Specification guide for AyrDyne® electrical control panel

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1.0 General information

1.1 Scope of specification guide

The purpose of this specification guide is to outline the minimum requirements and considerations in the selection and implementation of an AyrDyne® electrical control panel. The AyrDyne electrical control panel includes hardware and software to control, monitor, and access data for maintenance on a dust collection system. AyrDyne is not limited to just dust collection. AyrDyne can be used for a variety of applications.

This guide, along with drawings, schematics, and supporting material, covers the minimum performance requirements to be met for the design, build, testing, installation, and commissioning of an AyrDyne electrical control panel.

1.2 References

The AyrDyne electrical control panel shall be designed, manufactured, and tested in accordance with the following latest editions of applicable codes, standards, and regulations:

- Underwriters Laboratories, Inc. (UL)
    - UL and cUL Listed to UL 508A
    - UL Listed to UL 698A
- National Electrical Manufacturers Association (NEMA)
    - NFPA 70E
- Occupational Safety and Health Act (OSHA)

1.3 Documentation

- Loop diagrams (if required)
- Bill of materials list
- Recommended spare parts list (if required)
- AyrDyne IOM
- Design approval required
- Electrical control panel layout drawing
- Electrical control panel schematic

2.0 Equipment for AyrDyne electrical control panel

2.1 Programmable Logic Controller (PLC)
- Allen-Bradley
- Siemens

2.2 Human Machine Interface (HMI)

- Allen-Bradley
- Siemens

2.3 Variable-frequency drive (VFD)

2.3.1 ABB ACS380

2.3.2 ABB ACS580

2.3.3 Allen-Bradley PowerFlex

2.3.4 Invertek VFD

2.3.5 Siemens

2.4 Electrical control panel enclosure

2.4.1 NEMA enclosure

2.4.1.1 NEMA 12
2.4.1.2 NEMA 4

2.4.2.1 NEMA 4X stainless steel
2.4.2.2 NEMA 4X fiberglass

2.4.3.1 NEMA 4 exhaust fan and grill
2.4.3.2 NEMA 4X exhaust fan and grill

2.4.4.1 Indoor
2.4.4.2 Outdoor

2.4.2 Control power

2.4.3 DC power supply

2.4.4 Emergency stop safety relay

2.4.5 Dual-channel safety circuit

2.5 AyrDyne controller and monitoring system with color HMI

Functionality includes:

- Start and stop control of system
- Hand / Off / Auto for each motor
- Primary filter differential pressure reading
- Adjustable "Clean Stop" setting
- Adjustable "Clean Start" setting
- Adjustable "Alarm" setting
  - The system shall log alarm events with a retention period of four days while in the POWERED_ON state
- Primary differential pressure trending
- Filter life monitoring
- Static pressure monitoring
- Secondary filter monitoring
- On and fault indication of each motor
- Ability to manually pulse each cleaning solenoid
- Pulse cleaning for RF
  - Custom pulse duration and spacing settings
- Pulse cleaning for RP
  - Pulses directly over each filter every four cleaning arm rotations
  - Display of pulse spacing
  - Custom pulse duration settings
- Various primary filter cleaning settings
  - Demand: Clean based on primary filter differential pressure settings
  - Downtime: Clean for determined time after dust collector is OFF
  - Constant: Clean constantly while dust collector is ON
  - Manual: Clean on command when dust collector is OFF
- Hour meter to indicate blower run time
- Power meter to indicate blower energy used and estimated cost
- Password-protected settings to prevent accidental changes of system's programs and parameters. These are the user groups that require passwords:
  - Manager – Can perform any operation on the system as well as add or remove users, change group assignments, and change passwords for any user.
  - Maintenance – Can perform any operation except for user administration. May change their own password or logoff time.
  - Operator – Can change settings on the system that are not part of the airflow and balancing. May change their own password or logoff time.

2.6 Circuitry for a no-return explosion isolation valve

2.6.1 Pro-Flap

Micro switch, dust accumulation level sensor, and wear and tear sensor.

2.6.2 K&B valve

Micro switch and dust accumulation level sensor.

2.6.3 Boss valve

Micro switch and dust accumulation level sensor.

2.6.4 Rembe Q-Flap

Accumulation sensor and flap unlock solenoid (if applicable, 24 VDC).

2.6.5 EcoMAXX

Isolation valve closed switch and isolation valve dust accumulation sensor.

2.6.6 Q-Flap NX

Isolation valve closed switch and isolation valve dust accumulations sensor.

2.6.7 VigiFlap

Isolation valve closed switch and isolation valve dust accumulation sensor.

2.6.8 IsoFlap Passive Isolation Valve

Customer will supply IFV-M Interface Module OR DenTech Industrial will supply the required controls

2.7 Circuitry for the explosion bottle system

2.8 Circuitry for the fire suppression system

2.9 Circuitry for the chemical suppression system

2.10 Circuitry for the fire alarm contact

2.11 Circuitry for burst indicator

2.12 Circuitry for zero-speed switch

2.13 Circuity for double-dumb valve

2.14 Circuity for level indicator

2.15 Circuitry for broken bag detector
Broken bag detector will use a 4-20 mA input signal

2.16 Circuitry for high temperature alarm

2.17 Circuitry for compressed air dump valve

2.18 Alarm beacon

2.18.1 Alarm beacon and horn
2.18.2 Alarm beacon only – Red indicating stack light.
2.18.3 Warning beacon
2.18.4 Any additional color for alarm beacon

The following colors are suggestions:

- Yellow – warning alarms
- Green – running
- Blue – external help requested
- White – open

2.19 Circuitry for a basic/heavy-duty cold climate kit

2.20 Remote enclosure for the transmitters to be mounted near the dust collector.
- Static pressure transmitter
- Differential pressure transmitter
- HEPA

2.21 Provision for remote start and stop
This provision includes both two wire and three wire remote start and stop control. Two wire contact for use with remote machine start and stop control. Three wire contacts are for a remote start and stop station.

2.22 NEMA 4 remote start and stop station
This includes 22MM green "System Start" illuminated push button, 22MM red "System Stop" button, and 22MM red "Emergency Stop" illuminated button.

2.23 Circuitry for the drum present sensor

2.24 Compressed air monitoring device
The device will sense no airflow, solenoid failure, and leaks.

2.25 BACnet control

2.26 Electrical control panel interface connector

2.27 Relay alarm contacts for customer connection

2.28 Circuitry and supply for 4 fluidizer air pads
Includes 24 VDC solenoid, tubing (100 foot), small air receiver tank, miscellaneous tube fittings.

2.29 Circuitry for a pressure transmitter
The pressure transmitter will display the pressure on the HMI screen. The device will sense no airflow, solenoid failure, and leaks. The pressure transmitter needs to be mounted in the main compressed air line feeding the header.

2.30 Donaldson iCue

2.31 Static pressure transmitter

2.32 Differential pressure transmitter

2.33 Circuitry for a rotary airlock two-position selection switch
- 22MM black "OFF/ON" selector switch
- Selector switch is field-mounted near rotary airlock
- Alarm horn will sound if the selector switch is turned OFF for more than 15 minutes

- This is <u>not</u> a safety device or a means of a disconnect for the rotary airlock motor
- Customer needs to install proper safety signage at the rotary airlock
- Customer is required to add safety items to protect operator at rotary airlock
- Alarm horn is required for this option

2.34 Control via a velocity pressure from a traverse ring in the return air duct

2.35 Air flow in CFM

2.36 Circuitry for a diverter valve
- 24 VDC solenoid
- Proof of closure witch
- Proof of open switch
- Display diverter valve position on the AyrDyne

2.37 Circuitry for infrared gas sensors
Display the level for the sensor on the AyrDyne

2.38 Stagger cleaning
- Shut down motor and pulse cleaning for that module
- Keep other motors running while cleaning the shutdown module
- Cycle through each module

2.39 Ewon Cosy Ethernet Industrial Remote Access Router

2.40 Miscellaneous fuse holder, fuses, wire way, terminal blocks, terminal block labels, wire, wire numbers, and small miscellaneous items to complete the wiring to the electrical control panel

2.41 Sub-panel components will be identified with a P-Touch, Brady, or another compatible labeling system

3.0 Startup support

Technical support for AyrDyne startup

- Able to connect to AyrDyne via cell modem
- Able to make program changes via cell modem

4.0 Additional information

Note: Below is wording that varies depending on the type of dust collector. Please delete whatever is not needed for the specific project.

Standard AyrDyne Quote Wording

AyrDyne® controller / monitoring system (color HMI)
- Start and stop control of system
- Hand / Off / Auto for each motor
- Primary filter differential pressure reading
- Adjustable "Clean Stop" setting
- Adjustable "Clean Start" setting
- Adjustable "Alarm" setting
- Primary differential pressure trending
- On and fault indication of each motor
- Ability to manually pulse each cleaning solenoid
- Various primary filter cleaning settings
- Demand: Clean based on primary filter differential pressure settings
- Downtime: Clean for determined cycles after dust collector is OFF
- Constant: Clean constantly while dust collector is ON
- Hour meter to indicate blower run time
- Power meter to indicate blower energy used and estimated cost
- Password-protected settings

RF Dust Collector AyrDyne Quote Wording

AyrDyne® controller / monitoring system (color HMI)
- RF Dust Collector
- Start and stop control of system
- Start and stop delay for each motor
- Hand / Off / Auto for each motor
- Primary filter differential pressure reading
- Adjustable "Alarm" setting
- Primary differential pressure trending
- On and fault indication of each motor
- Pulse cleaning
- Custom pulse duration and spacing settings
- Various primary filter cleaning settings
- Downtime: Clean for determined time after dust collector is OFF
- Manual cleaning cycle: Clean on command when dust collector is OFF

- Hour meter to indicate blower run time
- Power meter to indicate blower energy used and estimated cost
- Password-protected settings

RP Dust Collector AyrDyne Quote Wording

AyrDyne® controller / monitoring system (color HMI)
- RP Dust Collector
- Start and stop control of system
- Start and stop delay for each motor
- Hand / Off / Auto for each motor
- Primary filter differential pressure reading
- Adjustable "Alarm" setting
- Primary differential pressure trending
- On and fault indication of each motor
- Pulse cleaning
- Pulses directly over each filter every four cleaning arm rotations
- Display of pulse spacing
- Custom pulse duration settings
- Various primary filter cleaning settings
- Downtime: Clean for determined time after dust collector is OFF
- Manual cleaning cycle: Clean on command when dust collector is OFF
- Hour meter to indicate blower run time
- Power meter to indicate blower energy used and estimated cost
- Password-protected settings

Other Non-standard RF/RP/ ETC. Dust Collector

AyrDyne® controller / monitoring system (color HMI)
- Start and stop control of system
- Start and stop delay for each motor
- Hand / Off / Auto for each motor
- Primary filter differential pressure reading
- Adjustable "Alarm" setting
- Primary differential pressure trending
- On and fault indication of each motor
- Pulse cleaning
- Custom pulse duration and spacing settings
- Various primary filter cleaning settings
- Downtime: Clean for determined time after dust collector is OFF
- Manual cleaning cycle: Clean on command when dust collector is OFF
- Hour meter to indicate blower run time
- Power meter to indicate blower energy used and estimated cost
- Password-protected settings

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For customer support, please contact our service technicians.

Phone: (717) 335-4899

Email: service@dentechindustrial.com

Or visit dentechindustrial.com/customer-support

1975 N. Reading Road, Denver, PA 17517

717-335-4820 | www.ayrdyne.com