation Pressure
- o System Pressure
- o System Air Flow
- o Dewpoint
- o etc

· Compressor Interfaces

Each compressor has an interface which can be of various types.
This interface serves following purposes:
- o Monitor physical parameters (such as pressure), translate this into an electrical signal and provide a means to communicate this information to the AERO.
- o Retrieve control commands from the AERO and translate this into signals that interface with the underlying compressor

· AERO
Functionalities provided with the AERO:
- o A local view on the monitored parameters. Both on asset and on system level.
- o Control of the Assets with as aim to optimize the operation of the compressed air system
- o A means to view monitored parameters on a local LAN segment (by using a PC)
- o A means to put asset and system parameters in the Cloud (using AirCloud) allowing to monitor these parameters remotely

· Cellular Gateway
Communication gateway with the Cloud.
- o Send measurement (asset and system) and event data towards the AirCloud infrastructure
- o Allow for configuration and firmware updates

· AirCloud Infrastructure
A Cloud based infrastructure developed an operated by CMC NV providing:
- o Storage of data retrieved from the AirMaster systems worldwide (such as each AERO installation)
- o Means to view all this data using a PC browser
- o Means to create reports
- o etc

⚠ It is possible to have an "isolated AERO solution": a solution where no data (measurements and events) is sent to AirCloud. This isolated solution prevents any data related to the operation of the company sent out of the company. However, CMC NV recommends to have a Cellular Gateway installed with any AERO installation for configuration and support purposes.

10.2 Compressor Interfaces – AERO 'T1' – METACENTRE™ air compressor interface products

Essential in any AERO setup is the AERO 'T1'. This AERO 'T1' communicates with the compressor interfaces over AirBUS485 (CMC NV proprietary serial network over RS485). AERO is legacy compatible with any METACENTRE™ air compressor interface product that features AIRBUS 485™ communications.
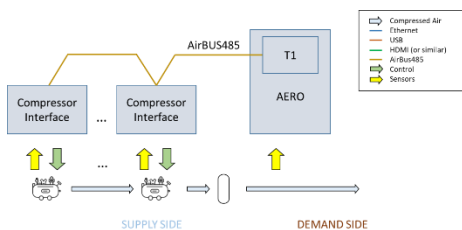

Figure 23 - AERO 'T1', AirBUS485, compressor interfaces

These compressor interfaces can be:

- VSB Box interface
- iPBC interface
- T1 (or similar) AirMaster compressor controller
- etc

Using these interfaces information of the assets is monitored (such as status, pressure, %load).
These interfaces also provide control capabilities towards the assets.
These compressor interfaces are mandatory for any installed asset.

10.3 Compressor Interfaces – optional AirTAG interfaces

Adding AirTAGs to an AERO system – though not mandatory – provides essential benefits:

- Precise power and flow measurements of the assets
When using AERO 'T1' interfaces for Power and Flow data retrieval from the assets, this data is calculated based on the percentage operational load of the assets. For each asset one must configure maximum power and

flow – and minimal power and flow – data. Percentage load combined with this data provides calculated power and flow.
By adding AirTAGs, these essential parameters are actually measured, which allows for much more precise information.
- Asset parameter monitoring, dashboard (and other) view locally and in the cloud.
installation of AirTAGs provides the capability to precisely monitor the operation of all the assets, either locally or in the cloud.
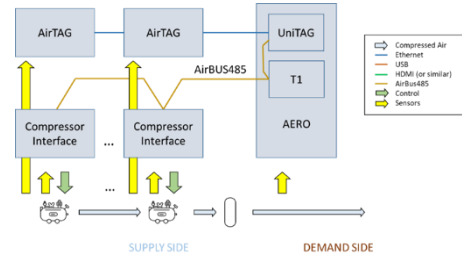

Figure 24 - Including AirTAGs

Information one can receive using the AirTAG:

- Power
- Flow
- Status (optional and only configurable by editing of the configuration file, done by highly skilled technicians only)

⚠️ When AirTAGs are included in a system, all compressor assets need to be equipped with an AirTAG.
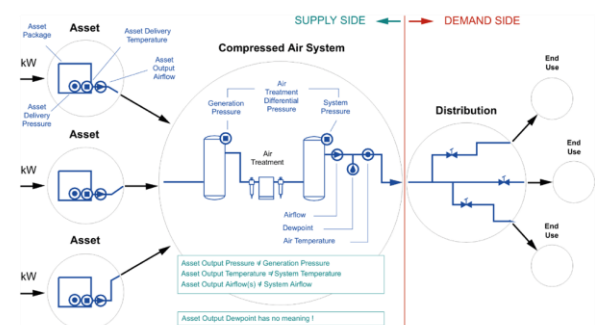
10.4 System Parameters

Figure 25 - System parameters

For optimal use of the AERO, Air System Parameters are essential:

- System Pressure
- Generation Pressure (remark: on the Dashboard views, Differential Pressure is

provided, being 'Generation Pressure – System Pressure'. This provides the "loss" of pressure over the Air Treatment system and is from an informational perspective more valuable than Generation Pressure as such).

- System Air Flow
It is recommended to install a System Air Flow meter. If this is not installed, the System Air Flow indicated on the dashboard will be the sum of the Air Flow information provided by the individual assets. Due to the fact that this does not take into account the impact of the Air Treatment elements, this can be misleading.
- System Dewpoint
- System Air Temperature

10.5   A closer look at the AERO internals

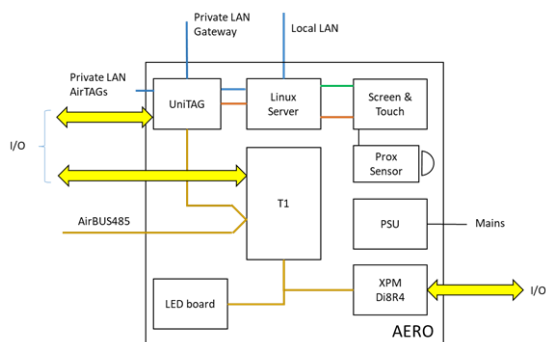An AERO exist of a number of blocks

Figure 26 - AERO block diagram

- UniTAG
System monitoring
- T1
Sequencer
- Linux Server (AERO PC)
Local Web Server platform
- Screen and Touch
User interface on the AERO, using LCD screen
- Proximity sensor
Senses the proximity of a user and as such controls the LCD screen backlight
- PSU
Power Supply Unit
- Di8R4
Connects with the T1 and provides extra I/O
- LED board
Internal information panel

10.6   Storage of configuration information

Configuration information for AERO systems is stored on different locations and serves different but similar purposes.

- AERO PC (linux Server)

Editing is done using the local AERO interface. It stores:
o Users
This is done from the local usage perspective. Hence users who log in on the local AERO screen or users who log in using their PC connected on the Local LAN
o Sensor Configuration
Controls how the gauges on the local AERO screen (and on PC connected to the Local LAN) appear
o Group Members
Manages how monitored information from the Assets is processed
o Alert Settings
Manages how gauges appear on the dashboard when certain values are surpassed
o Scheduling
Scheduling of Tables as defined in the T1

- UniTAG

A configuration file (in the form of xml) imposes how the UniTAG operates . This configuration file can be adapted in various manners (see also further):
o Direct editing (only for highly skilled technicians)
o It is edited using the UniTAG Web Server (only for skilled technicians)
o It is pushed from AirCloud
o It is pushed from the local AERO UI

This configuration file controls the complete functionality of the UniTAG. It takes is too far to describe this in detail, but some examples:
o How it connects to the Cloud
o How the assets are configured
o How the sensors connected to the UniTAG are configured
o How and when Alerts need to be generated
o etc

- AirCloud

Editing is done using the AirCloud user interface
it stores:

o Users (from the AirCloud usage perspective)
o Sensor Configuration
Where Sensor configuration on the AERO PC is focused on the local AERO gauges, here we also manage how sensors are used on the UniTAG (see "Push to Device")
o Group Members
Similar to Group Members on AERO
o Alert Settings
this differs from Alert Settings on AERO PC as it also allows to trigger Events

The following aspects are not directly related to the AERO installation configuration itself, but are worth mentioning:
o AirTAG Configuration
When AirTAGs are part of an AERO installation, these also need configuration, this is also done from AirCloud
o Report configuration
When you would like to generate reports for an AERO installation, this is also done from AirCloud.

10.7 The concept "Push To Device"

During configuration work – either locally on the AERO, either in AirCloud – you set up elements controlling how the system will operate. Part of this data is relevant for the AirCloud, part is relevant for the Linux Server in the AERO (AERO PC), part is relevant for the UniTAG in the AERO.
The user needs to use the "Push to Device" operation to explicitly load to data on the UniTAG in the AERO, either from the Linux PC in the AERO or from the AirCloud environment. Remark that a Push to Device from the AirCloud infrastructure goes over the Cloud.

Figure 27 - Push to Device: load relevant configuration information on the UniTAG in the AERO

Remark that for editing of the Schedule, you also need a 'Push to Device'. In this case, the T1 in the AERO is updated.
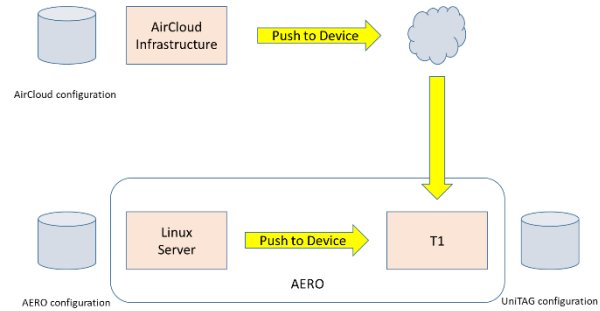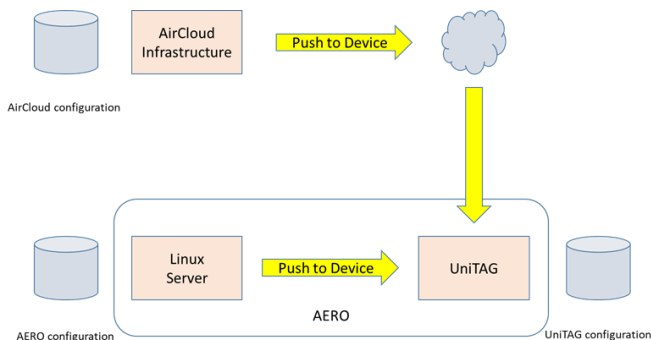

Figure 28 - Push to Device: load relevant configuration information on the T1 in tge AERO

⚠ It is essential to assure that there are no conflicts between the configuration as it is managed in AirCloud and the configuration as it is managed on the AERO.

11. LAN Connection

This chapter focuses on the connection of a PC (or Laptop … further referred to as "PC") to AERO LAN and how to surf to the web server on the AERO.

11.1   Elements having impact

11.1.1 LAN connections on the AERO

The AERO is equipped with 3 dedicated LAN connections which in turn support 2 dedicated communication networks:
PRIVATE LAN (IN and OUT)
LOCAL LAN
PRIVATE LAN IN is intended to be used with AirMatics equipment (such as AirTAG and SmartTAG)
PRIVATE LAN OUT is intended to be used with the Gateway that provides cellular connectivity.
LOCAL LAN is intended to be used in connection to the user's LAN infrastructure. On this LAN infrastructure, users can also have their PC connected.
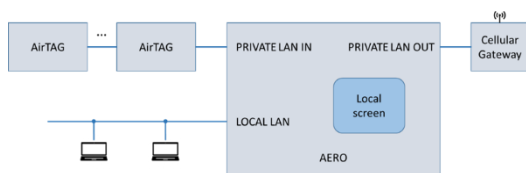

Figure 29 - – LAN connections on AERO – standard use

11.1.2 Gateway integration

The Gateway provides cellular connectivity. It is required to make use of all the AirCloud based functionalities. It is very important to mention that Gateway connectivity adds high value for remote servicing as well as firmware updates.
In case the user does not want data to be sent in the Cloud, the AERO (more specific: the UniTAG in the AERO) can be configured as such.

11.1.3 Availability of DHCP server

On the Local LAN a DHCP server is required in order for the AERO to receive an IP address. Set up of a

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[1] In computer networking, the multicast DNS protocol resolves hostnames to IP addresses within small networks that do not include a local name server. It is

fixed IP address on the Local LAN segment in the AERO is not supported.

11.1.4 Routers (and other network devices) on the user's LAN infrastructure

The AERO makes use of mDNS (multicast DNS[1]). This mechanism provides a means to provide a unique URL without the necessity of specifically knowing the IP address of the AERO, which might be cumbersome as the IP address is provided via the DHCP server and as such can vary over time. The customer's network infrastructure likely will limit the knowledge of the provided unique URL to a certain exposure. When there are for instance routers involved between LAN "segments" one will be capable of reaching the AERO with the provided URL on one LAN connection in a building and not on another LAN connection. Practically, using wireless LAN probably will not expose the URL.
If you know the IP address used by the Local LAN connection on the AERO at "this moment", you be capable of reaching it the AERO System dashboard when the URL is not exposed, but you will not be capable of "clicking through" to the underlying AirTAG asset dashboards.

11.2   URL, IP addresses

Every AERO comes with a unique URL which is based on the following construction:
http://"*ArticleNumber*"-"*SerialNumber*".local/

As an example, supposing:
Article number = Y18TICS77
Serial number = 1234
Then the URL to be used is:

http://Y18TICS77-1234.local/

⚠️   The Operating System on your PC needs to support mDNS, a zero-configuration networking service (similar to Apple "Bonjour").

At any moment in time, you can consult the IP addresses, article number and serial number in use by swiping with your finger from above the local AERO screen downwards into the screen.
This will bring up on top of the screen:

a zero-configuration service, using essentially the same programming interfaces, packet formats and operating semantics as unicast Domain Name Service.

Figure 30 - AERO network information

Here you see the current IP addresses, the
"ArticleNumber"-"SerialNumber", the software version
on the AERO PC.
Remark you can also go back to the dashboard. This is
useful when click-through to underlying AirTAGs does
not properly work – for instance during configuration
of the AERO or if an underlying AirTAG cannot be
reached.
The AERO Linux PC can also be restarted.

12. Configuration AERO – global approach

AERO's configuration is done in 3 distinct steps. Firstly, configuration of menus & parameters
contained in AERO's T1. The T1 can be found on
the interior back-plate. The T1 has a dedicated user interface.

Secondly, complete 'local' display configuration which is done using AERO's exterior 12.1" Touch display or using a PC connected to the Local LAN.

Finally, configure AERO's presence on AirCloud.

In case of an "isolated AERO solution", it is highly advised to still have a gateway for AirCloud connection for purposes of Support and Over The Air Software updates.

Before continuing:
- Physical Checks
  Before applying power to AERO, ensure that the power supply connections are correct and secure.
- Sensor connections
  Assure all sensor (Pressure, Flow, …) are properly connected
- RS485 connections
  Verify connections of RS485 connected devices
- AirTAG installation
  In case AirTAGs are installed, assure these are properly configured.
  They need to reside in the same Tenant as the UniTAG in the AERO
  You need to know their article number and serial number
- Gateway installation
  Assure you have good cellular connection and that UniTAG in AERO and AirTAGs can be viewed in AirCloud.

13. Step 1: Configure The AERO 'T1'

Access to the AERO T1 requires opening the AERO Enclosure. Access the AERO enclosure at the operator interface using the supplied enclosure door KEYand the enclosures 2-point locking system.

Figure 31 - Access T1 by opening the enclosure

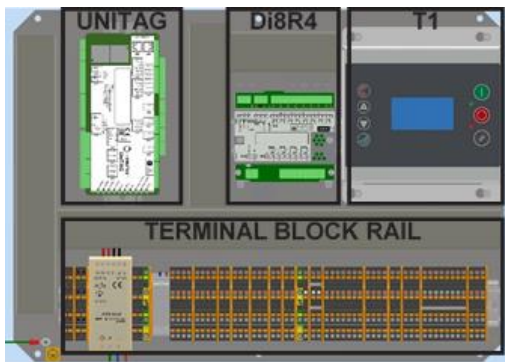The location of the T1 is illustrated here (right top):

Figure 32 - location of T1

Setting up T1 is done using the keys and LCD screen on the T1.

Before successful basic operation can be established the following items must be set (in the order show) to suit installation requirements.

DESCRIPTION	MENU	ITEM
Sensor Offset Calibration	S04	1O
Sensor Range Calibration	S04	1R

Pressure Display

Check the displayed system pressure. If the pressure is incorrect, or inaccurate, check the range of the sensor and carry out the pressure sensor commissioning and calibration procedure.

DESCRIPTION	MENU	ITEM
Number of Assets	S02	NC
Max. Pressure Alarm	S02	PM
Stop Control Function	S02	CF
Real Time Clock Set	S01	Ct
Auto Restart Enable	S01	AR
Rotation Interval	S01	RP
Asset Configuration	C03	01 - 12
Asset Running Hours	C01	01 - 12
High Pressure Set Point	T01	PH
Low Pressure Set Point	T01	PL
Minimum Pressure Alarm	T01	Pm
Sequence Algorithm	T01	SQ
Compressor #1-12 Priority	T01	01 - 12

13.1 Optional Features and Functions

Individual installation requirements may involve the implementation of additional or optional functions and features; implement as required.

13.2 Menu navigation

Display Item Structure:

All operational system status and values are accessible from the normal User display. To view status or values, that are not normally visible on the default screen, press UP or DOWN. All standard User display items are view only and cannot be adjusted. The standard User display items are regarded as 'Menu Page 00' items.

All adjustable value, parameter or option item displays are grouped into 'menu mode' lists. Items are assigned to a list according to type and classification. Item lists are identified by page number (or menu number); All adjustable parameters and options are assigned to menu mode pages 'P01' or higher.

Normal Operational Display (Menu Page P00):

At controller initialisation, all LED indicators are switched on for several seconds before initialisation is complete and the normal operating display (Page P00) is shown. In normal operational display mode, the main display will continuously show the detected system pressure and the Item display will show the first item of the 'Page 00' menu. User menu 'Items' can be selected using the Up or Down buttons at any time. Pressing the Enter button will lock any selected

Item display and inhibit return to the default display. When an Item display is locked the lock key symbol will be shown. To unlock an Item display: press Up or Down to view an alternative Item display or press Reset or Escape. No Item values, options or parameters can be adjusted in page 'P00'. If a fault condition occurs the fault code becomes the first list item and the display will automatically jump to display the fault code. More than one active fault code item can exist at any one time and can be viewed by pressing UP or DOWN. The most recent 'active' fault will be at the top of the list.

13.3 Access code

Access to adjustable menu page items is restricted by access code. To access menu mode pages press MENU (or UP and DOWN together); an access code entry display is shown and the first code character will flash.
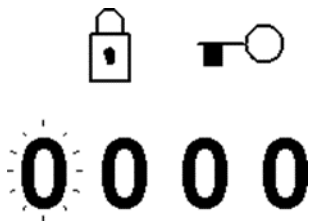
Figure 33 - Access code on T1

Use UP(plus) or DOWN(minus) to adjust the value of the first code character then press ENTER. The next code character will flash; use UP or DOWN to adjust then press ENTER. Repeat for all four code characters.

If the code number is less than 1000 then the first code character will be 0 (zero). To return to a previous code character press ESCAPE. When all four code characters have been set to an authorized code number press ENTER. An invalid code will return the display to normal operational mode; page 'P00'.
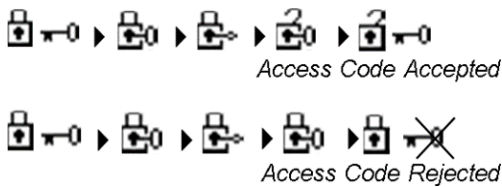

Access Code Accepted

Access Code Rejected

Figure 34 - Code accepted or not

Access Code Timeout:

When in menu mode, if no key activity is detected for a period of time the access code is cancelled and the display will automatically reset to the normal operational display.

Also see 16 Operation – T1

13.4 Menu Navigation T1

Menu Mode Navigation:

In menu mode the menu 'page' number will be highlighted at the top of the display.
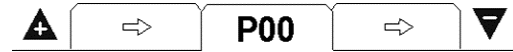

Figure 35 - Indication of Page on the T1 screen

To select a menu 'page' press UP or DOWN. To enter the highlighted menu 'page' press ENTER; the first item of the menu 'page' will be highlighted. Press UP or DOWN to scroll though the selected menu 'page' items.

To select an item value or parameter for modification press ENTER; an adjustment screen for the item will be displayed.

The value or option can now be modified by pressing UP(Plus) or DOWN(Minus). To enter a modified value or option in to memory press ENTER.
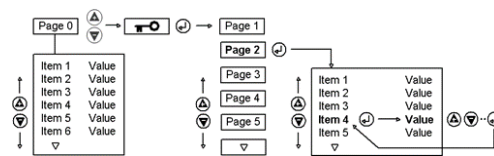

Figure 36 - Navigation in menus on T1

Press ESCAPE at any time in menu mode to step backwards one stage in the navigation process. Pressing ESCAPE when the page number is flashing will exit menu mode and return the display to normal operational mode.
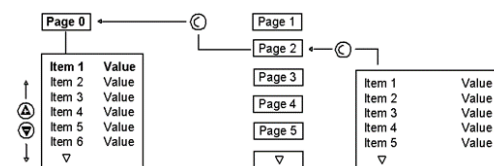

Figure 37 - Using ESC button

All menu items have a unique reference consisting of the menu page ID (a) and the menu page item number (b). Each item in a menu also has a unique two alphanumeric character code (c). All three references are visible at the top of every menu item display.
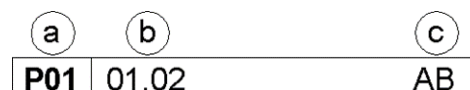

Figure 38 - T1 Menu Item reference

Some menu items may consist of several individual settings. Each setting of the menu item is also referenced as a sub-item number. For example: P01-01.02 references sub-item '02' of menu item '01' in menu page 'P01'. Sub-item settings, where applicable, are always displayed together on the same 'Item' adjustment display screen. Most menu items are single value or single option only in which case the single item is referenced as sub-item number '01' (for example: P01-01.01).

Reset button:

Press and hold RESET for several seconds at any time to immediately exit menu mode and return to the normal operational display. Any value or option adjustment that has not been confirmed and entered into memory will be abandoned and the original setting maintained.

The T1 will retain an 'access code' for a short period after menu exit allowing the menu structure to be re-entered without the need to re-enter the access code again. To immediately clear access code retention press and hold RESET for several seconds.

The 'locked symbol'

A 'locked' symbol displayed with any item indicates the item is locked and cannot be modified. This will occur if the Item is view only (not adjustable) or in instances where the item cannot be adjusted while the AERO is in an operational state; stop the AERO first.

13.5 User Level Menus (default access code 0011)

MENU	ITEM	DESCRIPTION
T01 - 06	PH	High Pressure Set Point
T01 - 06	PL	Low Pressure Set Point
T01 - 06	Pm	Minimum Pressure Alarm
T01 - 06	SQ	Sequence Algorithm
T01 - 06	01 - 12	Asset #1 - #12 Priority
P02	PF	Pre fill Function
P02	PT	Pre fill Time
P02	PP	Pre fill Pressure
P02	01 - 12	Asset #1- #12
S01	Ct	Real Time Clock Set
S01	PS	Pressure Schedule Enable
S01	AR	Auto Restart Enable
S01	RP	Rotation Interval
S01	TS	Default Table Select
S01	BL	Display Backlit Adjust
C01	01 - 12	Asset #1 - #12 Running Hours
C02	01 - 12	Asset #1 - #12 Maintenance
E01	01 - 15	Fault Log #1 (9most recent) - #15

13.6 Service Level Menus (default access code 0021)

MENU	ITEM	DESCRIPTION
S02	P>	Pressure Units
S02	F>	Flow Units
S02	NC	Number Of Compressors
S02	PM	Maximum Pressure Alarm
S02	CF	Stop Control Function
S02	TO	Tolerance
S02	DA	Damping
S02	ST	Start Delay Time
S02	SF	Start Function
S02	PC	Pressure Change Time
S02	P2	Second Pressure Function
S02	DP	DP Setting
S02	DD	DP Delay Time
S02	CA	CAP Alarm Inhibit
S02	MA	Max Cap Restricted Alarm Inhibit
S02	ER	Error Log Reset
S04	10	Pressure Offset
S04	1R	Pressure Range
S04	20	Pressure 2 Offset
S04	2R	Pressure 2 Range
S05	AF	Aux. Pressure Function Select
S05	P1	Aux. Pressure #1 Source
S05	P2	Aux. Pressure #2 Source
S05	D1	Aux. Pressure #1 Deviation Limit
S05	D2	Aux. Pressure #2 Deviation Limit
S05	D+	Max + Aux. Pressure Deviation
S05	D-	Min - Aux. Pressure Deviation
S05	10	Aux. Pressure #1 Offset
S05	1R	Aux. Pressure #1 Range
S05	20	Aux. Pressure #2 Offset
S05	2R	Aux. Pressure #2 Range
C03	01 - 12	Asset #1 - #12, Configuration
C04	01 - 12	Asset #1 - #12, Zone Select

13.7 High Level Menus (default access code 0032)

MENU	ITEM	DESCRIPTION
R01	01 - 10	Relay #1 - #10 Function
R01	11 - 18	Virtual Relay #11 - #18 Function
R02	T1	Timer Relay #1
R02	T2	Timer Relay #2
R02	P1	Pulse Relay #1
R02	P2	Pulse Relay #2
R02	P3	Pulse Relay #3
R02	P4	Pulse Relay #4
R02	AF	Asset Available Relay
R02	RF	Asset Run Delay
R02	LF	Asset Load Delay
D01	D1 - D8	'T1' Digital Input #1 - #8
D01	R1 - R6	'T1' Output Relay #1 - #6
D01	A1	'T1' Analogue input #1
D01	A2	'T1' Analogue input #2
D01	A3	'T1' Analogue input #3
D01	AO	'T1' Analogue Output
D02	SI	Screen Invert
D02	LT	LED Panel Test
D03	D1 - D8	'XPMDi8R4' Digital input #1 - #8
D03	R1 - R4	'XPMDi8R4' Output Relay #1 - #4

13.8 Tables

Figure 39 - Tables Menu

MENU	ITEM	DESCRIPTION
T0#	PH	High Pressure Set Point

The 'upper' or 'unload' pressure set point that will be used when the 'Table' is active.

T0#	PL	Low Pressure Set Point

The 'lower' or 'load' pressure set point that will be used when the 'Table' is active.

T0#	Pm	Minimum Pressure Alarm

The sequence control strategy mode that will be used when the table is active.

T0#	SQ	Sequence Algorithm
T0#	01 - 12	Asset #1 - #12 Priority

The 'priority' setting for Asset number # that will be used when the table is active.

T0#	'n'	The 'priority' setting for compressor number 'n' that will be used when the table is active.

'n' = Number of Assets in the system

'#' = Table T01 - T06

13.9 Pre-Fill

Figure 40 - Pre-Fill Menu

MENU	ITEM	DESCRIPTION
P02	PF	Pre-fill Function

Determines the 'Pre fill' strategy or function that will be used at system start-up.

✗		Pre-fill function OFF
✓		Pre-fill, Back-up Mode
✓ [!→X]		Pre-fill, Standard Mode
✓ [A^^]		= Prefill, Automatic Mode

MENU	ITEM	DESCRIPTION
P02	PT	Pre-fill Time

Sets the maximum time allowed for a system 'Pre-fill' at start-up.

MENU	ITEM	DESCRIPTION
P02	PP	Pre-fill Pressure

If pressure is at, or above, this setting at system start-up the
pre-fill function will be abandoned immediately and normal pressure control and sequence strategy will be implemented. This setting is intended to inhibit 'Pre-fill' operation if pressure is already at an acceptable level at system start-up.

MENU	ITEM	DESCRIPTION
P02	01 - 'n'	The function of Asset #1 to 'n' during the 'Pre-fill' period.

'n' = number of Assets in the system

✕   Do not use

✓   Use for Primary pre-fill

!   Use for Emergency

These settings are applicable to Pre-fill 'Standard' and Pre-fill 'Back-up' modes only. In Automatic mode the system management unit dynamically utilises compressors as required.

Press and hold 'Start' for 5 seconds to manually skip Pre-fill mode at start-up.

13.10   Real Time Clock Set

It is NOT NECESSARY to configure the real time clock 'if' AERO has or will have internet access. Once Internet access is established, AERO will automatically configure the real time clock.

The following procedure can be used to configure the real time clock 'if' AERO does NOT have Internet access...

06	BL	5
08	Ct	1 . 18:00
08	PS	X
08	AR	✓
08	RP	9 . 00:00

Figure 41 – RTC (ao) setting

MENU	ITEM	DESCRIPTION
S01	Ct	Real Time Clock Set

Adjustment for the internal real time clock (Hours, Minutes, Date, Month, Year) is done in 'Ct'. The 'Day of the Week' (1= Monday to 7=Sunday) is automatically calculated and set in accordance with the Day, Month and Year.

13.10.1   Pressure Scheduling

Configuration of the Pressure Schedule itself is done in Step 2 and from the AERO Touch Display.

'Enabling' and 'disabling' the schedule function is done at the T1's user interface.

MENU	ITEM	DESCRIPTION
S01	PS	INHIBIT
S01	PS	ENABLE

✕ = inhibit Pressure Schedule

✓ = enable Pressure Schedule

See Figure 41 – RTC (ao) setting, Parameter 'PS'

13.10.2   Enabling Auto Restart

MENU	ITEM	DESCRIPTION
S01	AR	INHIBIT
S01	AR	ENABLE

✕ = inhibit Power Failure Auto Restart

✓ = enable Power Failure Auto Restart

The AERO will only auto re-start when power is restored if the AERO was in an operational 'Started' state when the power loss or disruption occurred.

See Figure 41 – RTC (ao) setting, Parameter 'AR'

13.10.3   Rotation Interval

MENU	ITEM	DESCRIPTION
S01	RP	Sets the sequence 'Rotation' interval or time

13.11   Default Table Select

MENU	ITEM	DESCRIPTION

S01   TS   Determines the 'Table' that will be used by default when 'Pressure Schedule' is not active and no Table is selected remotely on a digital input.

13.12   Display Backlight Adjust

MENU	ITEM	DESCRIPTION
S01	BL	Adjustable: 1 to 7, default 5

The display will temporarily increase brightness by 2 levels when a key is pressed and return to normal setting after a period of no keypad activity. The default display back-light level has been set to enable a 'continuous use service life' in excess of 90000 hours while providing good readability in all ambient light conditions. LCD display 'service life' is defined as the time period before the back-light reduces to 50% of initial brightness. Typically the display will remain usable for a much longer period for time. Adjusting the back-light to high levels will reduce service life.

13.13   Equal Hours Run Mode

Figure 42 - Equal Hours Run mode

MENU	ITEM	DESCRIPTION
C01	01 - 'n'	Record of detected 'running' hours for each Asset. The run hours value can be manually adjusted, at any time, to match the running hours meter/display value of each Asset.

13.14   Set Asset Availability

Figure 43 - Compressor Availability

MENU	ITEM	DESCRIPTION
C02	01 - 'n'	Sets Asset availability.

For an Asset(s) that is unavailable for use for a pre-longed period for time due to maintenance or repair. The Asset will not be utilised under any circumstances; any Asset Alarm (Warning) or Trip (shut-down) condition will be ignored.

'n' = number of compressors in the system.

13.15   Error Log

Figure 44 - Error Log page

MENU	ITEM	DESCRIPTION
E01	01 - 15	Error Log; presented in chronological order; entry 01 = most recent.

Each error log item will show the error code. To view details for the selected error log item press Enter.

Figure 45 - Error log details

The first information display
shows the:

- · The Error Code
- · Error Code symbols (if applicable)
- · The date the error occurred
- · The time the error occurred
- · The active operational functions of the AERO
- · at the time the error occurred; (see: AERO 'T1' Status Display)

To return to the main error log menu screen press Escape.

To view the second information screen press Enter.

E01	01.01
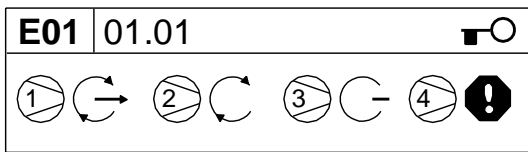
Figure 46 - Second information screen

The operational status of each Asset, at the time the error occurred, is displayed
symbolically (see: Asset Status Displays).

To return to the first information
screen press Enter or Escape.

13.16   Pressure Control – Tables

Figure 47 - Pressure Control ; Tables

MENU	ITEM	DESCRIPTION
S02	P>	Pressure Units

Selects the display pressure units:
Bar, psi or kPa.

MENU	ITEM	DESCRIPTION
S02	F>	Air Flow Meter Units

Selects the display units for the optional 4-20mA air
flow sensor monitoring feature:

m³/min: cubic meters per minute
cfm: cubic feet per minute

MENU	ITEM	DESCRIPTION
S02	NC	Number of Compressors

Sets the number of compressors connected to, and
controlled by, the AERO. This value must be set to
match the system at commissioning.

MENU	ITEM	DESCRIPTION
S02	PM	Maximum Pressure Alarm

High pressure 'Fault' level. This value remains active
at all times and is the same for all 'Tables'. Set just
below system pressure relief value(s) and below the
maximum system pressure rating of all air system
components.

MENU	ITEM	DESCRIPTION
S02	CF	Stop Control Function

Determines if the AERI maintains control of the
compressors when the AERO is stopped.

✕ = Stop: return pressure control to the
compressors.
√ = Standby: maintain control and continouosly hold
compressors 'off load'.

MENU	ITEM	DESCRIPTION
S02	TO	Tolerance

The pressure control 'Tolerance' band setting

MENU	ITEM	DESCRIPTION
S02	DA	Damping

The pressure control 'Damping' setting.

MENU	ITEM	DESCRIPTION
S02	ST	Start Time

Sets the period of time, at system start, that the
management unit will wait for ancillery equipment to
start/respond before loading any compressor.

MENU	ITEM	DESCRIPTION
S02	SF	Start Function

Determines the function of the Start Time feature and
the reaction of the management unit to a failure of
ancillery equipment to respond within the Start Time.

✕   No Start Time Function

🕐❗   Management unit will wait for the full Start
Time regardless of feedback. If feedback does not

occur before Start Time expires the management unit will Trip (shutdown). If the feedback disappears at any time during operation the management unit will Trip (shutdown).

✓ ⛔ Management unit will wait for the full Start Time. The management unit will begine to utilise compressor(s) as soon as feedback is received. If feedback does not occur before Start Time expires the management unit will Trip (shutdown). If the feedback disappears at any time during operation the management unit will Trip (shutdown).

🕐 ⚠️ Management unit will wait for the full Start Time regardless of feedback.

If feedback does not occur before Start Time expires the management unit will show an Alarm (Warning) and begine to utilise compressor(s) as required. If the feedback disappears at any time during operation the management unit will show an Alarm (Warning).

✓ ⚠️ Management unit will wait for the full Start Time. The management unit will begine to utilise compressor(s) as soon as feedback is received. If feedback does not occur before Start Time expires the management unit will show an Alarm (Warning) and begine to utilise compressor(s) as required. If the feedback disappears at any time during operation the management unit will show an Alarm (Warning).

MENU	ITEM	DESCRIPTION
S02	PC	Pressure Change Time

The time that the AERO will implement a smooth and controlled change from one 'target' pressure level to another when a table change is made.

MENU	ITEM	DESCRIPTION
S02	P2	Second P.Sensor Function

P2=X:
Second pressure sensor function inhibit; no sensor connected.

P1<>P2   :
The system management unit will automatically utilise the second pressure sensor (P2) in the event of a primary pressure sensor (P1) failure.

⚠️The primary and secondary pressure sensors must be installed to monitor the same pressure at the same location.

P2=>DP:

The management unit will monitor and display the differential pressure (DP) between the primary (P1) and secondary (P2) pressure sensors.

The differential is displayed as a positive value regardless of positive or negative relationship between the sensors.

🛈 The system management unit will use the primary pressure sensor (P1) for control.

MENU	ITEM	DESCRIPTION
S02	DP	DP Alarm Level

Differential pressure Alarm level when P2 set for 'P"=>DP' mode.

⚠️Set to 0(zero) to inhibit DP Alarm function.

MENU	ITEM	DESCRIPTION
S02	DD	DP Alarm Delay

Differential pressure Alarm delay time (seconds) when P2 set for 'P"=>DP' mode.
The set differential pressure must exceed, and remain above, the differential pressure Alarm level for the delay time.

MENU	ITEM	DESCRIPTION
S02	CA	Capacity Alarm Enable

✗ = inhibit Capacity Alarm
✓ = enable Capacity Alarm

🛈 When inhibited the Capacity Alarm panel indication will still function; alarm code generation and remote alarm indications are inhibited.

MENU	ITEM	DESCRIPTION
S02	MA	Restricted Cap. Alarm Enable

✗ = inhibit Restricted Capacity Alarm
✓ = enable Restricted Capacity Alarm

⚠️When inhibited the Restricted Capacity Alarm panel indication will still function; alarm code generation and remote alarm indications are inhibited.

MENU	ITEM	DESCRIPTION
S02	ER	Error Log Reset

Clears and resets the 'Error Log'. Adjust the item setting to '√' and press ENTER. The display will return to the main menu and all existing entries in the error log will be perminantly deleted.

13.17   Sensor Calibration

01	1O	0	BAR
02	1R	16.0	BAR
03	2O	0	BAR
04	2R	16.0	BAR

MENU	ITEM	DESCRIPTION
S04	1O	Pressure Sensor Offset
S04	1R	Pressure Sensor Range
S04	2O	Pressure Sensor #2 Offset
S04	2R	Pressure Sensor #2 Range

1) Commissioning

Initially set the 'Offset' (minimum) to the minimum or lowest pressure value for the sensor. Set the 'Range' (maximum) to the maximum or highest value for the sensor.

For example:
If the pressure sensor is a 0 to 16bar (0 to 232psi) type set the 'offset' to 0bar (0psi) and the 'Range' to 16.0bar (232psi).

If the sensor is a –1.0 (minus one bar.g) to 15.0bar type, set the 'offset' to –1.0bar (minus one bar) and the range to 15.0bar.
Note: The 'range' value equates to the maximum value not the scope of the sensor.

Execute the calibration procedure.

2) Calibration Procedure

a) Offset: Expose the sensor to atmosphere and adjust the 'offset' setting (if necessary) until the detected pressure display shows 0.0bar (0psi).

b) Range: Apply an accurately know pressure to the pressure sensor and adjust the 'Range' setting until the detected pressure display matches the applied pressure. An applied pressure equal too, or greater than, the nominal system working pressure is recommended.

The detected pressure is displayed with the calibration menu item and will change to match the new calibration setting as the setting is adjusted.

There is no need for the applied pressure to be static; it can be dynamic and changing. This enables calibration to be carried out on a fully operational system where changing system pressure can be accurately verified from another source.

Correct pressure sensor set-up and calibration is critical for successful system operation. It is recommended that pressure sensor calibration is examined, and adjusted if necessary, annually or a pre-determined routine periodic basis.

13.18   Pressure Balance

11	2R	16.0	BAR
01	AF	- - -	
02	P1	- - -	
03	P2	- - -	
04	D1	0.0	BAR

Figure 48 - Pressure Balance page

The pressure balance feature enables upto two additional remote pressures to be integrated with the primary detected pressure, using one of three available functions, to produce a calculated 'balanced' pressure that is used for pressure control.
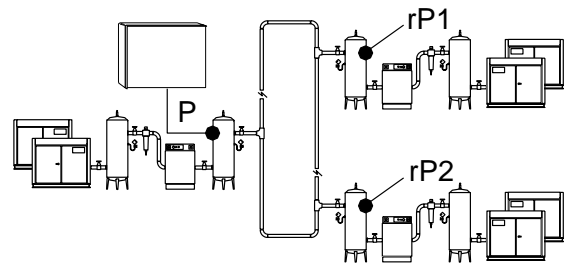
⚠ Remote pressure references are transmitted on the RS485 network at maximum intervals of ten seconds. If RS485 communications is disrupted the management unit will automatically default to using the primary pressure for control.

MENU	ITEM	DESCRIPTION
S05	AF	Aux Pressure Function Select

	DESCRIPTION
⊳◉⊲ ≡	The highest pressure
⊳◉⊲ ≡	The average of all pressures
⊳◉⊲ ≡	The lowest pressure

MENU	ITEM	DESCRIPTION
S05	P1	Aux Pressure #1 Source

Determines the source of the first remote pressure:

C01 to C12:   Compressor 1 to 12
'-'   no first remote pressure

MENU	ITEM	DESCRIPTION
S05	P2	Aux Pressure #2 Source

C01 to C12:   Compressor 1 to 12
'-'   no first remote pressure

MENU	ITEM	DESCRIPTION
S05	D1	Aux Pressure #1 Deviation Limit

Sets a '+/-' pressure tolerance limit that the first remote pressure can deviate from the detected local primary pressure. If the first remote pressure exceeds this limit it is ignored and not included in the final control pressure calcuation.

For example:
If D1 is set for 1.0bar, and the first remote pressure is 1.1bar above or below the primary pressure, the first remote pressure is ignored and not used in 'balanced' control pressure calculations.

MENU	ITEM	DESCRIPTION
S05	D2	Aux Pressure #2 Deviation Limit

Sets a '+/-' pressure tolerance limit that the second remote pressure can deviate from the detected local primary pressure. If the first remote pressure exceeds this limit it is ignored and not included in the final control pressure calcuation.

For example:
If D2 is set for 1.0bar, and the second remote pressure is 1.1bar above or below the primary pressure, the second remote pressure is ignored and not used in 'balanced' control pressure calculations.

MENU	ITEM	DESCRIPTION
S05	D+	Max +(plus) Aux Pressure Deviation

Sets a limit that the calculated 'balanced' pressure can deviate above the primary detected pressure. The calculated 'balanced' pressure is restricted from exceeding this limit.

For example:
If 'D+' is set for 0.5bar, the resulting calculated 'balanced' pressure (in accordance with the set function) is prevented from exceeding more than 0.5bar above the detected primary pressure.

MENU	ITEM	DESCRIPTION
S05		Max –(minus) Aux Pressure Deviation

Sets a limit that the calculated 'balanced' pressure can deviate below the primary detected pressure. The calculated 'balanced' pressure is restricted from exceeding this limit.

For example:
If 'D-' is set for 0.5bar, the resulting calculated 'balanced' pressure (in accordance with the set function) is prevented from exceeding more than 0.5bar below the detected primary pressure.

MENU	ITEM	DESCRIPTION
S05	10	Aux Pressure #1 Offset

Offset calibration setting for the first remote pressure. Set to match the 'offset' calibration of the selected remote pressure source.

MENU	ITEM	DESCRIPTION
S05	1R	Aux Pressure #1 Range

Range calibration setting for the first remote pressure. Set to match the 'range' calibration of the selected remote pressure source.

MENU	ITEM	DESCRIPTION
S05	20	Aux Pressure #2 Offset

Offset calibration setting for the second remote pressure. Set to match the 'offset' calibration of the selected remote pressure source.

MENU	ITEM	DESCRIPTION
S05	2R	Aux Pressure #2 Range

Range calibration setting for the second remote pressure. Set to match the 'range' calibration of the selected remote pressure source.

13.19 Asset Configuration

Figure 49 - T1 Display View for Asset Configuration

① Compressor Connectivity:

I-485   Fixed speed, load/unload; connected to 'T1' in AERO on Multi485 network.

(0/100%) 0% or 100% regulation

V-485 Variable Capacity/Speed; connected to 'T1' in AERO on Multi485 network.
(0 . . 100%) variable %Load regulation

I-PCB Fixed speed, load/unload; connected to 'iX' Expansion Module (option)
(0/100%) 0% or 100% regulation

Compressor Start Time:

Set to match the time that the compressor takes to start it's main motor and load. This time will typically be equivalent to the compressors 'Star/Delta' time. If unknown, the time can be established by experiment; manually start the compressor, from a stopped condition, and determine the time from pressing the start button until the compressor loads and contributes capacity output to the system.

⚠️ This time is used by the AERO for 'staggered starting' of multiple compressors and other operational calculations. An accurate time is important for successful AERO operation.

% Maximum Output Capacity

The maximum output capacity of each compressor must be set as a percentage with reference to the highest output capacity (the largest) compressor in the system. The heist output capacity compressor must be assigned with 100% capacity. Equal capacity (equal sized) compressors should be assigned the same % capacity value.

For example:

Compressor 1	5 m³/min	25%
Compressor 2	10 m³/min	50%
Compressor 3	12 m³/min	60%
Compressor 4	12 m³/min	60 %
Compressor 5	20 m³/min	100%
Compressor 6	20 m³/min	100%

% Minimum Output Capacity

⚠️ Only applicable for a variable output compressor (V-485).

The minimum output capacity of a variable output compressor must be set as a percentage of the compressor's maximum output scaled in accordance with the % maximum capacity output value. Minimum output capacity is regarded as the output capacity at the lowest possible speed (variable speed compressor) or the minimal output achievable (stepping or other variable regulation control compressor).

For example 1:
For a variable speed compressor that has been assigned a maximum capacity output percentage of 100%, and is able to reduce speed to 50% of maximum speed:
Minimum Output Capacity = 50%

For example 2:
For a variable speed compressor that has been assigned a maximum capacity output percentage of 50%, and is able to reduce speed to 50% of maximum speed:
Minimum Output Capacity = 25%

For example 3:
For a 3-step (0/50/100) reciprocating compressor that has been assigned a maximum capacity output percentage of 60%, the minimum output capacity is the half-output regulation step:
Minimum Output Capacity = 30%

% Minimum Efficiency

⚠️ Only applicable for a variable output compressor (V-485).

The minimum efficiency point is regarded as the speed, or step, below which another smaller capacity compressor in the system could achieve the equivalent output at a higher efficiency.

The percentage value is directly related, and scaled, to the maximum and minimum output percentage values.

For example:
For a variable speed compressor that is able to reduce speed to 50% of full speed, which has been assigned a maximum output capacity of 50% and a minimum output capacity of 25%.
If another compressor in the system is able to provide 60% of the compressor's full speed output more efficiently, set the % Minimum Efficiency value to 30%. This percentage value represents 60% of the full speed output of the compressor.

When the compressor is detected as operating below the % Minimum Efficiency value the system management unit will re-evaluate utilisation and re-configure, if possible, to utilise a smaller capacity compressor, or combination of compressors. This process is automatic and executed dynamically in accordance with prevailing operational conditions at the time.

The intent of this feature is to prevent a variable output capacity compressor operating at minimal speed, or minimal output, for prolonged periods of time. Generally, a variable output compressor operating at minimal capacity is less efficient than a smaller capacity compressor that is able to achieve the same output at higher, or maximum, output capacity.

13.20 Zone Control
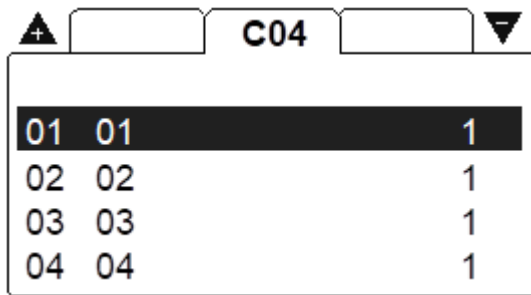
Figure 50 - Zone Control on T1

C04 - 01   Zone; Compressor 1
to
C04 – 'n'   Zone; Compressor 'n'

'n' = number of compressors in the system.

◯◯ Each compressor in a system can be assigned to one of three zones.

⚠ To inhibit zone control, set all compressors to zone '1'.

13.21 'T1' Diagnostics
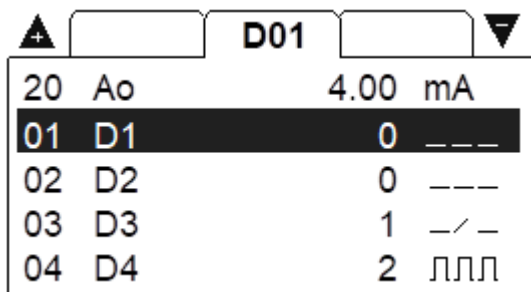
Figure 51 - Diagnostics on T1

The unit is equipped with comprehensive diagnostic functions. Each input can be examined individually and each output can be manually activated or manipulated individually.

'T1' Controller Diagnostics:

Digital Inputs:

—╱—   OFF (open circuit)

———   ON (closed circuit)

ЛЛЛ   Pulsing

The pulse signal from an 'i-PCB' is 0V to 24VDC at 50/60Hz. A typical DC voltage meter, or multimeter, will detect this as 12VDC +-4V.

Relay Outputs:
Each relay output can be energised and de-energised manually by selecting the item. Use Up(plus) and Down(minus) to adjust and Enter.

Analogue Inputs:
The item will alternate between the detected value and the electrical measurement on the controller input terminals. An independent measuring device can be used to check the displayed electrical measurement.

A1:   System Pressure, 4-20mA
A2:   Air Flow Sensor, 4-20mA
A3:   2nd Pressure, 4-20mA

Analogue Output:
The analogue output can be manually adjusted. Use Up(plus) and Down(Minus) to adjust and Enter. The output will return to normal operational value upon menu exit.

13.21.1 'T1' Screen and LED Panel Diagnostics

MENU	ITEM	DESCRIPTION
DO2	SI	Screen Invert
DO2	LT	LED Panel Test

0 = on test
1 = all on
2 = control test

13.21.2 'DI8RI4' Diagnostics

MENU	ITEM	DESCRIPTION
DO3	D1-D8	'XPMDi8R4' Digital input #1 - #8
DO3	R1-R4	'XPMDi8R4' Output Relay #1 - #4

Follow 'T1' Diagnostics

13.21.3 Software Version

To display T1 software version: press and hold Reset Key the press Escape

13.22 Virtual Relay Automation
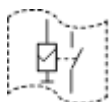
Virtual Relay automation is a configurable system wide automation feature. The feature allows output relay functions to be configured to respond to any 'virtual relay' condition, status or signal function available in the AERO or from another compatible unit on the network.

A separate 'Virtual Relay Automation' publication fully describes it's use as well as offering a number application examples / scenarios.

The Virtual Relay Automation feature requires a high level understanding of both 'application' and 'electrical automation'.

Contact SUPPORT for more information.

SUPPORT does NOT extend into designing virtual relay automation schemes or routines!

AERO owners / operators seeking assistance with designing virtual relay automation schemes or routines should contact SALES.

13.23 Following the Configuration

IN THE EVENT OF POWER FAILURE, SOME SETTINGS CAN BE LOST!

TO PREVENT THIS, FOLLOWING CONFIGURATION OF THE AERO T1, IT IS IMPORTANT TO 'POWER CYCLE' THE AERO.

BY POWER CYCLING THE AERO YOU ARE COMMITTING CONFIGURATION DATA FROM VOLATILE MEMORY INTO NON-VOLATILE MEMORY.

14. Step 2: Local AERO Configuration

Complete Step 1 'Configuring the AERO T1' before proceeding to Step 2 or 3!

Whereas Step 1 focused on harnessing control of Assets, gathering additional data from around the system (e.g. Pressure data) and the deployment of the Asset & Pressure Control Strategy, Step 2 focuses on the local User Interface display settings.

Local display settings manage how information is displayed at both the local TOUCH display and via LAN access.

After describing local TOUCH display settings, this section continues to clarify how operators can use the LAN access feature as well as any differences.

The user interface is functionally the same on the local AERO screen as on a PC that is connected to the Local LAN and browses to the Dashboard of the AERO.

Remark: Screens shots taken in this document are made using a LAN connected PC.

14.1 Power up

With power applied the AERO Touch display will initialise it's internal systems. During this time a series of boot sequences can be observed. Once complete AERO's dashboard will display...
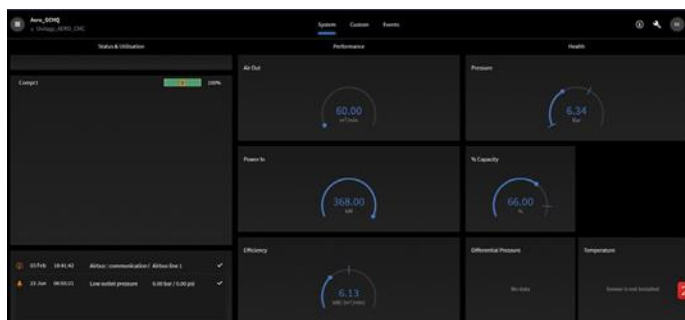
Figure 52 - Dashboard on AERO

Observe that variation in dashboard can exist relative to configuration settings

Information displayed is provided by the AERO 'server PC' which is concealed within the interior of the AERO door assembly.

The server PC...

- · Sends and receives data with the 'AERO T1' and 'UNI-TAG' (both are housed within AERO itself!)
- · Provides local TOUCH display access to configure some 'AERO T1' parameters (such as the 'pressure schedule' feature). Accessible 'AERO T1' parameters are limited to those used for 'daily operation'
- · Returns a web-page to USERS with LAN access to the AERO

It's useful to understand that AERO Users are logging onto the 'server PC'!

When any text or numeric data is to be entered or edited, an on-screen keyboard will appear...

Figure 53 - Local on screen keyboard

14.2 Logging in

A default 'VIEW' account exists to provide VIEW only access to AERO. Two further User types can exist; 'USER' and 'ADMIN'.

AERO is pre-configured with a default VIEW and a single ADMIN account.

Using the user Avatar located top right of the display, enter your Login ID & Password details. Once logged in, you can use the user Avatar to view and edit the account profile and to log back out...
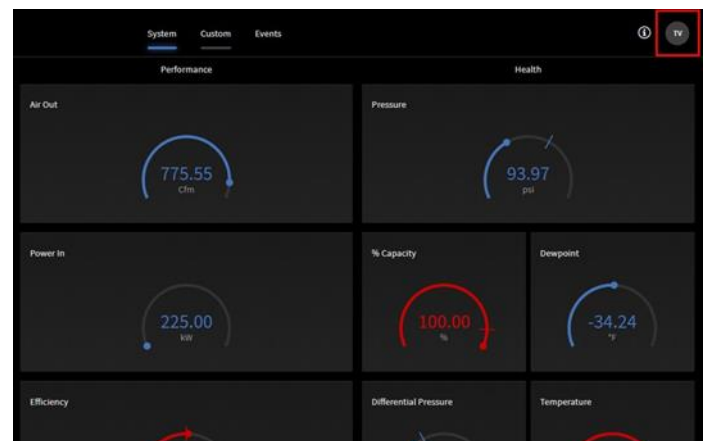
Figure 54 - Right Top: User button

Observe that...

- You need to be logged in as an ADMIN to complete Step 2, 'configuration of the Aero touch display'
- ADMIN Login & Passwords are intentionally not printed in this publication
- When first supplied, AERO is configured with a single ADMIN Login & Password
- After 30 minutes of inactivity the AERO will revert to default VIEW
- Users with ADMIN rights can create additional user accounts

14.3 Reaching the Configuration pages

Browse to the dashboard on the AERO:

Click the Menu button top right
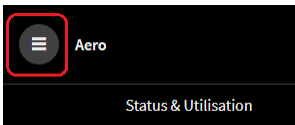
Figure 55 - AERO screen - the Menu button

Select "Devices":
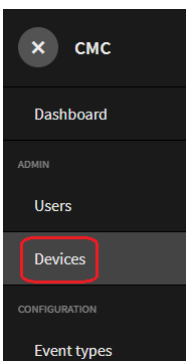
Figure 56 – Devices selection in the Menu bar

Click the Edit button (highlighted):
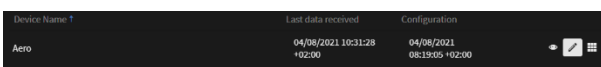
Figure 57 - Edit button for the AERO

Brings up the Edit Page:
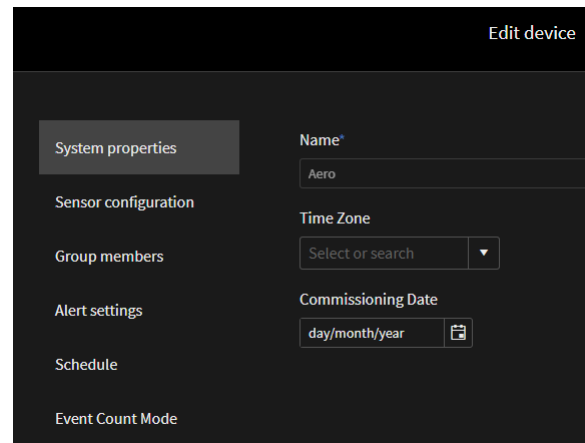
Figure 58 - Edit Page

Here you can select

- System properties
- Sensor Configuration
- Group members
- Alert settings
- Schedule
- Event Count Mode

These will be explained one by one in the next chapters.

14.4 System properties

See Figure 56 – Devices selection in the Menu bar

- Name: is fixed to "Aero" (cannot be adapted)
- Time Zone: fill in according to your time zone
- Commissioning Date: informative, fill in the date the system is commissioned

14.5 Sensor configuration

⚠️ Local System management on AERO (nor in AirCloud) does not provide a manner to set up the hardware connectivity of sensors. For instance: setting up the range of a pressure sensor (0 ... 16 bar or 0 ... 32 bar). This is written directly in the configuration file which is done at the factory during the production of the AERO. If required, this can be adapted by CMC NV technical support and installation people.

In Local System management in AERO / Sensor configuration, you manage the appearance of the related gauges on the desktop.

The Sensor Configuration page:
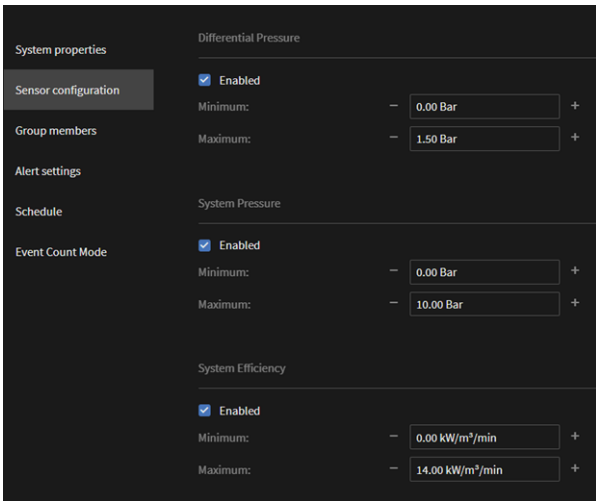
Figure 59 - Sensor configuration - local AERO interface - part 1
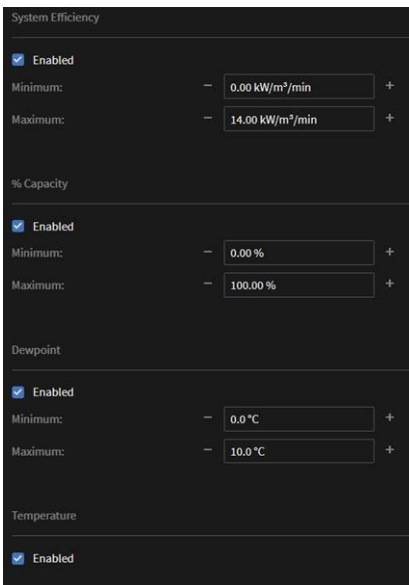
Figure 60 - Sensor configuration - local AERO interface - part 2

The "Enable" click button allows to make use or not of the related measurement
For instance, if we unselect the Enable button for the Dewpoint, we get on the dashboard:
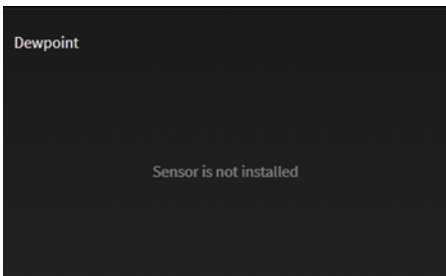
Figure 61 - Result of unselecting the Enable button related to a measurement

⚠️ If Alert Setting levels (see further) might be set outside of the range defined in "Sensor configuration", this will overrule the settings in Sensor configuration. For instance: suppose you set for Differential Pressure a Minimum on 0 Bar and a

Maximum on 1.5 Bar in Sensor configuration, but you would set in Alert settings the alert level Maximum to 2 Bar, the gauge will be adapted accordingly, to also cover 2 Bar. However this should be considered "bad practice".

14.5.1 <u>Differential Pressure</u>
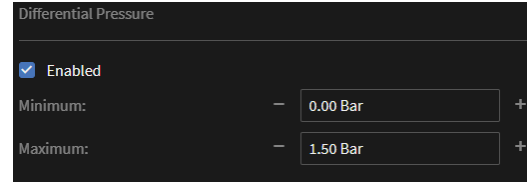
Figure 62 - Differential Pressure sensor configuration on local AERO interface

This allows to set the range of the gauge of the sensor:

Figure 63 - Gauge and related setting of the range as appearing on local AERO dashboard

Remark that automatically about 10% extra is range is provided at max.

Figure 64 - 10% reserve on top of Maximum

14.5.2 <u>System Pressure</u>
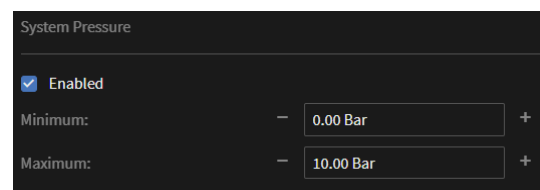
Figure 65 - System pressure sensor configuration on local AERO dashboard

Same rules apply as for the Differential Pressure sensor configuration.

14.5.3 Efficiency
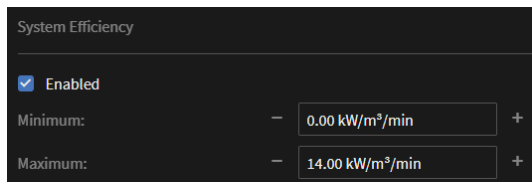
Figure 66 - Efficiency sensor configuration local AERO screen

Same rules apply as for the Differential Pressure sensor configuration.

14.5.4 % Capacity
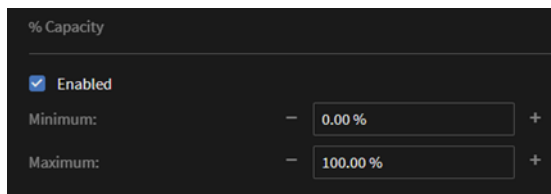
Figure 67 - % Capacity gauge configuration local AERO display

Same rules apply as for the Differential Pressure sensor configuration.

14.5.5 Dewpoint

Figure 68 - Dewpoint sensor configuration local AERO display

Same rules apply as for the Differential Pressure sensor configuration.

14.5.6 Temperature

The temperature gauge has a fixed range between -20 °C (-4 °F) and 100 °C (212 °F).
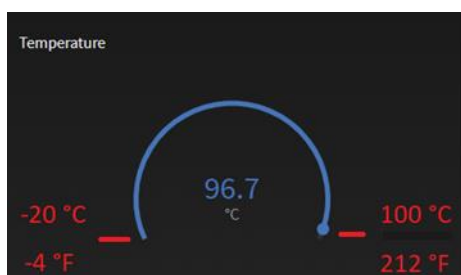
Figure 69 - Temperature gauge fixed range on the local AERO display

14.5.7 What about Air Out?

On the local AERO dashboard, there is also a 'Air Out' gauge. However, it appears this is not configurable in this sensor configuration page. So how does it know its range?

The range is deducted from the settings in "Group Members" (see related chapter)
For instance, if we have:

Figure 70 - sum of full load capacity defines max of Air Out gauge

The sum of all maximum fill load capacities here is 11 m3/min.
In this case, as a result, the corresponding gauge automatically ranges between 0 m3/min and 11 m3/min:

Figure 71 - relation of the member group settings to the range of the gauge

14.5.8 What about Power In?

On the local AERO dashboard, there is also a 'Power In' gauge. However, it appears this is not configurable in this sensor configuration page. So how does it know its range?

The range is deducted from the settings in "Group Members" (see related chapter)
For instance, if we have:

Figure 72 - How Group Member settings impact the range of the Power In gauge

Here, the sum of the Full Load Powers is 26 kW. This results in the following rage:
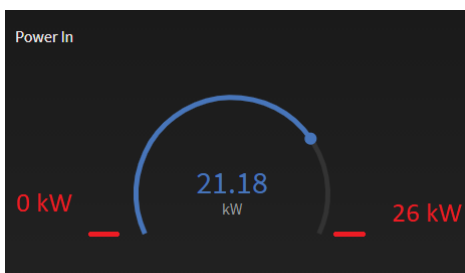
Figure 73 - Range of Power In gauge based on Group Members configuration

14.5.9 Push to Device

So far however, the UniTAG in the AERO is not updated yet (see also 10.7 The concept "Push To Device"). A "Push to Device" is needed.

Therefor take these steps:
- After having the save button click, you have:
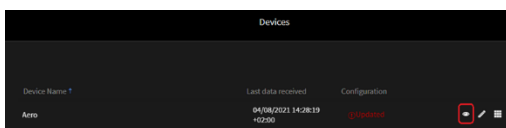
Figure 74 - Devices page

- Click on the "eye" button, you get:
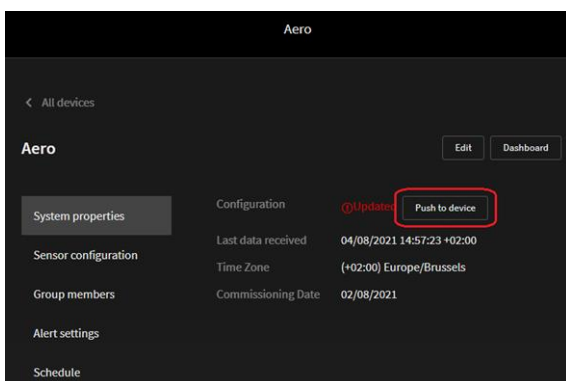
Figure 75 - Push to Device : store the settings on the UniTAG

- Push the button "Push to Device" to store the data in the UniTAG.

14.6   Group Members

The term 'Group Members' refers to the interfaces with the Assets used in the AERO system. Each of these is a 'Member', together they are the 'Group'.

As a remark: It is assumed that the T1 in the AERO is properly configured.

⚠️ An installation should either have all compressors equipped with an AirTAG or none of the compressors equipped with an AirTAG. A mixed mode is not supported.

Configuration Page:

Figure 76- Configuration of Group Members

Fields used:
- Nr
  nr of the compressor asset as used in the T1
- In Use
  This check box is set if the compressor is in use
- Asset ID
  The name of the asset as used on the System Dashboard on the AERO
- Type
  An Asset is either "load/unload" or "variable".
- Full load power
  See further
- Min load power
  See further
- Full load capacity
  See further
- Min load capacity
  See further
- Asset
  See further

14.6.1Some words on Full and Min values

We refer to:

- Full load power
- Min load power
- Full load capacity
- Min load capacity

Essential is the way Power consumption (Power In gauge) and Flow (Air Out) are calculated on the AERO. There is a significant difference with and without AirTAGs installed.

14.6.1.1 Metacentre only

When we have no AirTAGs installed, the Metacentre provides at any moment in time, for each asset, a percentage.
The Status of the Asset (loaded / unloaded) is also provided.

When the Status of an Asset is Unloaded, power in and flow are 0.

When it is Loaded, the percentage value retrieved is used to calculate the actual Power In and Air Out interpolating between the related Min load and Max load numbers as provided in the referred values entered in the configuration page.

14.6.1.2 AirTAGs included

When AirTAGs are installed, the Power In and Air Out values are not calculated but they are directly retrieved from the installed AirTAGs.

How the AirTAGs retrieve these numbers is depending on their configuration.

14.6.1.3 Gauge Range

Note, the numbers edited in these fields are also used for the gauge ranges as explained in 14.5.7 What about Air Out? and 14.5.8 What about Power In?

14.6.2 How to configure the AirTAGs as Group Member

When you have an installation without AirTAGs, you have to leave all the 'Asset' fields empty (represented by '-').

When you have AirTAGs installed, you need to provide an identification for all of these AirTAGs.

This identification is constructed as such:

'*ArticleNumber*'-'*SerialNumber*'

Hence, suppose:

- Article Number = Y18TICS78
- Serial Number = 12345678

Then you need to fill in:

Y18TICS78-12345678

⚠️ You can find this information on the Stickers on the AirTAGs.

14.6.3 How to edit the content of these fields

Of the compressor you want to edit: click the edit button on its line:
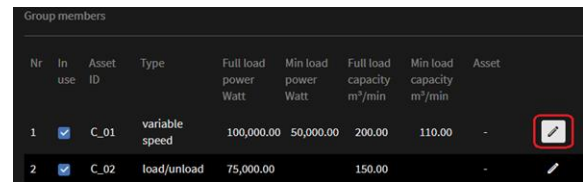
Figure 77 - Edit button for group member

You get:
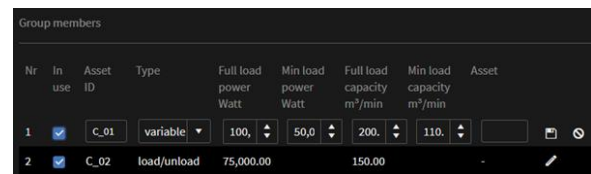
Figure 78 - Editing mode entered

Each of the fields can now be edited.
Once the fields you want to edit are done, you click the save button for that Asset:
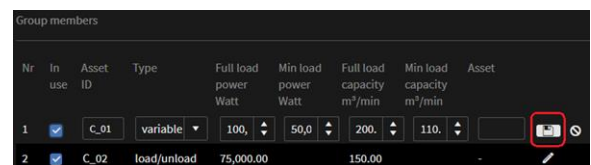

Figure 79 - Saving the adaptations for the Group Member

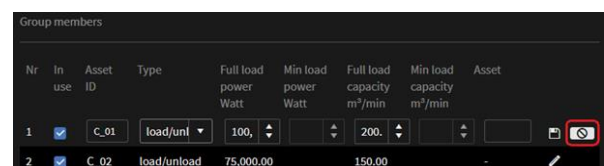In case you are not sure ... you can click the Cancel button for the Asset:

Figure 80 - Let's cancel what we tried

14.6.4   Push to Device

So far however, the UniTAG in the AERO is not updated yet (see also 10.7 The concept "Push To Device"). A "Push to Device" is needed.

Therefor take these steps:
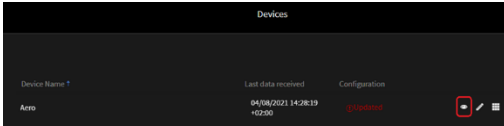
· After having the save button click, you have:

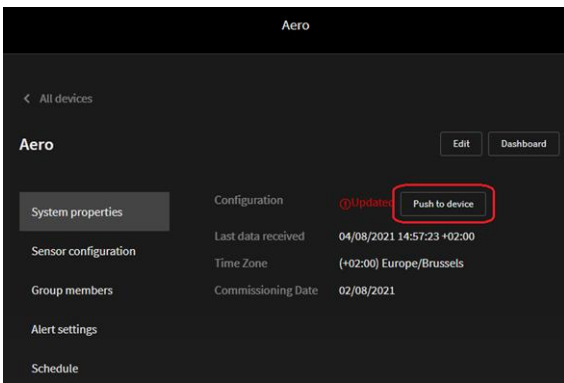**Figure 81 - Devices page**

· Click on the "eye" button, you get:

Figure 82 - Push to Device : store the settings on the UniTAG

· Push the button "Push to Device" to store the data in the UniTAG.

14.7   Alert settings (local AERO screen)

This page allows to control the behavior of a number of gauges on the screen of the AERO (or a PC connected to the Local LAN).

⚠️   These alert settings do not trigger events. Events are triggered from AirCloud and hence configured there.

The configuration page:
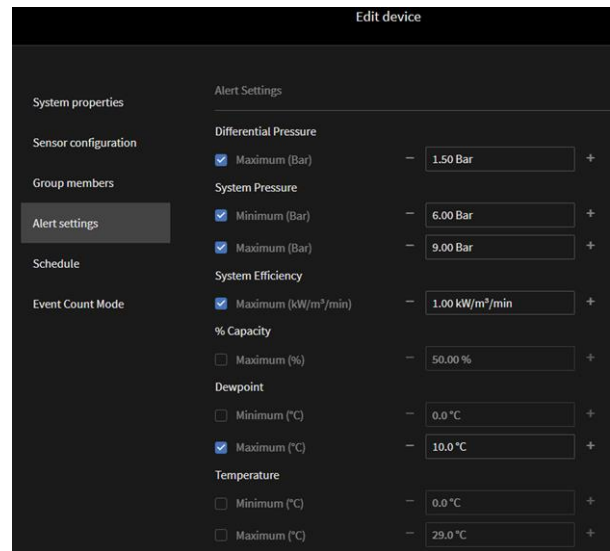
Figure 83 - Alert Settings page on AERO

Some measurements have a Max only, some have both Min and Max.

For instance, the above System Pressure (having both Min and Max) alert setting results in:

Figure 84 - Alert setting: both Minimum and Maximum Alert levels are set

If there is only one Alert level set (such as above with Dewpoint), we get:
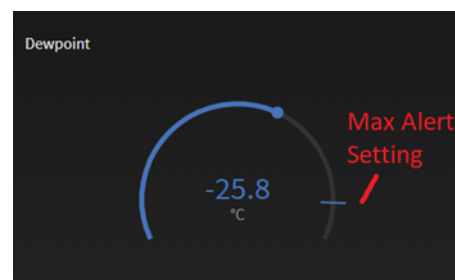
Figure 85 - Alert setting: Maximum Alert level is set

When the measured values is either below a Minimum Alert level or above a Maximum Alert setting, the gauge will color red, clearly indicating to the user that some values is beyond its limits. For example:

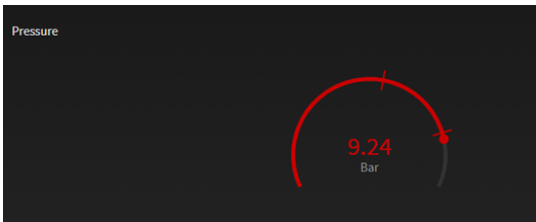**Figure 86 - Value below Minimum level**

.. or :

Figure 87 - Value above Maximum level

⚠️ For these settings, Push to Device is not needed.

14.8 Schedule

This pages relates to the Scheduling functionality. It tells the system which Table (defined on the level of the T1 in the AERO) should be used when. These Tables are set up during the configuration of the T1.
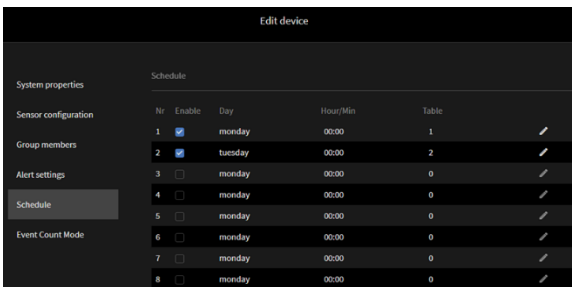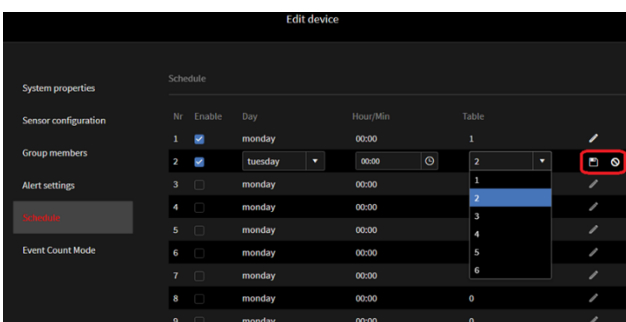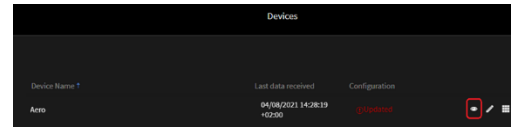

Figure 88 - The Schedule management page

Controlling these settings is similar to what is explained under "Group Members"

For instance:

Figure 89 - how to set up Schedule

So far however, the T1 in the AERO is not updated yet (see also 10.7 The concept "Push To Device"). A "Push to Device" is needed.

Therefor take these steps:
- After having the save button click, you have:

Figure 90 - Devices page

- Click on the "eye" button, you get:
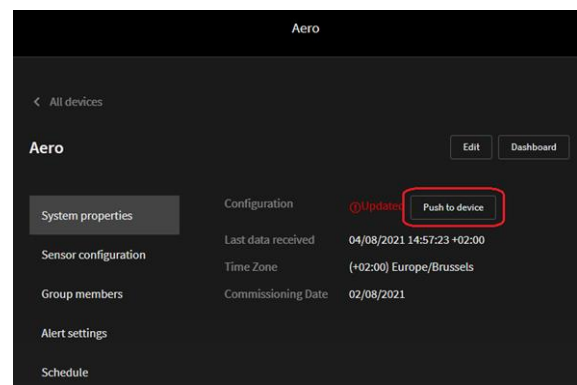
Figure 91 - Push to Device : store the settings on the T1

- Push the button "Push to Device" to store the data in the T1.

14.9 Event Count Mode

Not yet supported from AERO local interface. It is however supported from AirCloud.

It is advised to set up Event Count Mode in AirCloud.

15. Step 3: Configuration in AirCloud

To complete Step 3 you will require an Aircloud login ID and Password with access to the Tenant in which the AERO (and – if in use – the related AirTAGs) are installed. If you do not have an Aircloud login ID and Password, then contact your Airmatics service provider.

Using an internet connected PC and PC browser, navigate to the Aircloud login screen and login with your ID and Password.

Note that Step 3 requires ADMIN rights to the Aircloud environment.

Using Aircloud, an array of DEVICES including AERO combine to deliver a simple cloud based air compressor monitoring, performance and control solution that provides real time data, analytics and insights at the push of a button. Furthermore, Airmatics is a scale-able multi-tenant IOT platform meaning that it can provide login access to an array of devices and installations.

Herein, Step 3 focuses on Aircloud settings associated with AERO only!

After login, a list and map of accessible installations will display. Use the menu button located top left of the browser display to reveal the DEVICES menu

Next, use the Search tool to locate the AERO device requiring configuration...

Observe that

On Aircloud, SYSTEM PROPERTIES, GROUP MEMBERS, SENSOR CONFIGURATION and
ALERT SETTINGS can be edited.

⚠️ Some of the standard settings of the UniTAG will be irrelevant for an AERO implementation.
We assume you have a user account with admin rights on AirCloud
We assume you know the name of the UniTAG residing in the AERO you want to manage.

⚠️ Assure that (when used) the AirTAGs reside under the same tenant as the UniTAG installed in the AERO.

---

[2] Mind AirCloud does not support logging in with email address

⚠️ Assure that (when used) all AirTAGs are properly configured (sensors, …)

Follow these steps to get to configuration:

· Using PC, using your preferred browsed, go to the AirCloud site (if you don't know the correct URL, contanct AirMatics Service Provider).
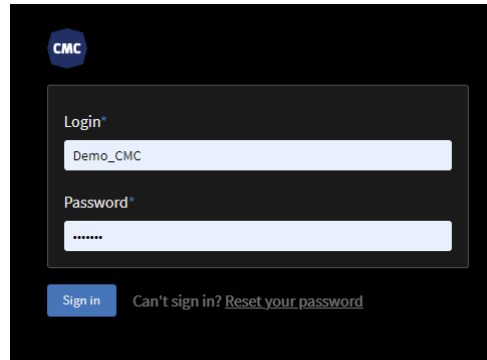· Log in with your user name[2] and password

Figure 92 - Log in on AirCloud

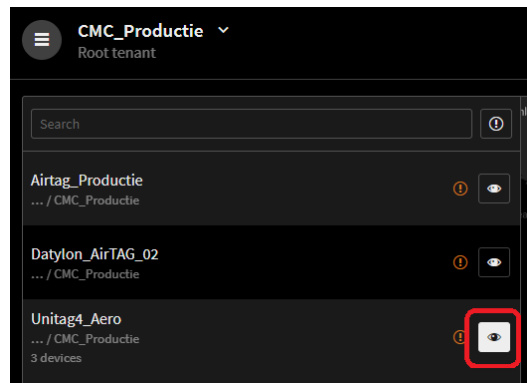· Go to the UniTAG dashboard using the following button:

Figure 93 - Go to UniTAG dashboard
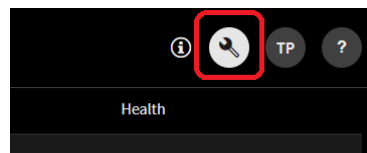
· Click the Device Settings button on the right top:

Figure 94 - Device Settings button on AirCloud
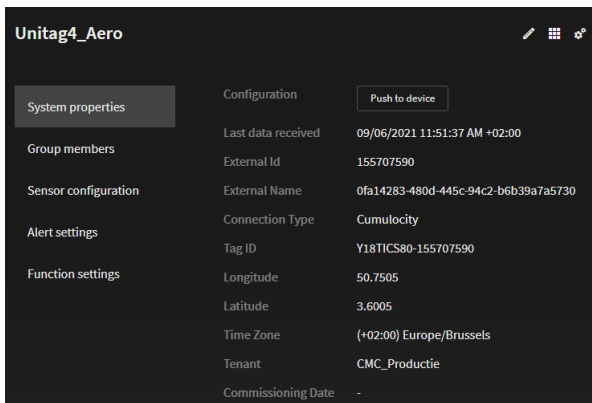
Which results in:

Figure 95 - Settings page

- You are currently looking to the values of the settings, in order to be able to edit these, click the 'Edit' button.

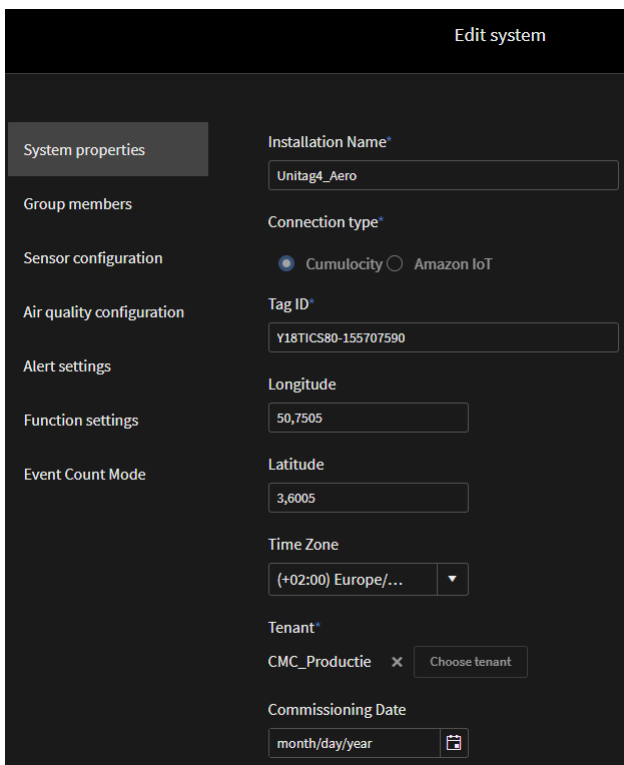This brings you to the page where you can edit the settings.

Figure 96 - Edit Page for UniTAG in AERO in AirCloud

On the left side, you have a bar with various sub-sets of configuration items you can select by clicking on it.

- System properties
- Group members
- Sensor configuration
- Air quality configuration (Not relevant in the context of UniTAG / AERO installations)
- Alert settings
- Function settings (Not relevant in the context of UniTAG / AERO installations)
- Event Count Mode (Not relevant in the context of UniTAG / AERO installations)

The relevant items will be handled one by one in the following paragraphs.

15.1 System properties

See Figure 96 - Edit Page for UniTAG in AERO in AirCloud.

15.1.1 Installation name

The Device name / Installation name is the name used to identify the device / Installation in list view.

15.1.2 Connection type

⚠️ This is preconfigured when the device is manufactured. Leave untouched.

15.1.3 Tag ID

⚠️ This is preconfigured when the device is manufactured. Leave untouched.

15.1.4 Longitude and Latitude

Many freely available browser based tools exist to help establish longitude and latitude values for a geographic location. Establish the latitude and longitude for the location of the AERO device and complete configuration. Doing so will accurately position the AERO device on map view!

15.1.5 Time Zone

Set up according to the Time Zone in which the AERO is installed.

15.1.6 Tenant

Tenants are used to associate the device with the correct branch or hierarchy and most often this has been factory configured.

15.1.7 Commissioning Date

Fill in the date of system commissioning.

Assure to click "Save" after configuration of these parameters is done.

15.2   Group Members

Figure 97 - Group Member configuration in AirCloud

It is worthwhile having a look at 14.6 Group Members where this is explained for local AERO configuration.

Configuration in AirCloud is similar, but having similar but also different purposes.

⚠️   It is essential to keep data in AirCloud in sync with the data on the local AERO (for instance 'Name', 'Full load', etc).

⚠️   In AirCloud, when an AirTAG asset is defined (see further), more items are dissembled when comparing this to the local AERO configuration. This is due to the fact that in AERO, these items are also used for other purposed (such as setting the range of some gauges on the local AERO dashboard).

⚠️   Figure 97 - Group Member configuration in AirCloud is to some extend misleading as you have a mix of members with AirTAG and members without AirTAG (this is done for the sake of this documentation). Assure that when you save Group Member configuration settings either all Group Members are with or all Group Members are without AirTAGs.

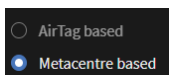The selection AirTAG based / Metacentre based always should be on Metacentre based:

Figure 98 - For AERO : always select "Metacentre based"

Similar between AirCloud and local AERO:

· In Use: set identical in AirCloud as it is set on local AERO
· Type: set identical in AirCloud as it is set on local AERO

· Full Load capacity: set identical in AirCloud as it is set on local AERO (only editable when no AirTAG is selected under 'Asset')
· Full load power: set identical in AirCloud as it is set on local AERO (only editable when no AirTAG is selected under 'Asset')
· Min Load capacity: set identical in AirCloud as it is set on local AERO (only editable when no AirTAG is selected under 'Asset')
· Min load power: set identical in AirCloud as it is set on local AERO (only editable when no AirTAG is selected under 'Asset')

The 'Asset' field

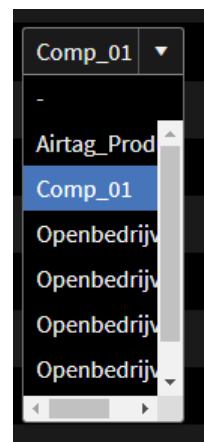⚠️   This acts differently from local AERO configuration.

Figure 99 - Asset selection: drop down of available AirTAGs in the Tenant

The drop down provides a list of the available AirTAGs under the tenant in which the UniTAG resides.

Here you can select an AirTAG which is still available for selection (obviously an AirTAG can only be selected once).

Assure to click "Save" after configuration of these parameters is done.

⚠️   When configuration is done properly before on the local AERO, a Push to Device is not required from the AirCloud environment. However, if everything between AirCloud and local AERO is in sync for Group Members, a Push to Device will not impact the operation of the system.

15.3   Sensor configuration
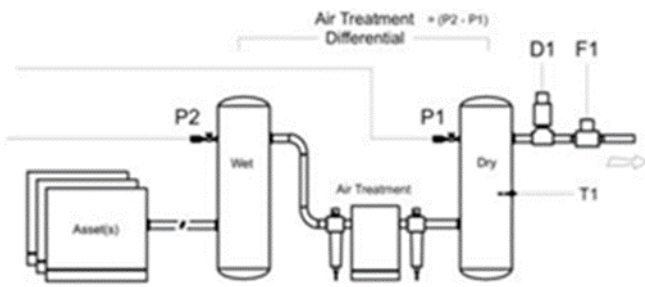
AERO sensor configuration covers the following...

Figure 100 - Sensors configured - location in system

- · P1: SYSTEM PRESSURE (MANDATORY)
- · P2: GENERATION PRESSURE (OPTIONAL)
- · D1: DEWPOINT SENSOR (OPTIONAL)
- · F1: AIR FLOW SENSOR (OPTIONAL)
- · T1: TEMPERATURE SENSOR (OPTIONAL)

The same impact on the gauge ranges (but then from AirCloud perspective) apply (see Figure 64 - 10% reserve on top of Maximum).
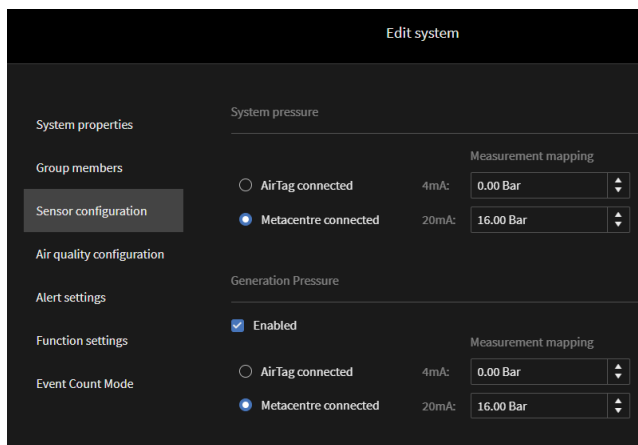

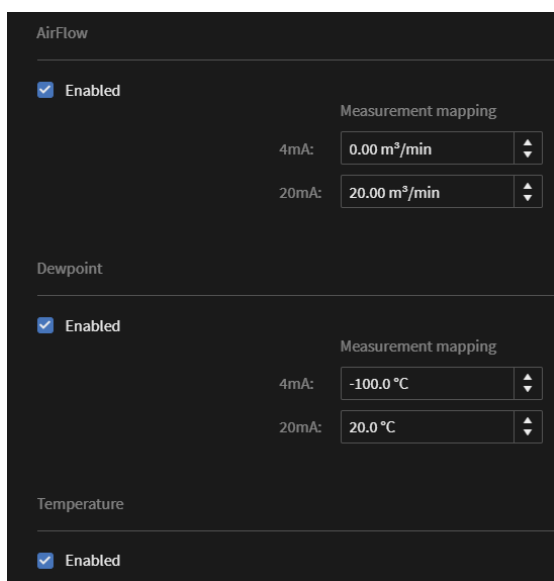**Figure 101 - AirCloud based Sensor configuration for UniTAG in AERO – part 1**

Figure 102 - AirCloud based Sensor configuration for UniTAG in AERO – part 2

15.3.1 System pressure

Always set to 'Metacentre connected'

Here you can also specify the range of the 4 – 20 mA sensor (min and max pressure levels).

15.3.2 Generation Pressure

Always set to 'Metacentre connected'

Here you can also specify the range of the 4 – 20 mA sensor (min and max pressure levels).

15.3.3 AirFlow

If a physical AirFlow sensor is installed and connected to the AERO, the 'Enabled' check box needs to be set.
If such AirFlow sensor is not installed, the 'Enabled' check box needs to be unset.
In the case no such sensor is installed, the value for AirFlow is either calculated from data provided by Metacentre or retrieved from the AirTAGs (if these are installed).

Here you can also specify the range of the 4 – 20 mA sensor (min and max flow levels).

See also 14.6.1 Some words on Full and Min values

15.3.4 Dewpoint

If a physical Dewpoint sensor is installed and connected to the AERO, the 'Enabled' check box needs to be set.
If such AirFlow sensor is not installed, the 'Enabled' check box needs to be unset.

15.3.5 Temperature

If a physical Temperature sensor is installed and connected to the AERO, the 'Enabled' check box needs to be set.
If such Temperature sensor is not installed, the 'Enabled' check box needs to be unset.

Scaling of the AirCloud based gauge is done automatically, see also 14.5.6 Temperature.

15.3.6 Push to Device

Assure to click "Save" after configuration of these parameters is done.

Sensor configuration needs to be "Pushed to Device".
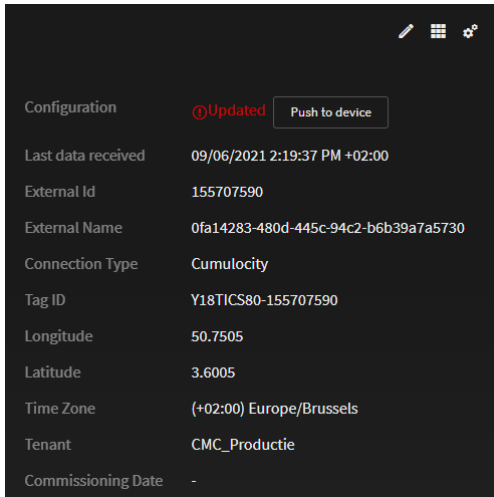
Steps:
- After 'Save' has been pressed:

Figure 103 - After 'Save' : screen to apply a Push to Device

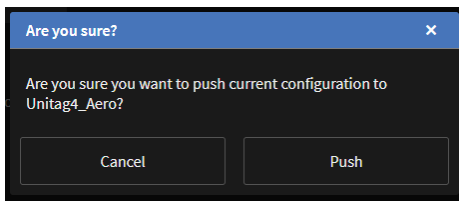- Click the button 'Push to Device'
- And confirm:

Figure 104 - Confirm you want to Push to Device

15.4   Alert Settings

See also 14.7 Alert settings (local AERO screen).

⚠️ On the local AERO display you can also configure "Alert Settings' (see 14.7 Alert settings (local AERO screen)). These settings control the color of the related gauge on the AERO. The Alert setting configuration from the AirCloud perspective also provide means to trigger related events and (if configured) email messages.

The Events will be listed in the "Events" tab on the AirCloud interface – both in AirCloud and on the local AERO display.
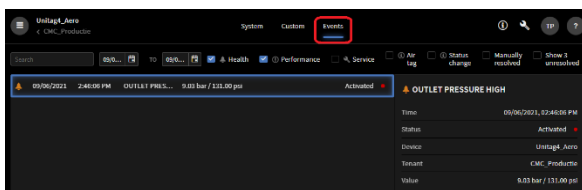

Figure 105 - Example of Event as seen on AirCloud Events tab

Figure 106 - On local AERO screen: indication of most recent event
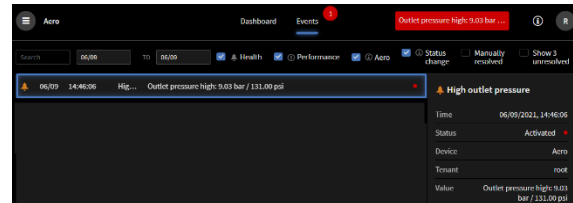

Figure 107 - Example of the same Event, now seen on the local AERO screen

The minimum and maximum settings will impact the color of the related gauge in the dashboard on AirCloud, similar to local AERO.
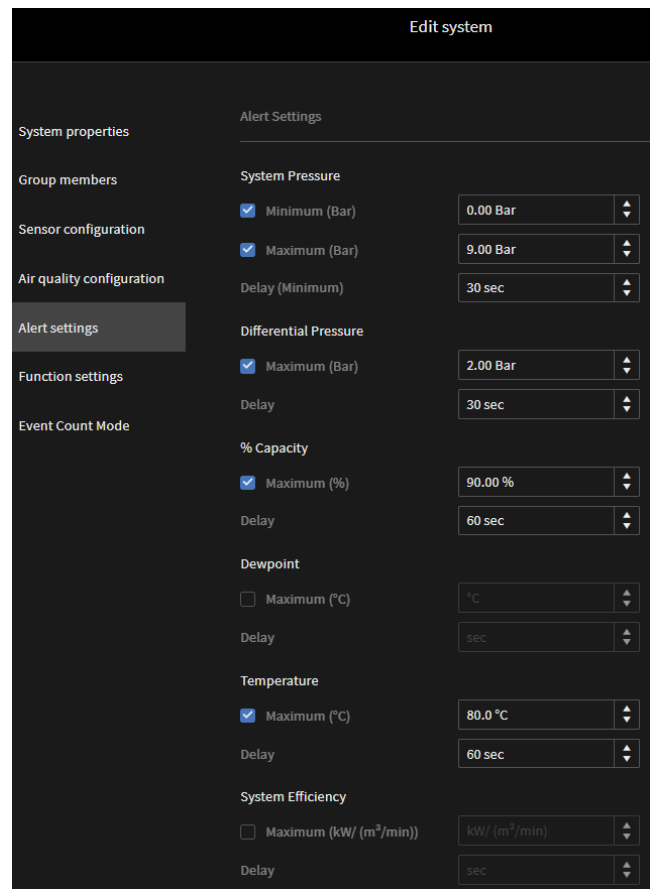

Figure 108 - Alert Settings - configuration in AirCloud

15.4.1 The purpose of 'Delay'

In all Alert Settings measurements, you can set a 'Delay'. This is used to filter condition accuracy.

For example, of you wanted to set a Minimum and/or Maximum System Pressure alarm condition and ignore small momentary minimum or maximum pressure alarm events, then set 'Delay' to an acceptable value.

15.4.2 Push to Device

Alerts are processed in the UniTAG in the AERO.
Hence a Push to Device is required.
Assure to click "Save" after configuration of these parameters is done.

Sensor configuration needs to be "Pushed to Device".
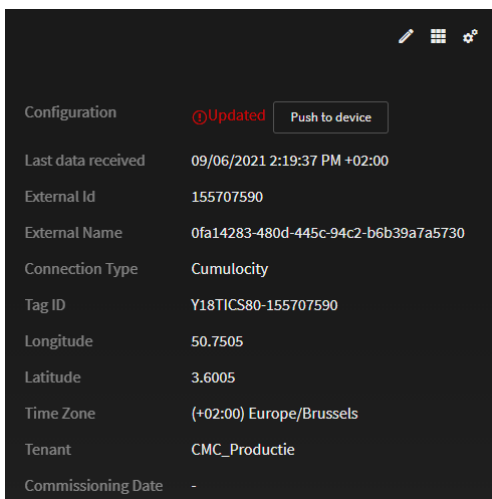
Steps:
- After 'Save' has been pressed:

Figure 109 - After 'Save' : screen to apply a Push to Device

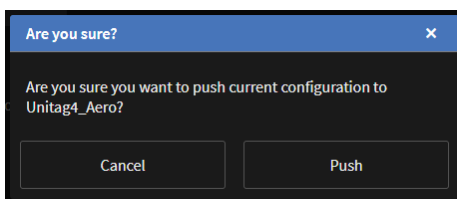- Click the button 'Push to Device'
- And confirm:

Figure 110 - Confirm you want to Push to Device

16. Operation – T1

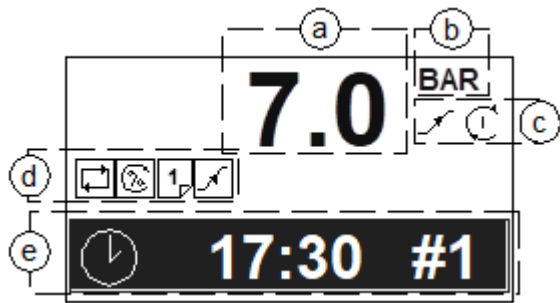## 16.1 'T1' User interface – Graphical display

Figure 111 - 'T1' Display

a)   System Pressure Value
b)   System Pressure Units
c)   Unit Status
d)   Unit Active Functions
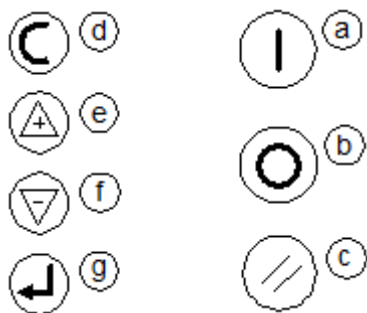e)   User Menu Item

16.2 'T1' Keypad

Figure 112 - Keys on the 'T1'

a)   Start
b)   Stop
c)   Reset
d)   Escape (Cancel)
e)   Up (Plus)
f)   Down (Minus)
g)   Enter

16.3 Unit Status

System Pressure:

- Increasing to normal operational levels (Prefill, target pressure change or at system start)
- Below the active lower, or load, pressure set point
- Between the lower, or load, and upper, or unload, active pressure set points
- Above the upper, or unload, active pressure set point

Unit Status:

- Stopped
- Standby
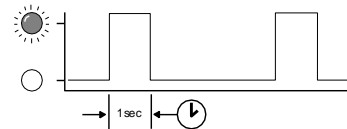- Started and Running
- Alarm (Warning)
- Shutdown (Trip)

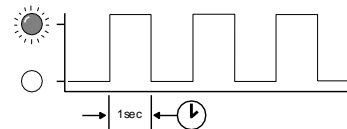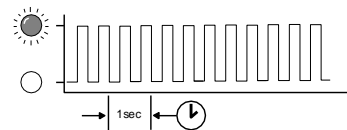## 16.4 LED indicators

Indicators

- Off
- On

Intermittant:

Slow Flash:

Fast Flash:

16.5 'T1' Unit Indicators

✓ Unit Run Indicator (Green LED)

- OFF – Not Active, Stopped
- Slow Flash: Active, Standby Mode
- ON – Active, Running

⚠ Unit Fault Indicator (Red LED)

- Fast Flash: Shutdown (Trip)
  Slow Flash: Alarm (Warning)

(!) The XC fault indicator does not indicate compressor fault states; see Compressor Status Indicators.

16.6   Asset Status Indicators

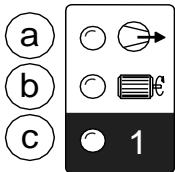On the LED panel on the front door:

Figure 113 - Per asset - LED indicators

Each compressor in the system has a set of dedicated status indicators. The indicators will continuously show the status of each compressor at all times.

a) Load Status

  ○   OFF – Not Loaded, Offload
  ☼   Slow Flash – The compressor has been requested to load but is not loaded (load or re-load delay period)
  ●   ON – Loaded

b) Run Status

  ○   OFF – Not Running
  ☼   Slow Flash – The compressor has been requested to load but is not running (blowdown delay or other start delay)
  ●   ON – Running

c) Available (Started)

  ○   OFF – No Commpressor Connected
  ☼   Fast Flash – Not Available, Shutdown Fault or Stopped
  ☼   Slow Flash – Alarm (Warning)
  ☼   Intermittent Flash – The compressor has been intentionally removed from service.
  ●   Available, OK

16.7   System alarms
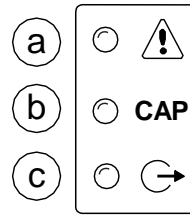
Figure 114 - System LEDs

a) Group Compressor Fault

  ○   OFF – All Compressors OK
  ☼   Fast Flash – One or more compressors Not Available, Shutdown Fault or Stopped
  ☼   Slow Flash – One or more compressors Alarm (Warning)

b) Insufficient Capacity Alarm (Warning)

  ●   On – Insufficient Capacity

c) Restricted Capacity Alarm (Warning)

  ☼   Slow Flash – Restricted Capacity

16.8   Unit Functions

Operating Mode:
⊟ Equal Hours Run
⊞ Timer Rotation
⊠ Energy Control

Active Functions:
⤸ Power Failure Auto-Restart
[1] Table #1 Active
[2] Table #2 Active
[3] Table #3 Active
[4] Table #4 Active
[5] Table #5 Active
[6] Table #6 Active
[X] Standby Mode Active
⤴ Prefill Function
⧉ Zone Function
⧗ Pressure Schedule
⧄ Function Inhibited (manual override)
✍ Remote Manual Override

16.9   User Menu

A number of User menu information displays are available on the screen of the 'T1' that can be accessed directly from the front panel using the Up and Down navigation buttons.

16.9.1 Real Time Clock

```
🕐     17:30    #1
```

17:30 (24hr system)
#1 = Monday to #7 = Sunday

16.9.2   Compressor Detailed Status

```
①     A:  100%    ↻→
```

Compressor 1
'A' (Duty) sequence assignment
'100%' percentage load

Status Symbol:

↻ Standby
↻ Running, Offload
↻→ Running, Loaded

#🔧 Removed From Service in Table Priority Selection (# = Table Number)

🔧 Removed From Service in Long Term Maintenance Menu

✕🔧 Removed From Service by Short Term I-PCB Maintenance Switch Function

⚠ Alarm (Warning)

❗ Not Available, Shutdown (Trip), Stopped

⬛ Network Communications Error (RS485 connectivity only)

The detailed status of each compressor in the system is shown separately.

16.9.3   Primary Detected Pressure

```
⇨●⇦     7.0    bar
```

The pressure detected on the unit's primary pressure sensor.

ⓘ   When using remote pressure balancing functions, the main display 'control' pressure may differ from the primary detected pressure.

16.9.4   Second Pressure Input

```
⇨●⇦     6.9    bar
   2
```

The second local pressure value.

16.9.5   Differential Pressure

```
△P     510  mBar
```

The differential pressure between the Primary and 2nd Pressure sensor inputs.

ⓘ Only displayed if the 2nd Pressure sensor function is selected for air treatment pressure differential monitoring.

16.9.6   Remote Pressure #1

```
⇨●⇦     7.2    bar
   1
```

The first remote pressure value from a remote source. Used for the Pressure Balance Function.

ⓘ Only displayed if the Pressure Balance Function is activated and the first remote pressure has been selected.

16.9.7   Remote Pressure #2

The second remote pressure value from a remote source. Used for the Pressure Balance Function.

ⓘ Only displayed if the Pressure Balance Function is activated and the second remote pressure has been selected.

16.9.8   Next Scheduled Sequence Rotation

The next scheduled sequence rotation:
     00:00   Time (24hr system)
     #1   Monday

ⓘ A setting of zero hundred hours (00:00hrs) on Monday (#1) equates to a sequence rotation at one second past midnight on Sunday.

16.10   Information Displays

↵ To view detailed information applicable to the selected User menu display item press Enter.

Ⓒ Press Escape to return to the normal user menu display items.
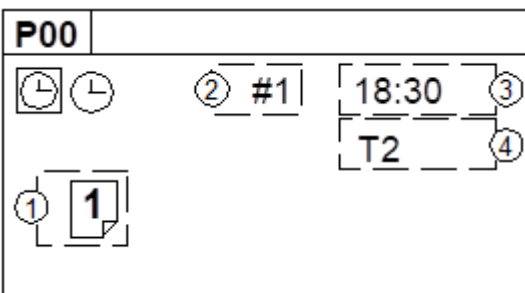
16.10.1   Real Time Clock

Figure 115 - Information Real Time Clock

Shows the next Pressure Schedule event.

1:     The Current Active Table
2:     Day (#1=Monday, #7=Sunday)
3:     Time (24hr system)
4:     Table

ⓘ Items 2 and 3 show the day and time that the unit will change to use the 'Table' shown in item 4.

16.10.2   Compressor Status
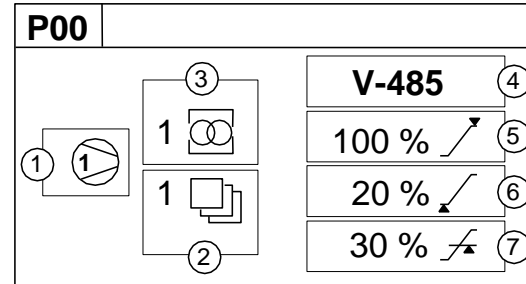
Figure 116 - Information Compressor Status

     Compressor Number
2:     Priority Setting
3:     Zone Allocation Setting
4:     Compressor/Connection Type
5:     Maximum Capacity % Setting
6:     Minimum Capacity % Setting
7:     Minimum Efficiency % Setting

ⓘ Item values 6 and 7 are only shown if compressor type is V-485 (variable capacity/speed).

16.10.3   Primary Detected Pressure

Figure 117 - Information Primary Detected Pressure

1:     Active Table
2:     Upper (Unload) Pressure Set Point
3:     Lower (Load) Pressure Set Point
4:     Minimum Pressure Alarm (Warning)

16.10.4   Differential Pressure

```
┌─────────────────────────┐
│ P00 │                   │
│ ─────┘                  │
│        ┌──────────────┐ │
│        │ △P  1.0 bar  │ ①
│        ├──────────────┤ │
│        │ └t┘ 30 sec   │ ②
│        ├──────────────┤ │
│        │     P2(SYS)  │ ③
│        └──────────────┘ │
└─────────────────────────┘
```
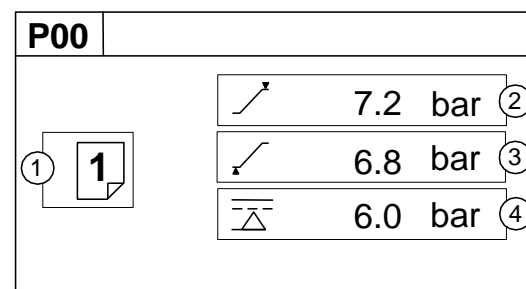
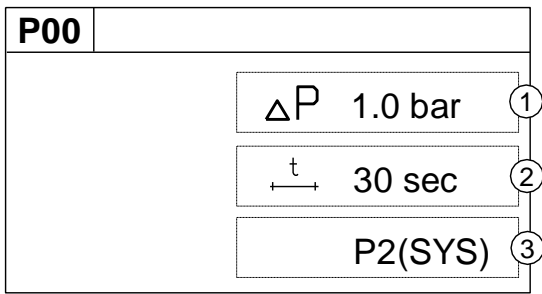**Figure 118 - Information Differential Pressure**

1:    Alarm (Warning) Level
2:    Alarm (Warning) Delay Time
3:    Source of 2nd Pressure

⊙ Only show if the 2nd pressure sensor is activated in air treatment pressure differential mode.
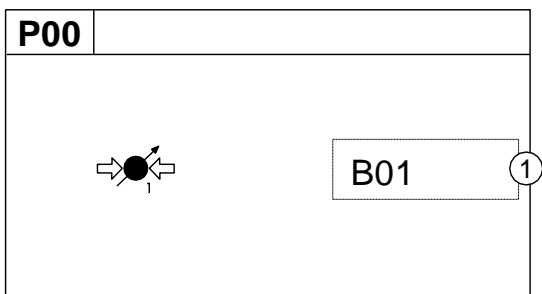
16.10.5   First Remote Pressure

```
┌─────────────────────────┐
│ P00 │                   │
│ ─────┘                  │
│                         │
│   ⇨●⇦      ┌─────────┐  │
│    1       │  B01    │  ①
│            └─────────┘  │
│                         │
└─────────────────────────┘
```

Figure 119 - Information 1st Remote Pressure

1:    Source of 1st Remote Pressure

⊙ Only show if pressure balancing function active.

16.10.6   Second Remote Pressure

```
┌─────────────────────────┐
│ P00 │                   │
│ ─────┘                  │
│                         │
│   ⇨●⇦      ┌─────────┐  │
│    2       │  B02    │  ①
│            └─────────┘  │
│                         │
└─────────────────────────┘
```
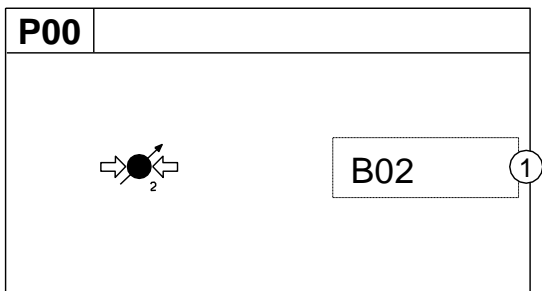
Figure 120 - Information 2nd Remote Pressure

1:    Source of 2nd Remote Pressure

⊙ Only show if pressure balancing function active and 2nd remote pressure in use

16.10.7   Sequence Rotation

```
┌─────────────────────────┐
│ P00 │                   │
│ ─────┘                  │
│                         │
│  ⟳ 🕐    #4      18:00  │
│                         │
│          18 / 05 / 2006 │
│  🕐                     │
│          A B C D        │
└─────────────────────────┘
```
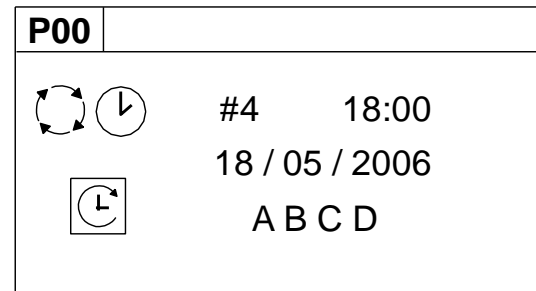
Figure 121 - Information - Sequence rotation

⟳ 🕐 Day of the week (#4: Thursday), the time of day (18:00) and the date (18/05/2006) of the next automated sequence rotation event.

🕐 The active 'mode' of operation

"ABCD" The current active rotation sequence assignment.

16.11   Manual Sequence Rotation

The sequence assignment can be manually rotated at any time. When viewing the 'Sequence Rotation' information screen press Enter:

✋ ⟳ The manual rotation symbols will appear and flash. Press Enter again to execute a manual rotation or Escape to abandon the manual rotation.

Automated sequence rotation is not disrupted by a manual rotation; the next scheduled automated sequence rotation event will still occur.

16.12   Asset Identification

Each compressor connected to the AERO will have a unique assigned compressor identification number; starting at compressor 1 increasing sequentially to the number of compressors connected to the AERO.
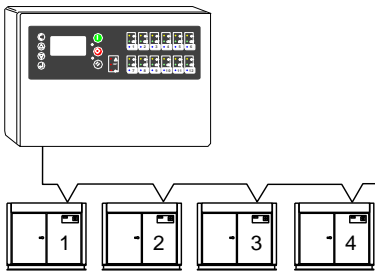
Figure 122 - Compressor identification for the T1

16.13 Stop

To stop the AERO press the Stop button.
The AERO will respond dependant on the setup of item 'CF' in menu S02:

✗ Pressure regulation control is automatically transferred back to each compressor. The compressor(s) will continue to operate using the pressure settings programmed or set in the individual compressor controller(s).

✔ The XC will hold each compressor in an offload state. If the compressor is equipped with a main motor run-on-time function the compressor will run offload for a period of time and then stop in to a 'standby' or 'auto restart' state.

16.14 Start

To start the AERO press the Start button.
If the 'Start Function' is enabled there will be a period of time before any compressor is requested to load

⚠ To manually skip the Start function, press and hold Start for several seconds.

If the Prefill function is enabled, and system pressure is below the set prefill pressure, the system will enter Prefill mode for the set Prefill time.

16.15 Pre-Fill

To manually skip the Prefill function, press and hold Start for several seconds.

When Prefill is complete, if applicable, the AERO will enter normal operating mode.

The AERO will operate in accordance with the parameters and options set in the active 'Table'.

General note: Each Asset in the system must be started (running or in a standby or auto restart condition) before AERO control of the Asset can be established.

16.16 Power Failure and Auto-Restart

⟲ If the power failure auto-restart function is enabled the AERO will automatically start, when power is restored after a disruption or failure, if the AERO was in a 'started' state when the power disruption or failure occurred.

The AERO will not automatically restart if the AERO was in a stopped state when the power disruption or failure occurred.

16.17 Failure Mode

If the AERO experiences a disruption to normal control, or an AERO shutdown fault occurs, pressure regulation control is automatically transferred back to each compressor. The compressor(s) will continue to operate using the pressure settings programmed or set in the individual compressor controller(s).

16.18 Reset

⊘ To reset an AERO Alarm (Warning) or Shutdown condition press Reset.

Compressor Alarm (Warning) conditions are automatically reset when the condition has been resolved and reset on the compressor.

Compressor Not Available (Shutdown, Trip) conditions are automatically reset when the condition has been resolved and reset on the compressor; and the compressor has been restarted.

16.19 Asset Fault Indications

Asset fault conditions are displayed by the Asset indicators and in the user menu status screen. Compressor fault conditions are not regarded as AERO unit fault conditions

16.20 Fault Codes

Fault codes are separated in to unit faults '**ERR**' and system Alarms (Warning) '**SYS**'.

ERR: Unit faults are errors with the XC controller itself and are all conditions that prevent normal operation from continuing.
SYS: System faults are items that arise from conditions external to the XC controller; the XC itself continues to function correctly.

There are two types of Fault condition:
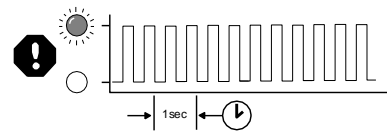
Alarm (Warning):
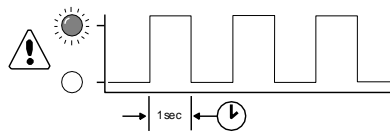
The Fault LED will 'slow flash' to indicate an Alarm (Warning) condition. An Alarm (Warning) indicates that the XC is continuing with normal operation but user attention is required.

All Alarm (Warning) conditions are registered in the AERO Error Log.

All Alarm (Warning) conditions must be manually reset.

Trip (Shutdown):

The Fault LED will 'fast flash' to indicate a Trip (Shutdown) condition.

A Trip (Shutdown) condition will stop normal operation of the AERO. Pressure regulation control will automatically revert to the individual compressors that will continue to operate using the pressure settings for their own control systems.

All Trip (Shutdown) conditions are registered in the AERO Error Log. All Trip (Shutdown) conditions must be manually reset.

Codes:

Each individual fault has a unique numeric code.

ERR.01   Pressure Sensor Fault

The signal from the control pressure sensor is out-of-range (<3.5mA or >21.8mA).

ERR.02   Flow Sensor Fault

The signal from the airflow sensor is out-of-range (<3.5mA or >21.8mA).

ERR.03   2nd Pressure Sensor Fault

The signal from the 2nd pressure sensor is out-of-range (<3.5mA or >21.8mA).

ERR.04   Internal 24V Fault

The 24VDC power supply, internal to the unit's controller, is below 19.2V (internal controller fault)

ERR.05   Emergency Stop

The wire link between terminals '+C' and 'C1' of the unit's controller is open circuit. These terminals are permanently connected together on the XC Terminal PCB: this error will never occur in normal operational circumstances.

ERR.06   Real Time Clock Error

The Real Time Clock device, internal to the unit's controller, has failed.

ERR.07   XPM-LED Module Error

Data communications with the internal XPM-LED (Status LED Display) module have been disrupted or lost.

ERR.08   XPM-Di8R4 Module

Data communications with the internal XPM-Di8R4 module have been disrupted or lost.

ERR.09 ⚠ XPM-Di8R4 Module

Short Circuit condition detected on internal XPM-Di8R4 module.

ERR.10 ⚠ I-PCB Expansion Module C1-4

Data communications with the external I-PCB Expansion module 'C:1-4' have been disrupted or lost.

ERR.11 ⚠ I-PCB Expansion Module C1-4

Short Circuit condition detected on external I-PCB Expansion module 'C:1-4'.

ERR.12 ⚠ I-PCB Expansion Module C5-8

Data communications with the external I-PCB Expansion module 'C:5-8' have been disrupted or lost.

ERR.13 ⚠ I-PCB Expansion Module C5-8

Short Circuit condition detected on external I-PCB Expansion module 'C:5-8'.

ERR.14 ⚠ I-PCB Expansion Module C9-12

Data communications with the external I-PCB Expansion module 'C:9-12' have been disrupted or lost.

ERR.15 ⚠ I-PCB Expansion Module C9-12

Short Circuit condition detected on external I-PCB Expansion module 'C:9-12'.

SYS.01 ⚠ ▽ Excess Pressure (PM)

Pressure has exceeded the set Maximum Pressure Limit.

SYS.02 ⚠ △ Min Pressure (Pm)

Pressure has fallen below the set Minimum Pressure Limit (see 'Tables')

SYS.03 ⚠ ⚠ Start Function Feedback

Start Function Feedback signal did not occur or has been lost during operation.

SYS.04 ⚠ Capacity Alarm (Warning)

Insufficient Capacity; all available compressors are loaded and pressure is still decreasing.

SYS.05 ⚠ Remote Alarm (Warning)

Auxiliary Input Function 'AA'

The auxiliary Input is set for 'Alarm (always active)' function and is in a Fault condition.

SYS.06 ⚠ Remote Alarm (Warning)

Auxiliary Input Function 'AR'

The auxiliary Input is set for 'Alarm (active when unit running)' function and is in a Fault condition.

SYS.07 ⚠ Remote Trip (Shutdown)

Auxiliary Input Function 'TA'

The auxiliary Input is set for 'Trip/Shutdown (always active)' function and is in a Fault condition.

SYS.08 ⚠ Remote Trip (Shutdown)

Auxiliary Input Function 'TR'

The auxiliary Input is set for 'Trip/Shutdown (active when unit is running)' function and is in a Fault condition.

16.21　Internal 'T1' Fault Codes

'E' code errors are specific to the unit's 'internal to controller' digital logic circuits and will only occur in the most exceptional of circumstances.

All 'E' code conditions are Trip (Shutdown) type faults. The 'Fault' (red) LED will 'fast flash' and the condition is registered in the Error Log. If an 'E' code fault condition persists, consult your product supplier for advice or renew the unit's controller.

E0836 PLL Unlock; Internal failure or excessively high external electrical interference detected.

The main timing circuit (processor clock) has been disrupted and the processor is running on an 'internal to chip' back-up clock.

The back-up clock is intended to keep the processor running, at a much slower processing speed, to enable emergency actions to be taken. The controller is unable to continue running the main software application in this condition.

The unit will Shutdown; compressors will continue to operate using local pressure regulation.
The controller's main power supply must be removed and re-applied to reset this condition.

E0866 Controller internal power supply fault

The low voltage logic processing power supply, internal to the unit's controller, is below minimum operational levels; internal to controller fault. Renew

the controller if this fault condition persists. The Trip
must be manually reset from the keypad.

E5000 Internal memory map error

The unit's controller has detected disruption to the
internal operational memory storage (RAM). The
integrity of the RAM memory contents are suspect;
the controller must be reset to clear and re-map the
memory. Renew the controller if this fault condition
persists.

The controller's main power supply must be removed
and re-applied to reset this condition

E5001   Internal memory failure
The unit's controller has detected disruption to the
internal permanent application memory storage
(FLASH). The integrity of the FLASH memory contents
is suspect. Re-load the main application software in
the first instance; re-new the controller if the
condition persists.
The controller's main power supply must be removed
and re-applied to reset this condition.

17. Functionalities on Local AERO Screen

This chapter provides an brief overview of the functionalities provided by the local AERO screen.

17.1   Dashboard

Figure 123 - Standard dashboard

The default view is the "dashboard"

Note following areas:

1) Access to Menu
2) Status and Utilisation view of the Assets
   a. General status of the system on top
   b. Per asset: %load, Name
3) Tabs: Dashboard and Events
   a. By default Dashboard is shown
   b. Events overview can be accessed via Events tab
4) System Control
   a. Have control of the Assets or not
5) Performance gauges
   a. Parameters related to 'Performance'; Flow, Power consumption and Efficiency
6) Health gauges
   a. Parameters related to System Pressure, % Capacity, Dewpoint, Differential Pressure, Temperature
7) User log on and settings

17.2   Trending view

When clicking on one of the gauges, one gets a view of the parameter over time.

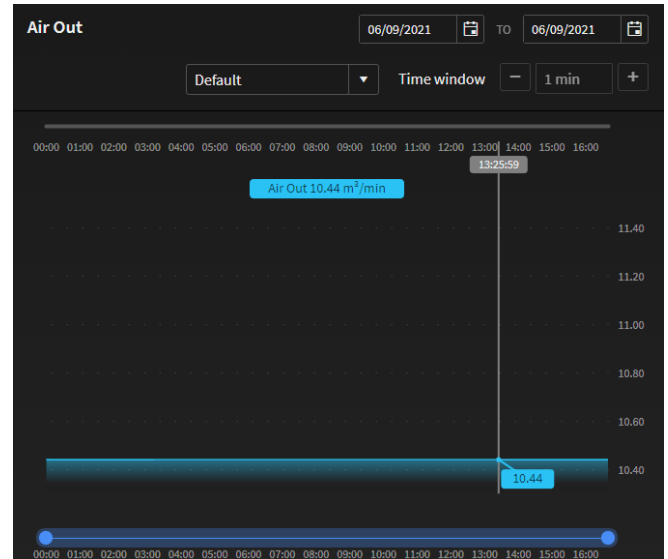On the local AERO, data is stored over 1 week.

Figure 124 - Parameter - trending over time

You can select which time frame to look at (using the dates on right top)

You have normal view or averaged, minimum or maximum value view (using the drop down and the linked Time Window.

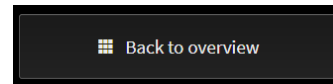One can always return to the dashboard using "Back to Overview"

Figure 125 - Go back to the dashboard
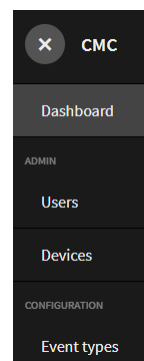
17.3   The Menu Items

Seen as Admin:

Figure 126 - Menu items for admin user
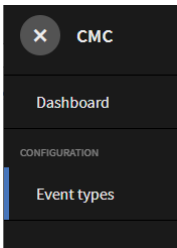
Seen as User level user:

Figure 127 - Menu times for User level user

- · Add users using [Add]
- · Look at user parameters using 👁
- · Edit user parameters using ✏
- · Delete a user using 🗑

17.4 Users log on and off

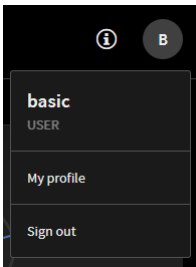Click the User log on and settings button:

Figure 128 - Logging out ... see profile

When logging out, consequently you have to re-log on when working on a PC connected to the Local LAN or, only on the local physical LCD screen, you arrive on the dashboard in view-only mode.

You can also adapt your own user profile using "My profile".

17.5 Devices

The Menu provides "Devices" (see Figure 126 - Menu items for admin user) for Admin Users.

All functionalities are explained in detail in 13 Step 1: Configure The AERO 'T1'

17.6 Users

The Menu provides "Users" (see Figure 126 - Menu items for admin user) for Admin Users.
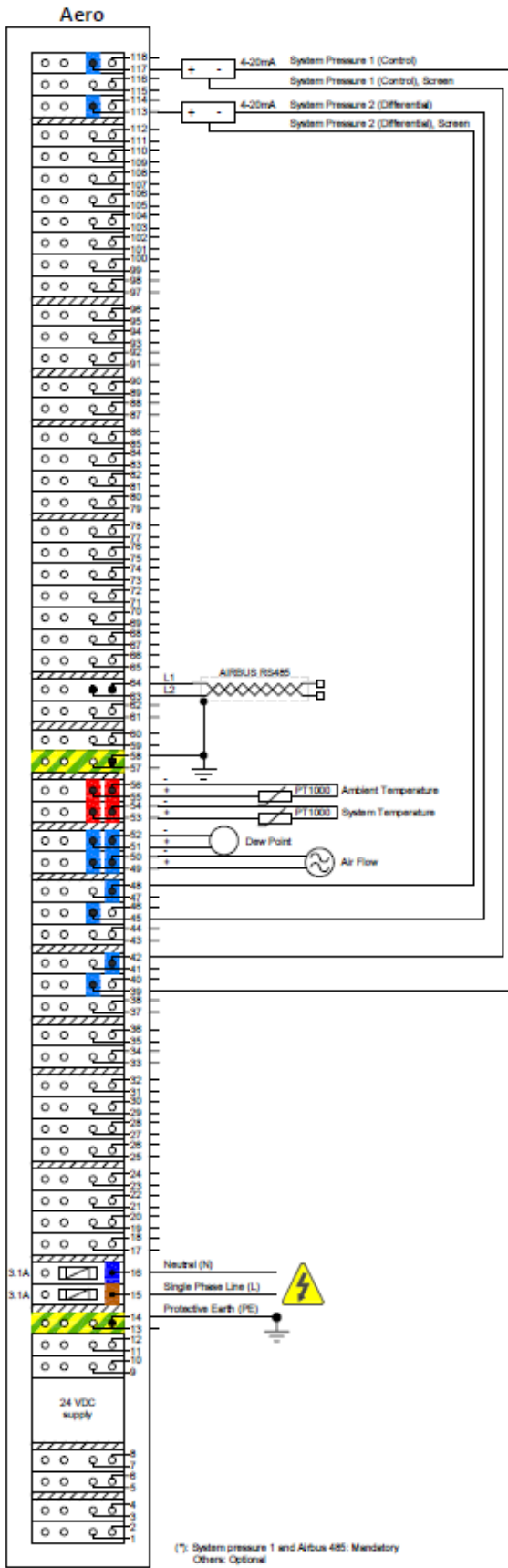

Figure 129 - User Management

You can:

18. Connection with typical sensors
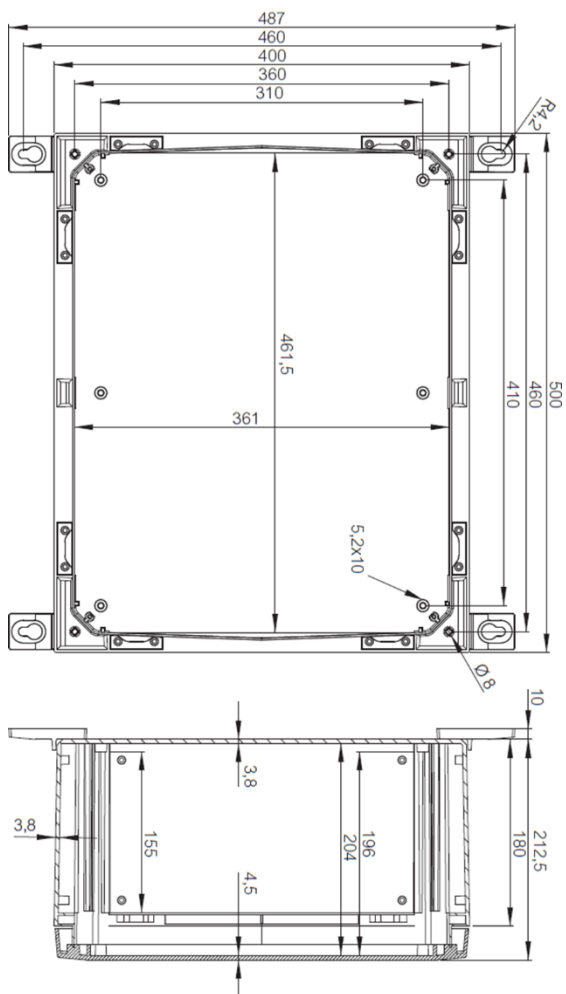
19. Enclosure dimensions

Figure 130 - Enclosure Dimensions

20. Asset Information

The following tables are provided to annotate information used as part of AERO's configuration. It's also a
useful aid memoir and may be necessary when seeking 3rd party assistance, support or service.

For up to 12 Assets, fill following form

ASSET ID	TEXT
AERO 'T1' ADDRESS	NO
MANUFACTURER	TEXT
MODEL / TYPE	TEXT
WORKING PRESSURE	BAR/PSI
FULL LOAD CAPACITY	m³/min / cfm
FULL LOAD POWER	kW
MINIMUM LOAD CAPACITY	m³/min / cfm
MINIMUM LOAD POWER	kW
OFF LOAD POWER	kW

21. Tenant

Users, Devices (AirTAG, UniTAG) and related Data all reside within a "Tenant".

Tenants are physically separated data spaces with a separate URL, own users, separate application management and no sharing of data by default.

Users in a single tenant by default share the same URL and the same data space.
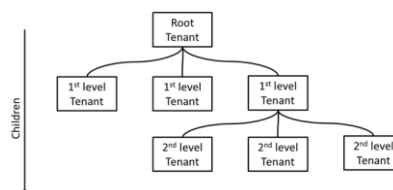

Figure 131 - Tenant Structure

22. Glossary of used terms

Asset	Typically used to describe an Air Compressor or other pump that's managed by AERO
Data Cable	RS485 or LAN cable
Gauge	A dial used on the Dashboard view
Dashboard	Main view on the local AERO screen or on AirCloud. Gives overview of all main parameters such as Pressure, Power …
User	An account on local AERO or on AirCloud, has User Name and Password. Associated level is User or Admin.
Trending view	View on parameter (for instance Pressure) with evolution over time
Tenant	A structure managing the scope of Devices and Users
AirCloud	The CMC NV Cloud solution for monitoring and interacting with AirMatics solutions
AirTAG	Box installed with an Asset, monitoring and processing various parameters of the Asset and bringing the information to AirCloud.
UniTAG	Box installed with an Compressor Sysetm, monitoring and processing various parameters of the System and bringing the information to AirCloud.
SmartTAG	Box installed with an Asset, monitoring and processing various parameters of the Asset – as well as interacting with the Asset - and bringing the information to AirCloud.
Gateway	Device managing the cellular data communication from TAGs to and from AirCloud
Metacentre	CMC NV existing product portfolio for Compressor System management
AirMatics	a cloud-based air compressor monitoring, performance and control solution that provides real time data, analytics and insights.