

BRAND-INDEPENDENT | 35 YEARS ON THE MARKET | OPEN & CONFIGURABLE COMPRESSOR MANAGEMENT

Airleader MASTER 4 and CN

Demand-based control of compressed air stations

Less idle running. Smoother operation.
A clear view of the entire station.

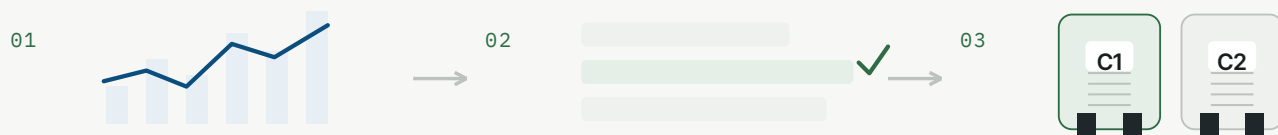


MASTER 4

CN

Airleader brings compressors of different makes and sizes together in one coordinated station. The controller matches air production to current demand and maintains pressure within a narrow shared band.

HOW THE CONTROL WORKS



Measure

Pressure, delivery rates and machine states show how the air network behaves.

Evaluate

The self-learning model determines demand and compares the available combinations.

Control

The selected compressors supply the air required. Measurements provide continuous feedback.

MASTER 4

16 Compressors
maximum

10-inch touchscreen

CN

32 Compressors
maximum

17-inch touchscreen and industrial PC

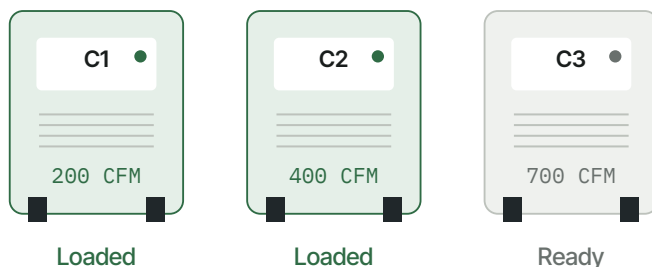
01 / DEMAND-BASED SELECTION

The right combination for current demand

Airleader evaluates pressure and pressure changes over eight time windows. Its network model learns continuously, distinguishing brief demand spikes from sustained demand.

MATCHING COMPRESSORS TO DEMAND

Example: demand of 600 CFM



$$200 + 400 = 600$$

The selected combination meets demand. C3 remains on standby.

Illustrative example; CFM = cubic feet per minute. All machines available and equally prioritised.

SELECTION ADAPTS TO OPERATING CONDITIONS

Fewer starts and less idle running

Selection considers delivery rates, starts, running hours and switching intervals. The chosen combination operates mainly under load; the smallest suitable compressor handles the remaining adjustment.

Set compressor priorities

Manual priorities assign compressors to ranks: heat-recovery units can be preferred and reserve units given lower priority. Compressors of equal rank continue to be selected automatically according to demand.

Balance motor running hours

Running hours are balanced between compressors of equal capacity. When the difference in motor running hours reaches the preset offset, Airleader exchanges the machines within the pressure band without a pressure drop.

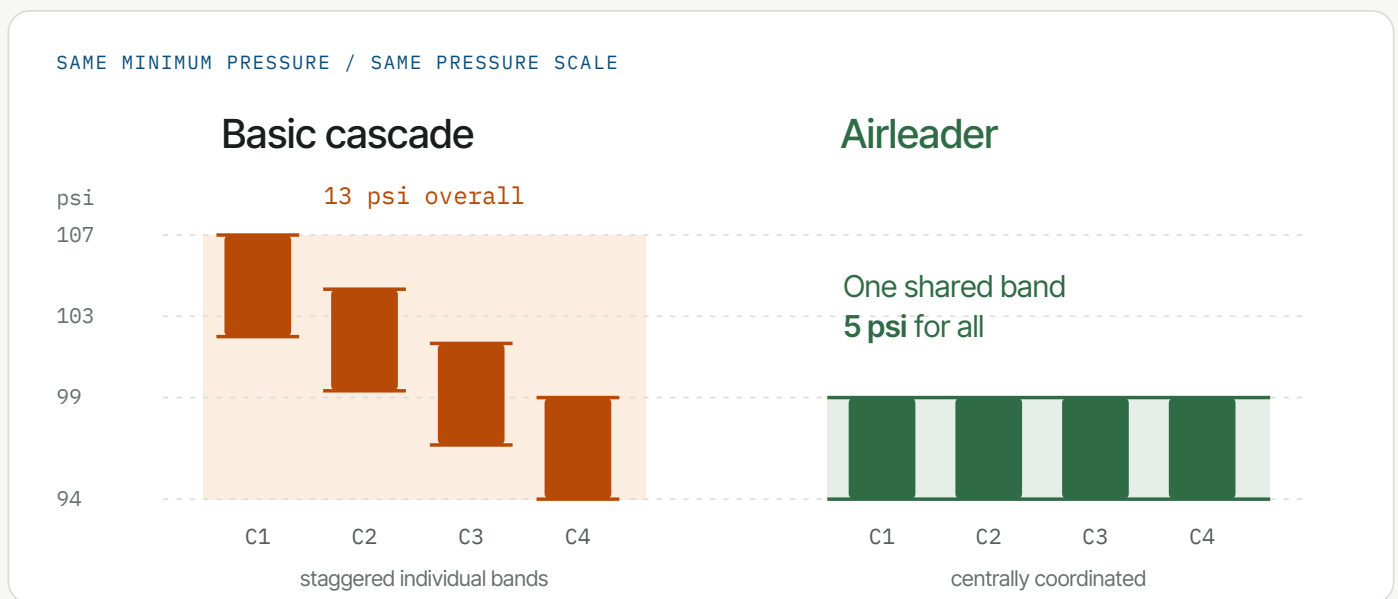
Respond to unavailable units

If a machine fails or enters maintenance, Airleader reassesses the remaining compressors and replaces its air delivery, provided sufficient capacity is available.

02 / SHARED PRESSURE BAND

More efficient control than a cascade

A basic cascade assigns staggered switching thresholds to each compressor. Airleader coordinates all machines within one shared pressure band. Additional compressors do not require another pressure step.



Example: shared band of 5 psi. The specified minimum for MASTER 4 is approx. 4.4 psi (± 2.2 psi). Achievable performance depends on network volume, demand and compressor dynamics.

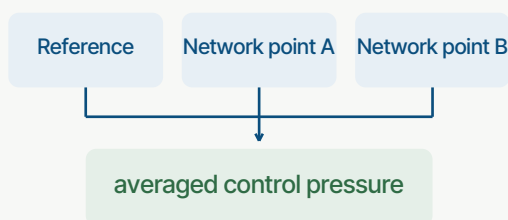
Why a cascade needs a wider band

Staggered thresholds make individual controllers respond in sequence. This increases the range between the lowest and highest pressure limits of the station.

Why a shared band helps

Airleader needs no additional pressure steps. With the same minimum pressure, the upper pressure level can be reduced, saving compression energy.

CONTROL PRESSURE FROM MULTIPLE MEASURING POINTS



The reference and up to two comparison sensors measure the same air network. The additional control-pressure sensors can be selected from up to 64 pressure sensors, depending on configuration. A lower reading reduces the average, so Airleader responds earlier to local pressure drops and can reduce pressure margins.

1.5 psi: approx. 1%

Airleader guideline for pressure reduction; actual savings depend on operating conditions. Always maintain the required minimum supply pressure.

03 / SPEED AND EFFICIENCY

Combine fixed-speed and VSD compressors

Fixed-speed compressors deliver a constant air flow under load. Variable-speed drive (VSD) compressors adjust air delivery through motor speed. Airleader makes effective use of both.

FIX-SPEED WHEN POSSIBLE

Full load for FIX-Speed, fine control for VSD

Even at the optimum operating point, variable-speed control adds losses. For the same air delivery, Airleader assumes **around 6% higher energy use** than a suitable fixed-speed machine (a guideline dependent on the machine and operating point). Where possible, FIX-Speed therefore supplies the full-load share, while the VSD handles fluctuating residual demand.

EXAMPLE / FIX-SPEED + VSD = 600 CFM

FIX-Speed: 400 CFM

VSD: 200 CFM

fixed full-load share

variable residual demand

VSD PRO

FOR MULTIPLE VSD COMPRESSORS

Coordinate several VSDs efficiently

Energy per ft³ of air

higher



low speed

high speed

Schematic curve; the efficient operating range depends on the machine.

VSD Pro coordinates the operating points of several VSD compressors. Through the integrated actual-pressure signal, units running too fast are slowed down and those running too slowly are accelerated.

Aim: keep each unit close to its most efficient operating range.

● less efficient

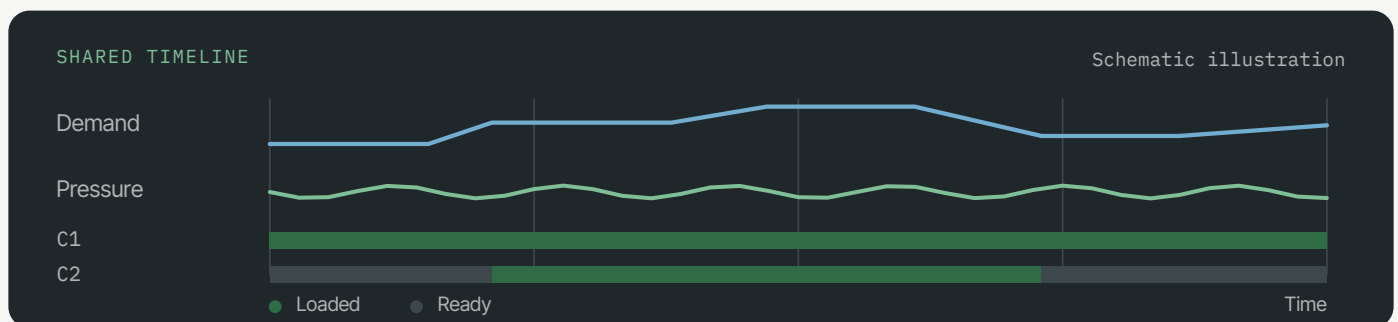
● more efficient

VSD Pro: Requires integration with the compressor's actual-pressure signal; the internal machine controller is retained. Availability and the number of actively integrated VSD compressors depend on the model, equipment and feature activation.

04 / OPERATION AND SCHEDULES

Monitor operation and set up control with ease

Set the pressure band on the touchscreen or in a browser. The station overview shows operating states, measurements, the current pressure profile and compressor priorities.



Faults, maintenance counters and due tasks are displayed and logged centrally. Optional alarm and service management forwards notifications automatically, for example by email.

REAL-TIME WEEKLY TIMER

up to

16

switching points

01 Compressor station ON / OFF

02 4 different pressure profiles

03 4 compressor priority sequences

04 2 relays ON / OFF, e.g. for dryers or valves

FOUR KEY SWITCHES

START / STOP

Switches the entire compressor station on or off.

MANUAL / AUTOMATIC

Selects local operation or automatic control by Airleader.

CLOCK ON / OFF

Enables or disables the weekly timer.

PROGRAMMING ENABLE

Allows data entry or locks settings against changes.

The four key switches connect to digital inputs on the controller module. Pressure profiles and priority sequences can also be selected via external switching contacts.

05 / ENERGY REPORTS AND SENSORS

Make energy use and wear measurable

Airleader creates daily, weekly and monthly reports for each compressor and the entire station. Sensors provide insight into energy use, compressed air quality and equipment condition.

COMPRESSOR DATA AND ENERGY CALCULATION

Illustrative monthly example

	Specific power:	0.16619 kW/CFM		Electricity price:	€0.20/kWh		Load cost:	99.42 %
	Specific energy:	0.002770 kWh/ft³		P-min:	87.0 psi		Idle cost:	0.58 %
	Compressed air cost:	0.000554 €/ft³		P-max:	95.7 psi		Total cost:	21,303.80 €

Channel	Compressor	Air delivery [CFM]		Load power [kW]		Idle [kW]	Load [h:min]	Idle [h:min]	Utilisation [%]	Switching cycles		Air volume [ft³]	Energy [kWh]			Specific energy [kWh/ft³]	Cost [€]		
		min	max	min	max					Motor	Load		Load	Idle	Total		Load	Idle	Total
01	Compressor A	-	176.6	-	30.0	8.0	100:00	10:00	90.9	24	22	1,059,440	3,000.0	80.0	3,080.0	0.002907	600.00	16.00	616.00
02	Compressor B	-	353.1	-	60.0	15.0	200:00	5:00	97.6	18	16	4,237,760	12,000.0	75.0	12,075.0	0.002849	2,400.00	15.00	2,415.00
03	Compressor C	-	529.7	-	90.0	20.0	150:00	8:00	94.9	20	18	4,767,480	13,500.0	160.0	13,660.0	0.002865	2,700.00	32.00	2,732.00
04	Compressor D	-	706.3	-	120.0	25.0	250:00	4:00	98.4	16	14	10,594,400	30,000.0	100.0	30,100.0	0.002841	6,000.00	20.00	6,020.00
05	Compressor E	176.6	882.9	35.0	145.0	12.0	300:00	2:00	99.3	12	10	12,713,280	33,000.0	24.0	33,024.0	0.002598	6,600.00	4.80	6,604.80
06	Compressor F	-	1,059.4	-	180.0	30.0	80:00	6:00	93.0	30	28	5,085,312	14,400.0	180.0	14,580.0	0.002867	2,880.00	36.00	2,916.00
Total										120	108	38,457,672	105,900.0	619.0	106,519.0	0.002770	21,180.00	123.80	21,303.80

SENSORS / FROM MEASUREMENT TO DECISION



Power and flow rate

Determine energy per ft³ and allocate consumption to individual areas.



Filter differential pressure

Detect rising pressure losses and plan filter changes according to condition.



Bearings and vibration

Track changes over time and prepare targeted inspections.



Dew point

Monitor moisture in compressed air and identify dryer problems.



Oil / cooling-water temperature

Identify overheating and gradual temperature changes at an early stage.



Heat quantity

Measure and account for useful heat from heat recovery.

INPUT CAPACITY / CONFIGURATION AS IN THE TECHNICAL SOURCE

up to 20 analogue sensors

Standard in the smallest configuration via connection modules: pressure, dew point, cooling-water pressure and temperature, ambient temperature and flow. Each analogue input has a switching output for threshold exceedances.

up to 24 / 72 digital inputs

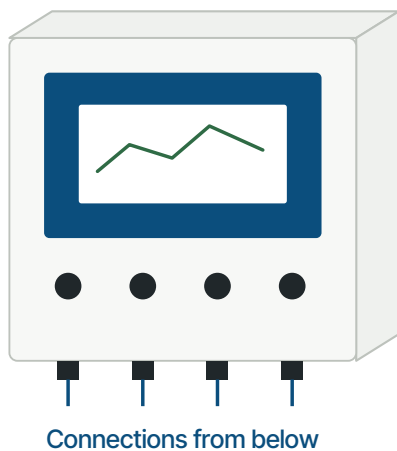
Additional fault and operating signals from dryers, condensate drains, ventilation systems and cooling-water pumps are recorded, monitored and displayed simultaneously.

06 / ENCLOSURE AND DATA STORAGE

Robust installation and long-term records

Airleader combines a protective enclosure for industrial use with local data storage. Mounting options make integration into existing control cabinets easier.

ENCLOSURE AND ELECTRICAL CONNECTIONS



IP54

90-250 VAC

Wide-range power supply

Fully shielded metal enclosure with a metal cover. Components connect from below via industrial multi-pin connectors.

Optional mounting kit

An optional mounting kit allows installation in existing control cabinets.

CN with a large control cabinet

As an option, Airleader CN offers a large metal control cabinet with a 17-inch touchscreen, industrial PC and integrated visualisation. Spare space allows additional components to be installed.

RECORDING IN THE AIRLEADER MODULE

32 GB

as standard

over 20 years

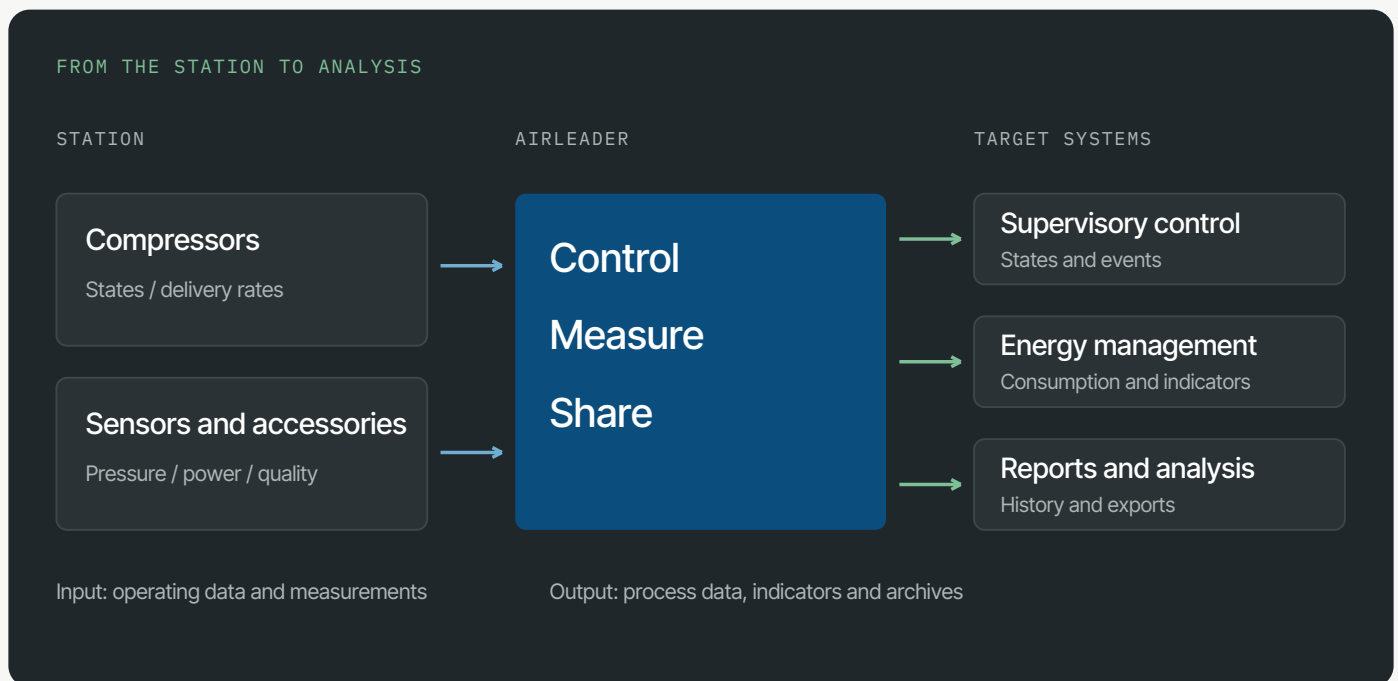
All compressor and sensor states are recorded every second directly in the module. Data can be read out at any time using a laptop.

The web visualisation keeps a parallel copy. After a connection outage, missing data is automatically synchronised from the controller.

Retention period as stated in the technical source for 16 compressors; depends on data volume. The visualisation runs on your own infrastructure. Access and backups remain under the control of your IT team.

Connect the compressor station to other systems

Airleader integrates external measurements and provides station data to higher-level systems. Operation, energy consumption and events can then be analysed alongside other equipment.



Connect control and energy systems

Modbus RTU over RS-485 and Modbus TCP over Ethernet transfer station data. Modbus can also read external sensor values. OPC, or OPC UA depending on the version, provides process data to higher-level systems.

Export and archive data

Daily CSV files at 10-second intervals and exports for Excel or Word support custom reports. USB archives enable offline analysis. Other data formats are available depending on the application.

Network distributed compressors

Compressors, sensors and accessories can connect over TCP/IP/Ethernet instead of continuous bus cabling. This uses existing networks and reduces cable runs. Configuration is handled in the Airleader programming interface.

External commands and signals

Digital contacts handle functions such as on/off control and profile selection. Switching outputs transmit common faults and threshold alarms. Analogue 4-20 mA signals integrate measurements and process variables.

Availability depends on model, software version and configuration; agree interfaces and data points for each project. Sources: MASTER/CN technical description and the new Airleader website. September 2026.