



Park Hill School District

Building Successful Futures • Each Student • Every Day

PARK HILL SCHOOL DISTRICT

REQUEST FOR PROPOSAL

**9501 N. Seymour Ave.
Kansas City, MO 64153**

2025 Boiler Replacement

Park Hill High School
Graden Elementary

Detailed Proposal Information is Available on District Website
<http://www.parkhill.k12.mo.us>

Bid Closing Date: March 10, 2025

Bid Closing Time: 9:00 am CST

Park Hill School District reserves the right to reject any or all proposals and to waive informalities or irregularities in any proposal.



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Building Successful Futures • Each Student • Every Day

January 9, 2025

CONTRACTOR:

You are invited to bid on providing labor and materials for the removal and installation of boiler units at Park Hill High School and Graden Elementary in the Park Hill School District.

C & C Controls must be used to coincide with District Energy Management System. If you have not done work for Park Hill School District in the past 5 years, you may be required to provide references.

A mandatory “pre-bid” meeting will begin at the Park Hill School District Support Services Center at 9501 N. Seymour Ave., Kansas City, MO 64153 on March 3, 2025 at 9:00 A.M.

Park Hill High School – 7701 NW Barry Road, Kansas City, MO 64153

Graden Elementary – 8804 NW 45 Highway, Parkville, MO 64152

The Park Hill School District, **will accept sealed bids until 9:00 a.m., March 10, 2025 at the office of Park Hill School District Support Services, 9501 N. Seymour Ave, Kansas City, MO 64153.**

Bids will be awarded by package.

Sincerely,

Jeremie Kahler

Jeremie Kahler
Operations Manager

REQUEST FOR PROPOSAL - HVAC

The Park Hill School District (DISTRICT) is seeking proposals from qualified providers (CONTRACTOR) to furnish labor and materials for removal and installation of boiler units.

Sealed proposals will be received at the Support Services office located at 9501 N. Seymour Ave, Kansas City, Missouri 64153 until March 10, 2025 at 9:00 AM. Proposals will be opened at that time.

Bid results will be posted on the DISTRICT website on March 17, 2025.

Said proposals must conform to the specifications and instructions.

The DISTRICT reserves the right to reject any and all proposals and to waive informalities.

Proposals must be returned on the form(s) provided, with "Bid Proposal – 2025 Boiler Replacement" clearly on the label. A proposal must consist of all pages of the proposal request including the signature page of the proposal, signed by an authorized representative of the firm. Non-conformance with these instructions may be grounds for rejection of proposal.

Faxed or e-mailed proposals will not be accepted. Late proposals will be rejected, unopened and returned.

Jeremie Kahler
Operations Manager
Park Hill School District
9501 N. Seymour Ave
Kansas City, Mo 64153

General Notes

- Bids will be awarded by package.
- Project is tax exempt.
- Certified payroll to meet requirements of Missouri Prevailing Wage law is required.
- CONTRACTOR is responsible for any damage to sidewalks and grounds.
- CONTRACTOR must coordinate any roof work with District.
- Verify all boiler output and notify District of differences
- Winning bidder will be required to provide schedule of work and adjust schedule as needed
- Factory start-up required on all replacements
- CONTRACTOR will be responsible for receiving equipment from Associated Equipment Sales, delivering all equipment to site, and supplying labor. PHSD will be purchasing equipment for CONTRACTOR to install.
- Specifications:
CONTRACTOR must work with C&C on integrating new equipment, new factory/field installed disconnects, hinged access panels, factory required filters, replace seal tite, factory start up. CONTRACTOR must inspect unit(s) for any damage or defects upon receipt at the site(s) and before installation. CONTRACTOR is responsible for lifting units in place. (picking and setting) CONTRACTOR is responsible for removal and disposal of existing equipment.
CONTRACTOR – All bulkheads must have bushing/grommet for wiring.
- Payment will not be made until after July 1, 2025.

PROJECT SCHEDULE

February 26, 2025 – RFP published to Park Hill School District website

March 3, 2025 – Mandatory Pre-Bid Meeting 9:00 AM at Support Services Center 9501 N. Seymour Ave, Kansas City MO 64153

March 10, 2025 – Sealed bids due by 9:00 AM to 9501 N. Seymour Ave, Kansas City MO 64153

March 20, 2025 – Park Hill School District Board of Education: First Read - Bids, Contracts, Agreements

April 17, 2025 – Park Hill School District Board of Education: Second Read and approval

April 18, 2025 – Park Hill Maintenance and Operations Department will contact board approved CONTRACTOR(s) to proceed with project

June 3, 2025 – Approximate work start date

August 1, 2025 – Work completion date

BID FORM—HVAC

PACKAGE #1 – Park Hill High School

SUBMIT BIDS TO: **Jeremie Kahler**
 Park Hill School District
 9501 N. Seymour Ave
 Kansas City, MO 64153

Sealed bids will be accepted until **9:00 a.m., March 10, 2025**. Please ensure the envelope you return is clearly marked “Bid Proposal—2025 Boiler”.

Package 1: Schedule will be coordinated with the District. Project is tax exempt.

Unit(s)

Bid

Boilers 1-4

Total \$

Factory start up required

District employee and C&C must be present.

CONTRACTOR must work with C&C on integrating new equipment, new factory/field installed disconnects, hinged access panels, factory required filters, replace seal tite, factory start up.

All bulkheads must have bushing/grommet for wiring, verify need for curb adapters with manufacturer.

COMPANY _____

ADDRESS _____

PHONE _____ FAX _____

EMAIL _____

PRINT NAME _____

SIGNATURE _____ Date: _____

BID FORM—HVAC

PACKAGE #2 – Graden Elementary

SUBMIT BIDS TO: **Jeremie Kahler**
 Park Hill School District
 9501 N. Seymour Ave
 Kansas City, MO 64153

Sealed bids will be accepted until **9:00 a.m., March 10, 2025**. Please ensure the envelope you return is clearly marked “Bid Proposal—2025 Boiler”.

Package 2: Schedule will be coordinated with the District. Project is tax exempt.

<u>Unit(s)</u>	<u>Bid</u>
Demo Old Plant	_____
Boilers 1 & 2	_____
	<u>Total \$</u> _____

Factory start up required

District employee and C&C must be present.

CONTRACTOR must work with C&C on integrating new equipment, new factory/field installed disconnects, hinged access panels, factory required filters, replace seal tite, factory start up.

All bulkheads must have bushing/grommet for wiring, verify need for curb adapters with manufacturer.

COMPANY _____

ADDRESS _____

PHONE _____ FAX _____

EMAIL _____

PRINT NAME _____

SIGNATURE _____ Date: _____

BID FORM—HVAC

COMBINATION PACKAGE – Park Hill High School and Graden Elementary

SUBMIT BIDS TO: **Jeremie Kahler**
Park Hill School District
9501 N. Seymour Ave
Kansas City, MO 64153

Sealed bids will be accepted until **9:00 a.m., March 10, 2025**. Please ensure the envelope you return is clearly marked "Bid Proposal—2025 Boiler".

Schedule will be coordinated with the District. Project is tax exempt.

<u>Unit(s)</u>	<u>Bid</u>
<u>Park Hill High School</u>	
Boilers 1-4	_____
<u>Graden:</u>	
Demo Old Plant	_____
Boilers 1 & 2	_____
	<u>Total \$</u> _____

Factory start up required

District employee and C&C must be present.

CONTRACTOR must work with C&C on integrating new equipment, new factory/field installed disconnects, hinged access panels, factory required filters, replace seal tite, factory start up.

All bulkheads must have bushing/grommet for wiring, verify need for curb adapters with manufacturer.

COMPANY _____

ADDRESS _____

PHONE _____ FAX _____

EMAIL _____

PRINT NAME _____

SIGNATURE _____ Date: _____

PARK HILL SCHOOL DISTRICT BOILER REPLACEMENTS - SCOPE OF WORK

Graden Elementary – Boiler Replacement

Central Boiler Room Demo: The Contractor shall remove two (2) existing Fulton Pulse boilers and MCS panel, all building zone pumps, chemical pot feeder, air separator, expansion tanks, condensate traps and related piping, strainers and valves in the central boiler room. Piping shall be capped at the point it enters the main boiler room. The contractor shall cap the gas main piping the first available connection after the takeoff to the water heaters. The flue piping shall be removed up to the common header interface where the hot water heater is joined into the common header. The existing Exhausto mechanical venting system shall remain in operation. The contractor shall cap the flue header that went to the boilers with similar material. All control interface and wiring shall be removed to the common controls interface panel (mechanical contractor to coordinate with school districts existing controls contractor and include any controls contractor expenses in their scope of work). All electrical conduit and wiring shall be removed back to the disconnect switches and capped in accordance with proper electrical code and good electrical practices. Combustion air to the room shall be maintained for the water heaters and the entrance to the room shall be provided with either a bird screen, louver or expanded metal cover with sufficient size opening to support the water heater needs. Drain down and removal of all boiler water shall be the responsibility of the mechanical contractor.

AHU1 Room – Boiler Installation.

The Contractor shall install the Owner Furnished boiler, pumps and other associated equipment as shown in the submittals attached in the AHU-1 Room. The contractor shall provide any and all other equipment, piping, valves, devices, controls, electrical, water, chemicals etc. to make a complete and functioning system with control interface to the existing controls system.

The work shall include but not be limited to the following:

1. Obtain all necessary Permits required for Project and all additional documentation required for the process.
2. Place new boiler on existing boiler pad and pipe boiler to the air handler using copper Type L piping. New boiler and boiler/AHU pumps shall be installed and wired with new disconnect switches. All wiring shall be to proper code and best electrical practices.
3. Coordinate all controls interface with current school district controls contractor using provided BacNet interface. Controls contractor to enable pumps and boiler, provide system temperature set point and provide feedback status and alarms to the building automation

system. Any and all electrical and controls devices, wiring, etc. shall be provided by the installing contractor so as to provide a fully operational and functioning system.

4. All piping shall be "Type L" Copper and shall be assembled by either "Pro-Press" or Soldering. System shall be hydrostatically tested and test reports submitted to the owner. All piping shall be fully insulated including valves and flange/joint connections. Devices needing servicing like strainer blowdown valves, shall have a removable insulated cover.

5. Installation shall include, Lochinvar Knight Boiler with condensate drain system, new gas regulator, air separator, boiler pump, Grundfos Magna 3 system pump, expansion tank, Adey side stream filter system/chemical pot feeder combo.

6. Reference attached piping diagram and Boiler/Pump IOM manuals for installation details and guidelines. Side stream Adey piping shall be 1" copper "Type L" same as the boiler piping. All drains shall be run to floor drain.

7. All piping, strainers, gauges, devices, etc. not provided by the Owner shall be included to make a fully functional and completely operational system in accordance with local codes, and the manufactures IOM manuals including recommended vales, strainers, make-up water lines, etc.

8. Flue piping shall be run through the roof. Any and all roof work required shall be included from the contractor with terminations adequately located above the roof. Combustion air may come from the room provided adequate combustion air from the outside is available. Bird screens, louvers or expanded metal screens are required to be present and in good working condition.

9. Boiler, and pumps shall be properly identified (B-1, P-1, P-2) and installed with new disconnect switches. Disconnect switches shall be located on the wall and have the ability for "lock-out/tag-out". All wiring shall be in hard conduit and in accordance with electrical codes and good electrical practices.

10. New control valves shall be included for the AHU and coordinated with the districts control contractor. The installing contractor shall coordinate this work and include all control cost for a fully functional system.

11. New temperature and pressure gauges shall be provided (in and out of boilers and pump inlet and outlet). Pressure gauges shall have snubbers and temperature gauges shall have wells. Ref: Trerice D82LFB4 and Trerice BX9140308.

12. Contractor shall be responsible for water make-up to the system (including if needed back-flow protection) and initial fill with ADEY MC1+ Chemical Protector per recommendations from the boiler representative.

AHU2 Room – Boiler Installation.

The Contractor shall install the Owner Furnished boiler, pumps and other associated equipment as shown in the submittals attached in the AHU-2 Room. The contractor shall provide any and all other equipment, piping, valves, devices, controls, electrical, water, chemicals etc. to make a complete and functioning system with control interface to the existing controls system.

The work shall include but not be limited to the following:

1. Obtain all necessary Permits required for Project and all additional documentation required for the process.
2. Place new boiler on existing boiler pad and pipe boiler to the air handler using copper Type L piping. New boiler and boiler/AHU pumps shall be installed and wired with new disconnect switches. All wiring shall be to proper code and best electrical practices.
3. Coordinate all controls interface with current school district controls contractor using provided BacNet interface. Controls contractor to enable pumps and boiler, provide system temperature set point and provide feedback status and alarms to the building automation system. Any and all electrical and controls devices, wiring, etc. shall be provided by the installing contractor so as to provide a fully operational and functioning system.
4. All piping shall be "Type L" Copper and shall be assembled by either "Pro-Press" or Soldering. System shall be hydrostatically tested and test reports submitted to the owner. All piping shall be fully insulated including valves and flange/joint connections. Devices needing servicing like strainer blowdown valves, shall have a removable insulated cover.
5. Installation shall include, Lochinvar Knight Boiler with condensate drain system, new gas regulator, air separator, boiler pump, Grundfos Magna 3 system pump, expansion tank, Adey side stream filter system/chemical pot feeder combo.
6. Reference attached piping diagram and Boiler/Pump IOM manuals for installation details and guidelines. Side stream Adey piping shall be 1" copper "Type L" same as the boiler piping. All drains shall be run to floor drain.
7. All piping, strainers, gauges, devices, etc. not provided by the Owner shall be included to make a fully functional and completely operational system in accordance with local codes, and the manufactures IOM manuals including recommended vales, strainers, make-up water lines, etc.

8. Flue piping shall be run through the roof. Any and all roof work required shall be included from the contractor with terminations adequately located above the roof. Combustion air may come from the room provided adequate combustion air from the outside is available. Bird screens, louvers or expanded metal screens are required to be present and in good working condition.

9. Boiler, and pumps shall be properly identified (B-1, P-1, P-2) and installed with new disconnect switches. Disconnect switches shall be located on the wall and have the ability for "lock-out/tag-out". All wiring shall be in hard conduit and in accordance with electrical codes and good electrical practices.

10. New control valves shall be included for the AHU and coordinated with the districts control contractor. The installing contractor shall coordinate this work and include all control cost for a fully functional system.

11. New temperature and pressure gauges shall be provided (in and out of boilers and pump inlet and outlet). Pressure gauges shall have snubbers and temperature gauges shall have wells. Ref: Trerice D82LFB4 and Trerice BX9140308.

12. Contractor shall be responsible for water make-up to the system (including if needed back-flow protection) and initial fill with ADEY MC1+ Chemical Protector per recommendations from the boiler representative.

Park Hill High School – Boiler Replacement

Central Boiler Room Demo: The Contractor shall remove four (4) existing Fulton Pulse boilers and MCS panel, the two Taco hot water pumps with suction diffusers and triple duty valves, chemical pot feeder, boiler stainers and valves, pump valves and expansion joints. The air separator and expansion tanks shall remain in place and these valves tested for functionality. Valves not functioning shall be replaced. Remove all condensate traps and related piping. The boiler flue piping shall be removed up to the common header interface. The existing Exhausto mechanical venting system shall be removed and the two termination fans removed. All control interface and wiring shall be removed to the common controls interface panel (mechanical contractor to coordinate with school districts existing controls contractor and include any controls contractor expenses in their scope of work). All electrical conduit and wiring shall be removed back to the disconnect switches. Combustion air to the room shall be maintained as original and the entrance to the room shall be provided with either a bird screen, louver or

expanded metal cover with sufficient size opening to support the boiler needs. Drain down and removal of all boiler and pump water shall be the responsibility of the mechanical contractor.

The work shall include but not be limited to the following:

1. Obtain all necessary Permits required for Project and all additional documentation required for the process.
2. Place four (4) new Lochinvar Crest FCB-2000N boilers on the existing boiler pad (increase size of pad as required to ensure a 6" perimeter of concrete around the boilers base. Pipe boilers back into the existing main header and ensure that reverse return piping arrangement is used. New isolation valves for the boilers shall be provided. The owner provided Lochinvar automatic isolation valve (1 per boiler) may serve as the boiler outlet isolation valve. Provide new isolation valves and Mason SFEJ Expansion joints at the entrance and exit of the new package pumping system. Provide a wye strainer with blowdown valve at the entrance to packaged pumping system.
3. Coordinate all controls interface with current school district controls contractor using provided BacNet interface. Controls contractor to enable pumps and boiler, provide system temperature set point and provide feedback status and alarms to the building automation system. Any and all electrical and controls devices, wiring, etc. shall be provided by the installing contractor so as to provide a fully operational and functioning system.
4. All piping shall be schedule 40 carbon steel and shall be fully welded. The piping layout shall be "reverse return" to encourage proper balancing. The system shall be hydrostatically tested and test reports submitted to the owner. All piping shall be fully insulated including valves and flange/joint connections. Devices needing servicing like strainer blowdown valves, shall have a removable insulated cover. The piping to and from the ADEY side stream filter/chemical pot feed may be 1" "type L" copper with appropriate dielectric unions as needed. The package pumping system headers, piping, valves and pump volutes shall be insulated.
5. Installation shall include, Lochinvar Crest FCB-2000N boilers with condensate drain system, new gas regulator, Grundfos Model MPCE packaged pumping system, ADEY boiler magnetic strainers, ADEY side stream filter system/chemical pot feeder combo, US Draft flue exhaust termination fans with V250 Controller.
6. Reference attached piping diagram and Boiler/Pump IOM manuals for installation details and guidelines. Side stream Adey piping shall be 1" copper "Type L" same as the boiler piping. Contractor to include isolations valves and drain valves. All drains shall be run to floor drain.
7. All piping, strainers, gauges, devices, etc. not provided by the Owner shall be included to make a fully functional and completely operational system in accordance with local codes, and

the manufactures IOM manuals including recommended vales, strainers, make-up water lines, etc.

8. The contractor shall install a new US Draft termination fan and overdraft damper system. The contractor shall provide and install new flue piping of either AL29-4C or 316L stainless steel as necessary for a complete sealed system. The contractor may reuse the 16" header and replace only the boiler flues and connections to the header as the sizes have changed. Any and all flue piping required shall be included from the contractor including any transitions to the inline damper and termination fan. Combustion air may come from the room provided adequate combustion air from the outside is available. Bird screens, louvers or expanded metal screens are required to be present and in good working condition. The US Draft V250 controller shall be mounted on the wall in the boiler room and all wiring verified or replaced as necessary to proper electrical codes. Contractor shall replace wiring and conduit on the outside of the building to the flue venting fan. Coordination with school district controls contractor shall be included in the contractor's scope of supply. Interlocks from the V250 controller to each boiler shall be wired and verified for functionality under low draft or no draft conditions.

9. Boilers shall be properly identified (B-1, B-2, B-3, B-4) and installed with new wiring and new disconnect switches. Pumps shall be properly identified (P-1, P-2) and installed with new wiring and new disconnect switch. Disconnect switches shall be located on the wall and have the ability for "lock-out/tag-out". All wiring shall be in hard conduit and in accordance with electrical codes and good electrical practices. Where possible, conduits should not be run on the ground.

10. BacNet connections from the boilers, packaged pumping system and flue venting system shall be interfaced to the school districts BAS system and coordination with school district controls contractor shall be included in the contractor scope of work.

11. New temperature and pressure gauges shall be provided (in and out of boilers and pump inlet and outlet). Pressure gauges shall have snubbers and temperature gauges shall have wells. Ref: Trerice D82LFB4 and Trerice BX9140308.

12. Contractor shall be responsible for water make-up to the system (including if needed back-flow protection) and initial fill with ADEY MC1+ Chemical Protector per recommendations from the boiler representative.

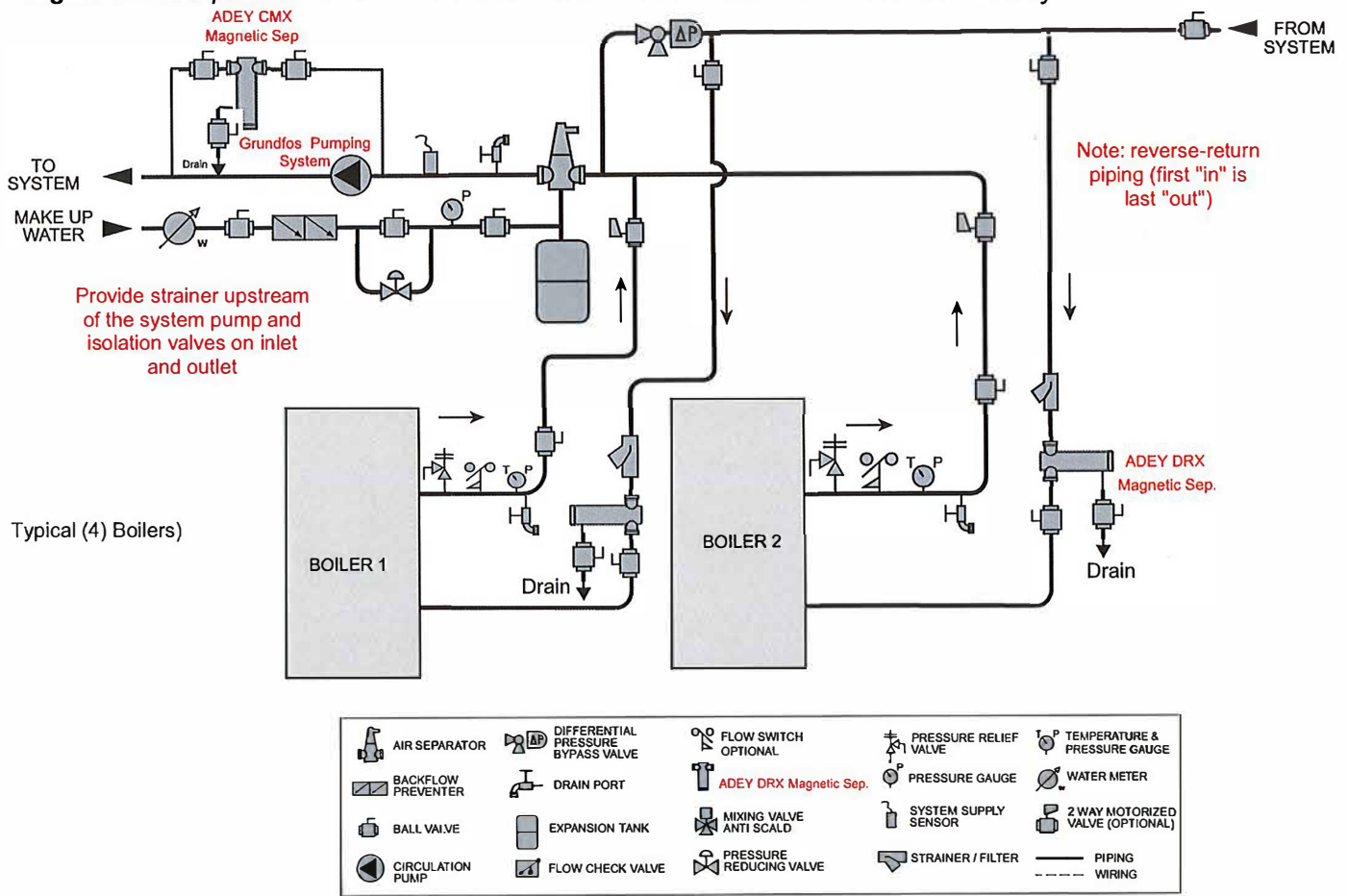
For Park Hill High School

5 Hydronic piping

Model	Number of Units						
	2	3	4	5	6	7	8
	Recommended Common Header Pipe Sizes in Inches						
FCB1000	4	5	6	6	8	8	8
FCB1500	5	6	8	8	8	10	10
FCB2000	6	8	8	10	10	10	12
FCB2500	6	8	10	10	12	12	12
FCB3000	8	8	10	12	12	14	14
FCB4000	8	10	12	12	14	16	16
FCB5001	10	12	12	14	16	16	18
FCB6000	10	12	14	16	18	18	20

[Based on a boiler ΔT of 30°F.]

Figure 5-5 Multiple Boilers - Alternate - Common Header - Fixed or Variable Flow Primary



NOTICE

Please note that these illustrations are meant to show piping concepts only, the installer is responsible for all equipment. The installer must follow all manufacturer's installation instructions for each system component. The installer is responsible for compliance with local codes.

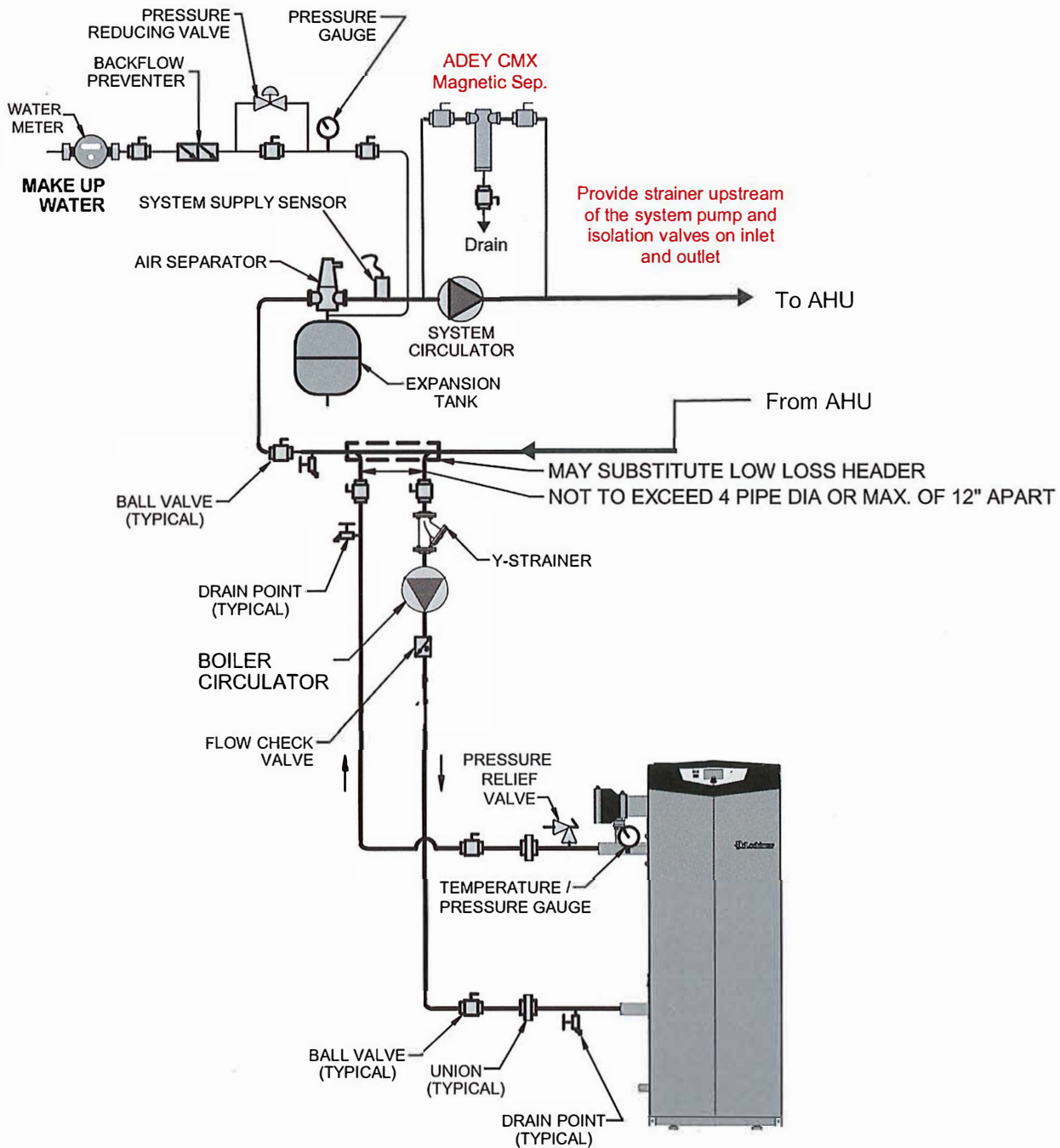
NOTICE

When installing multiple Crest boilers in fixed or variable flow primary applications, utilize a reverse-return or other piping method to ensure balanced flow through each boiler. Connection locations shown are for reference only and will vary with boiler type.

6 Hydronic piping

Figure 6-2 Single Boiler - Single Temperature with Single Zone

For Graden Elementary



NOTICE

Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.



14535 West 96th Terrace
Phone: 913-894-4455
Fax: 913-894-4459

SUBMITTAL

PROJECT NAME: Parkhill High School Renovations
PROJECT NUMBER: JL24-25037
PRODUCTS: Lochinvar Boilers/ Grundfos Pump Skid
CUSTOMER: AJ Purdon
ENGINEER: NA
DATE: 2/21/2025

APPROVALS:

Contractor

Engineer



14535 West 96th Terrace
Phone: 913-894-4455
Fax: 913-894-4459

SUBMITTAL DETAILS

PROJECT NAME: Parkhill High School Renovations

CONTENTS: FCB2000N Crest Condensing Boiler with Hellcat Combustion

- 1,999 MBH input / 1,923 MBH output (maximum)
- 25:1 turndown
- Natural gas
- Realtime O2 combustion technology
- CSD-1 compliant
- ASME "H" stamped gasketless heat exchanger
- 316L stainless steel fire tubes
- 120/1/60 (Standard for FCB1000-2000)
- 160 psi design
- 50 psi ASME pressure relief valve
- Direct spark ignition
- Low NOx operation
- Sealed combustion
- Low gas pressure operation
- On/Off switch
- Adjustable high limit with manual reset
- Low water cutoff with manual reset and test
- High/Low gas pressure switches with manual reset

- Low air pressure switch
- Inlet/outlet temp gauges
- Down stream gas test cocks
- Con-X-Us Remote Connect
- 10" Multi-Color graphic LCD display w/ navigation dial (SMART TOUCH control)
 - BACnet MSTP communication
 - Cascading sequencer for up to 8 boilers
 - Outdoor reset control w/ wired outdoor air sensor

ACCESSORIES (shipped loose for field installation)

- Condensate neutralization kit (1/boiler)
- Step down gas regulator 2 psi max inlet (1/boiler)
- 4" Motorized Isolation Valve (1/Boiler)

Qty (1) Model HYDRO MPC E 3CRE45-2-2:

- Skid Performance: 900 gpm @ 80' tdh (scheduled specifications)
- Qty (3) 15hp TEFC 460/3/60 CRE-45-2-2 non self-priming, vertical multistage centrifugal pumps
 - CU352 controller
 - Each pump is integrated variable speed (permanent magnet MLE motors)
 - All pumps in operation will run at equal speed
 - The MPC E maintains constant pressure through continuous adjustment of pump speed
 - Rubber vibration dampers between each pump and baseframe
 - System performance is adjusted to the demand through cutting in/out the required number of pumps
 - Pump changeover is automatic and depends on load, operating hours and fault

- 6" ANSI 150# flanged stainless steel suction & discharge headers
- 3" lug style butterfly isolation valves on suction and discharge of each pump
- 3" check valve on each pump discharge
- Suction and discharge pressure transducers factory installed
- Pressure gauges mounted on suction and discharge headers
- UL listed Packaged Pumping System (Category QCZJ)
- NSF61/NSF372 drinking water and low lead approved
- Control Panel
 - BACnet MSTP Communication
 - 100kA SCCR fault current rating
 - Individual pump run lights
 - Surge Protection
 - Emergency/normal operating switch for each pump
- Side mount external service disconnect switch (single point power)
- Alarm circuit with audible alarm
- UL Type 3R

Qty(4) FL1-03-03786 4" MagnaClean DRX Magnetic Filter

- ASME Section VIII Division 1 (2015) construction
- 145 psi maximum working pressure
- 212F maximum working temperature
- 304L SS casing, flanges and pressure vessel
- High-power neodymium magnets
- ASME B16.5 Class 150 flanges with EPDM gaskets
- PA6 nylon belt
- "No Touch" Cleaning Feature

Qty (1) FL1-03-05013-US MagnaClean Midi Side-Stream Magnetic Filter/
Chemical Pot Feeder

- 2" NPT connection with maximum flow rate of 59.4 GPM
- 145 psi maximum working pressure
- Working temperature of 14F to 302F
- 316L SS canister with 304L SS clamp assembly
- Spun-bonded cartridge filters (5-50 micron)
- Needlefelt bag filters (3-50 micron)
- Adaptive filtration (magnetic, non-magnetic or both)
- Tool-free servicing and maintenance
- Air vent kit included
- Plastic funnel with 1" stainless steel valve

US Draft

- New Termination fans, overdraft damper system and V-250 Controller
 - CBX635 Termination Fan
 - OBD16-S6 Opposed Blade Damper
 - CGM-605 Carbon Monoxide Gas Monitor
 - Stainless steel construction
 - USA provided motors

**CREST COMMERCIAL
CONDENSING BOILER WITH
HELLCAT COMBUSTION TECHNOLOGY**

Submittal Sheet



Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

**MODELS
FCB1000 - FCB6000**



FCB-Sub-02

Job Name:
Parkhill High School

Location:

Contractor:

Type Gas:
Natural Gas

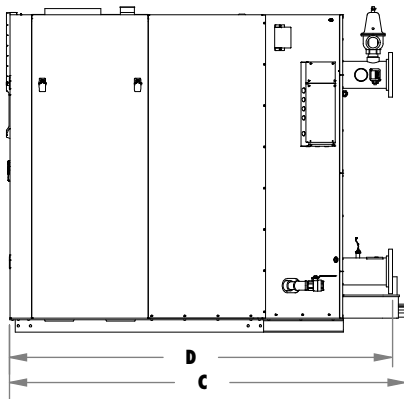
Engineer:

Model #:
FCB2000

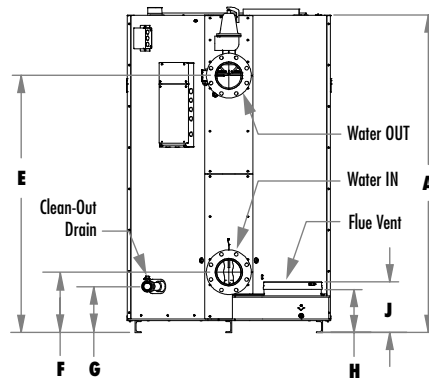
Agent/Wholesaler:
AES

Equipment Tag(s):
B-1,-2,-3,-4

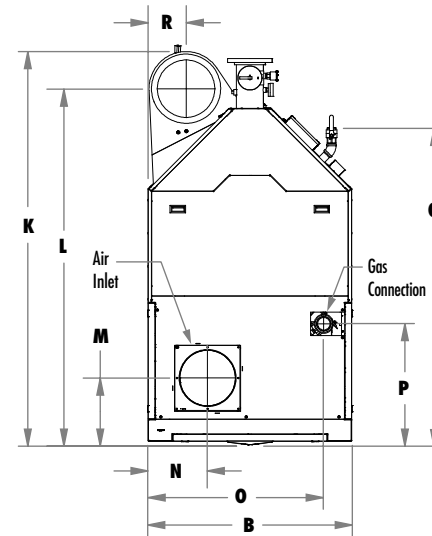
SIDE



BACK



TOP



JOB NOTES:

Notes:

- * Add "N" for natural gas, "L" for LP gas models
- Low NOx Operation.
- Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.
- The ratings have been determined under the provisions governing forced draft burners.
- The Net AHRI water ratings shown are based on a piping and pickup allowance of 1.15.

Model Number	Input MBH		Gross Output MBH	Net Rating MBH	Combustion Eff. %	Thermal Eff. %	Turn down	Flow Rate GPM		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	Gas Conn.	Water Inlet/Outlet	Air Intake	Vent Size	Oper. Weight (with water)	Ship. Weight (lbs.)
	Min	Max						Min	Max																							
FCB1000	50	999	961	836	96.4%	96.2%	20:1	18	350	78"	30"	56"	57-1/2"	66-1/8"	11-7/8"	11-3/8"	11-1/4"	12-1/2"	55-1/2"	51-3/4"	12-3/4"	6-1/2"	26"	21-1/2"	48-3/4"	6-1/2"	1-1/4"	3"	6"	6"	1,939	1,721
FCB1500	60	1,500	1,443	1,255	96.4%	96.2%	25:1	25	350	78"	30"	63-3/4"	64"	65-3/8"	12-3/8"	11-3/8"	11-1/4"	12-1/2"	63-1/4"	58-1/4"	13-1/4"	7-1/2"	25-3/4"	23-1/4"	55-3/4"	5-1/8"	1-1/2"	4"	8"	8"	2,345	1,985
✓ FCB2000	80	1,999	1,923	1,672	96.4%	96.2%	25:1	25	350	78"	30"	62-1/2"	64-1/4"	65-3/8"	12-3/8"	11-3/8"	11-1/4"	12-1/2"	62-1/4"	57-1/4"	12"	7-1/2"	26"	21-1/2"	55-1/2"	5-1/8"	1-1/2"	4"	8"	8"	2,622	2,120
FCB2500	125	2,500	2,400	2,087	96.1%	96%	20:1	25	350	77-3/4"	35"	79-1/4"	79-1/4"	63-3/4"	13-1/2"	11-1/4"	10-1/2"	12-1/4"	79"	71-3/4"	17-1/4"	9-1/4"	30-1/4"	28"	67"	7-1/4"	2"	4"	8"	9"	3,555	2,812
FCB3000	150	3,000	2,883	2,507	96.1%	96%	20:1	25	350	77-3/4"	35"	79-1/4"	79-1/4"	63-3/4"	13-1/2"	11-1/4"	10-1/2"	12-1/4"	79"	71-3/4"	17-1/4"	9-1/4"	30-1/4"	28"	67"	7-1/4"	2"	4"	10"	10"	3,582	2,848
FCB4000	200	3,999	3,843	3,342	96.1%	96%	20:1	45	350	78"	43-1/4"	95-1/4"	90-3/4"	63-1/2"	13-3/4"	11-1/2"	10-3/4"	12-1/2"	94-3/4"	85-3/4"	19"	11-1/4"	36-1/2"	35"	77"	10-1/2"	2-1/2"	4"	12"	12"	4,882	3,874
FCB5000	250	4,999	4,804	4,177	96.1%	96%	20:1	50	600	78"	46-1/2"	96-1/2"	94"	63-1/2"	15"	11-1/2"	10-3/4"	12-1/2"	96-1/4"	87"	18-3/4"	13"	39-3/4"	34"	78-1/2"	9"	2-1/2"	6"	14"	14"	5,920	4,470
FCB6000	300	6,000	5,766	5,014	96.1%	96%	20:1	60	600	78"	50"	102-3/4"	99-3/4"	63-1/4"	14-3/4"	11-1/2"	10-3/4"	12-1/2"	96-1/2"	87-1/2"	16-1/2"	14-3/4"	43-1/4"	29-3/4"	78"	9-1/4"	3"	6"	14"	14"	6,755	4,862

CREST[®] + HELLCAT[™] CONDENSING BOILER

Codes & Registrations

ANSI Z21.13/CSA Certified

ASME Certified, "H" Stamp / National Board

California Code Compliant

Canadian Registration Number (CRN)

CSD1 / Factory Mutual / GE Gap Compliant

South Coast Air Quality Management District
Qualified (FB 1000-2000)

AHRI Certified



DESIGNED * ENGINEERED * ASSEMBLED

USA

Standard Features

- › Hellcat Combustion Technology featuring RealTime O₂ Trim[™]
- › Proof of Closure Valve (FCB 6000)
- › Modulating Burner with up to 25:1 Turndown
- › Direct-Spark Ignition
- › Low NOx Operation
- › Sealed Combustion
- › Air Inlet Filter
- › Low Gas Pressure Operation
- › Vertical and Horizontal Direct Venting
 - › Direct Vent up to 150 Feet
 - › PVC, CPVC, Polypro or AL29-4C (FCB 1000-4000)
 - › AL29-4C (FCB 1000-6000)
- › ASME "H" Stamped Heat Exchanger
- › 316L Stainless Steel Fire Tubes
- › 160 psi Working Pressure
- › On/Off Switch
- › Interior Service Light
- › Adjustable High Limit with Manual Reset
- › Low Water Cutoff with Manual Reset & Test
- › High & Low Gas Pressure Switches w/Manual Reset
- › Low Air Pressure Switches indicate Blocked Vent/Air
- › Condensate Trap w/Blocked Drain Switch
- › Drain Valve
- › System Sensor
- › Outdoor Air Sensor
- › Inlet & Outlet Temperature Sensors
- › High-Voltage Terminal Strip
- › Low-Voltage Terminal Strip
- › Downstream Gas Test Cocks
- › 50 psi ASME Relief Valve
- › Temperature & Pressure Gauge
- › Zero Clearances to Combustible Materials
- › SCCR of 5,000 A
- › See Warranty for Details
 - › 10-Year Limited Warranty
 - › 5-Year Warranty on Burner
 - › 18-Month Warranty on Parts
 - › Lifetime Thermal Shock

Smart Touch[™] Features

- › CON-X-US Remote Connect
- › SMART TOUCH Touchscreen Operating Control
- › Full-Color 10" Capacitive Touchscreen LCD Display
- › Built-in Cascading Sequencer for up to 8 Boilers
 - › Built-in Redundancy
 - › Cascade Multiple Sized Boilers
 - › Lead/Lag Cascade
 - › Efficiency Optimized Cascade
- › Front-End Loading Capability with Copper-Fin II[®] and Power-Fin[®] Boilers
- › Building Management System Integration with 0-10 VDC Input
- › BACnet MSTP Communications
- › Outdoor Reset Control with Outdoor Air Sensor
- › Password Security
- › Domestic Hot Water Prioritization
 - › DHW tank piped with priority in the boiler loop
 - › DHW tank piped as a zone in the system with the pumps controlled by the Smart Touch
 - › DHW Modulation Limiting
 - › Separately Adjustable SH/DHW Switching Times
- › Low Water Flow Safety Control & Indication
- › Inlet & Outlet Temperature Readout
- › Freeze Protection
- › Service Reminder
- › Time Clock
- › Data Logging
 - › Hours Running, Modulation Rate
 - › Ignition Attempts
 - › Last 10 Lockouts with Burner State
 - › Recycling Reporting
- › Programmable System Efficiency Optimizers
 - › Night Setback
 - › Anti-Cycling
 - › Outdoor Air Reset Curve
 - › Ramp Delay
 - › Boost Temperature & Time
 - › Modulation Factor Control
- › Pump Control Board (24V) with LED Indicators
 - › System Pump, Boiler Pump, DHW Pump, DHW Recirculation Pump (future) and Bypass Pump (future)

- › High-Voltage Terminal Strip
 - › 120V/1PH/60Hz Power Supply (FCB 1000-2000)
 - › 208V/3PH/60Hz Power Supply (FCB 2500-3000)
 - › 480V/3PH/60Hz Power Supply (FCB 4000-6000)
- › Low-Voltage Terminal Strip
 - › 24 VAC Auxiliary Device Relay
 - › Auxiliary Proving Switch Contacts
 - › Alarm on Any Failure Contacts
 - › Runtime Contacts
 - › DHW Thermostat Contacts
 - › Unit Enable/Disable (Demand) Contacts
 - › System Sensor Input
 - › DHW Tank Sensor Contacts
 - › Outdoor Air Sensor Contacts
 - › Cascade Contacts
 - › 0-10 VDC BMS External Control Contact
 - › 0-10 VDC Variable Speed Boiler Pump Control Contact
 - › 0-10 VDC System Pump Speed Input Contact
 - › Flow Switch / Low Water Cutoff Contact

Optional Equipment

Alarm on Any Failure

ASME Relief Valve Option:

75 psi 100 psi 125 psi 150 psi

BMS Gateway - BACnet IP or LonWorks

Condensate Neutralization Kit

Common Vent Damper Kits

Modbus Communication

Short Circuit Current Rating (SCCR) Options:

FCB 2500 - 6000

100,000 A

200,000 A

Motorized Isolation Valve

Variable Speed Boiler Pump

Wireless Outdoor Temperature Sensor

Electrical Transformer Options (Shipped Loose)

› FCB 1000-2000:

208V/3PH/60Hz → 120V/1PH/60Hz

480V/3PH/60Hz → 120V/1PH/60Hz

600V/3PH/60Hz → 120V/1PH/60Hz

› FCB 2500-3000:

480V/3PH/60Hz → 208V/3PH/60Hz

600V/3PH/60Hz → 208V/3PH/60Hz

› FCB 4000-6000:

208V/3PH/60Hz → 480V/3PH/60Hz

600V/3PH/60Hz → 480V/3PH/60Hz



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f i n i n s t a b l e Lochinvar.com

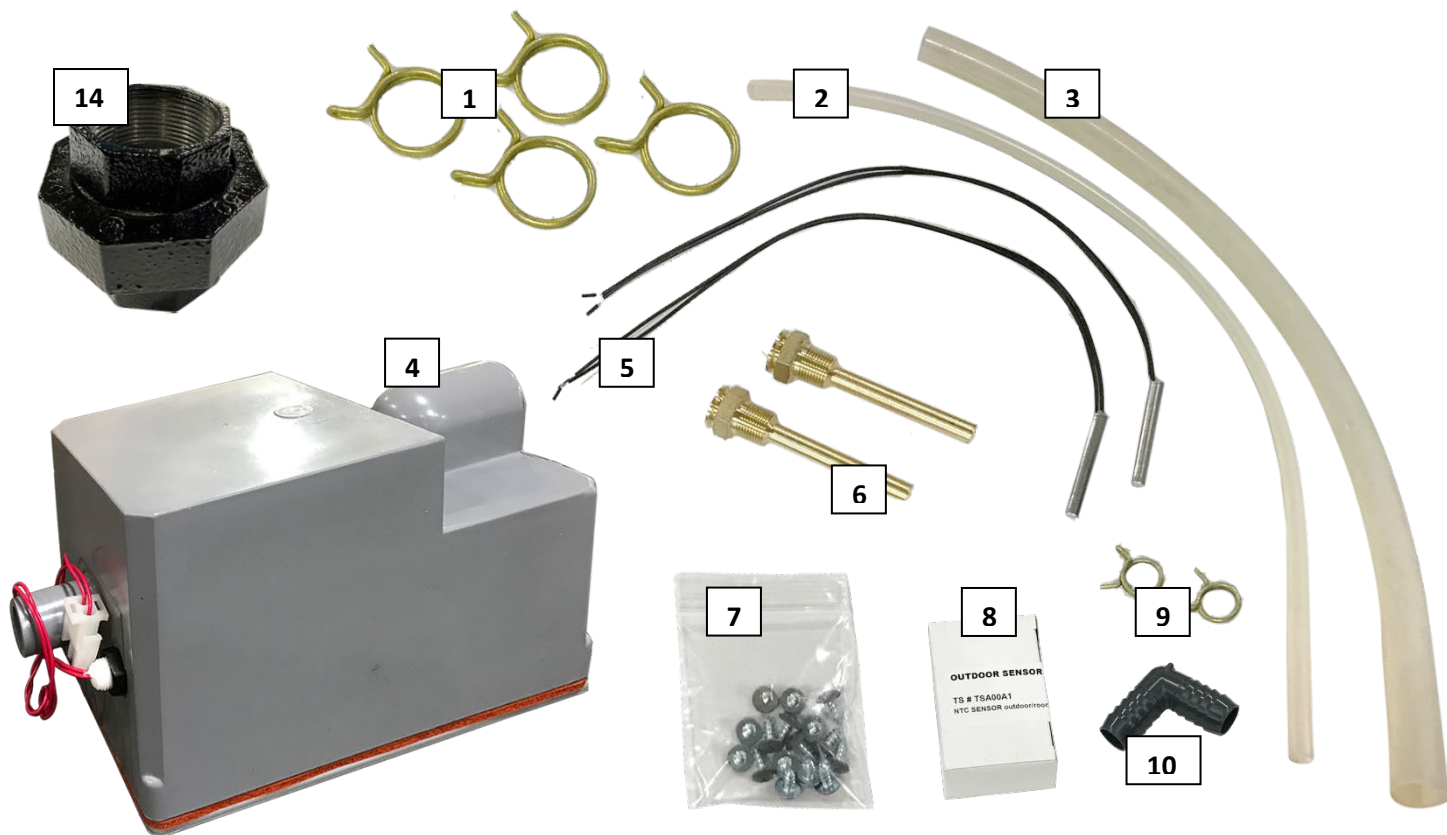
IN THE BOX

Models FCB 1000-6000

CREST[®]

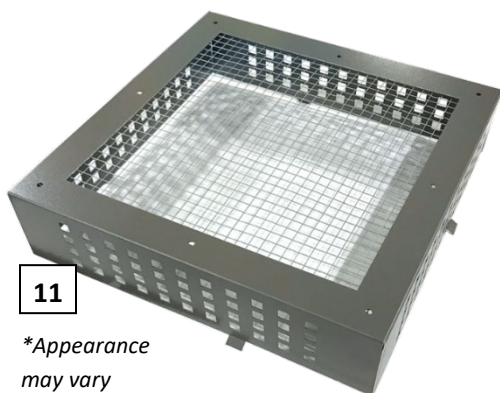
CONDENSING BOILER

HELLCAT[™]
COMBUSTION TECHNOLOGY



Item No.	Description
1	1" HOSE CLAMPS (4X)
2	3/8" SILICONE HOSE*
3	1" SILICONE HOSE*
4	CONDENSATE TRAP
5	SYSTEM SENSORS (2X)
6	BULBWELLS (2X)
7	MOUNTING SCREWS

Item No.	Description
8	OUTDOOR SENSOR
9	3/8" HOSE CLAMPS (2X)
10	90° ELBOW
11	AIR INTAKE COVER*
12	6" SS to PVC ADAPTER ♦
13	AIR INLET COLLAR & GASKET ♦
14	GAS UNION*



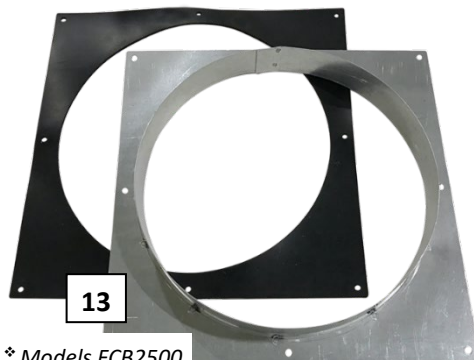
11

*Appearance may vary



12

♦ Model FCB1000 ONLY



13

♦ Models FCB2500 and up ONLY

Refer to replacement parts list if re-order is needed.



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HIGH EFFICIENCY BOILERS & WATER HEATERS

CONDENSATE NEUTRALIZATION KIT

Submittal Sheet

CON-Sub-05

CONDENSATE NEUTRALIZATION KITS FOR BOILERS UP TO 6.0 MBTU

Job Name: Parkhill High School Renova Model No. _____

Location: _____

Engineer: _____

Agent/Whls: AES

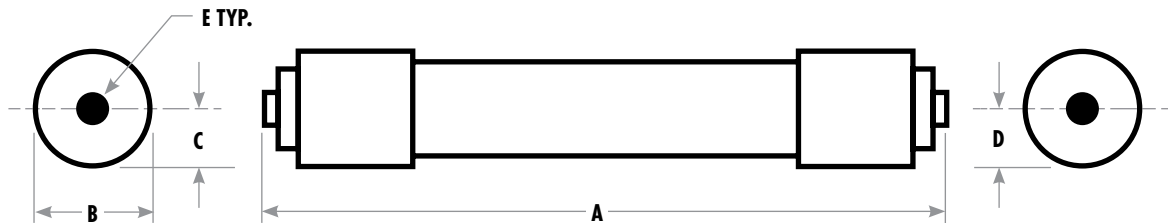
Contractor: _____

NOTES:

STANDARD FEATURES

- Clear tube for visual inspection
- Integrated unions with o-rings
- Calcite and magnesium oxide media
- Recharge kits sold separately
- Includes PVC adapters
- Includes mounting brackets for 2" tube style

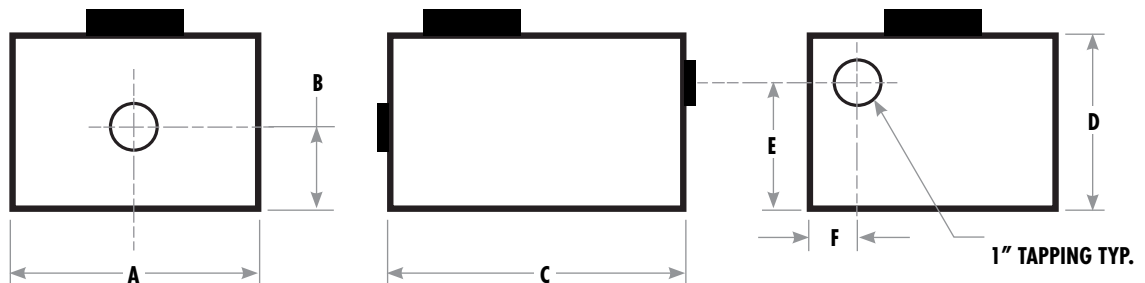
MODEL
CN2-300
CN4-850
CN4-2000



SAP NO.	BTU/HR RANGE	MODEL NO.	A	B	C	D	E	F	RECHARGE KIT
○ 100289339	0 - 300,000	CN2-300	18-3/4"	2-3/4"	1-3/8"	1-3/8"	1/2" FNPT	—	100295915
○ 100374577	400,000 - 850,000	CN4-850	15-3/4"	5"	2-1/2"	2-1/2"	3/4" FNPT	—	100295916
✓ 100289581	1,000,000 - 2,000,000	CN4-2000	26-3/4"	5"	2-1/2"	2-1/2"	3/4" FNPT	—	100295917
○ 100289582	2,500,000 - 6,000,000	CN6T	12"	1-3/4"	15"	8	5-3/4"	2-1/2"	100295918

All dimensions +/- 1/8"

MODEL
CN6T



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TWO-WAY MOTORIZED VALVE

Submittal Sheet

TWV-Sub-07

TWO-WAY MOTORIZED VALVE FOR FTX AND CREST MODELS

Job Name: Parkhill High School Renovations

Wholesaler: AES

Location: _____

Contractor: _____

Engineer: _____

Model No. _____

NOTES:

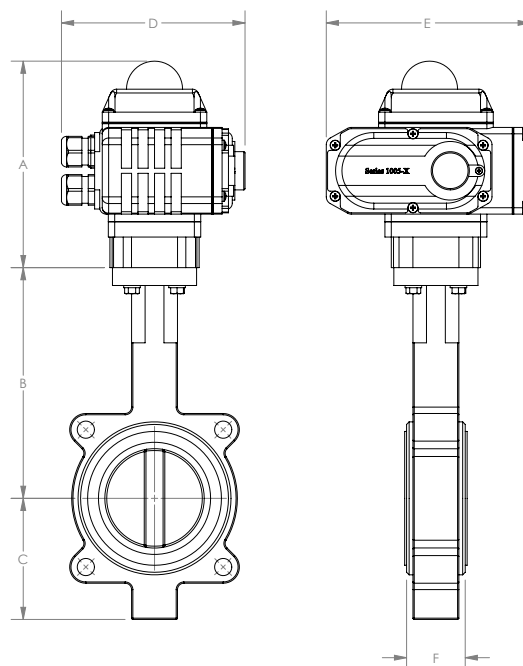
DIMENSIONS AND SPECIFICATIONS

Part Number	NEMA 4 Certification	Used On Models	Pipe Size	A	B	C	D	E	F	Bolt Hole Pattern
○ 100339077	—	FTX400 - 600	2"	3-1/4"	6-1/2"	3"	4"	10"	1-3/4"	4
○ 100339075	—	FTX725 - 850	2-1/2"	3-1/4"	7"	3"	4"	10"	2"	4
○ 100266962	—	FB 751 - 1251	3"	4"	7-1/4"	3-1/2"	5-1/4"	11"	2"	4
○ 100312760*	Yes	FB/OF 751 - 1251	3"	6-1/2"	7-1/4"	3-3/4"	5-3/4"	6-1/2"	2"	4
✓ 100157681	—	FB 1501 - 4001	4"	5-1/4"	8"	4"	5-1/2"	11-1/2"	2"	8
○ 100312791*	Yes	FB/OF 1501 - 4001	4"	5-1/2"	8"	4-1/2"	5-3/4"	6-1/2"	2"	8
○ 100280019	Yes	FB/OF 5001 - 6001	6"	8-1/2"	9"	5-1/2"	6-1/4"	10"	2-1/4"	8

* Available as an option on FB models for NEMA 4 Certification

STANDARD FEATURES

- 120V AC Actuator
- End Switch
- CSA Certified
- Maximum Working Pressure 200psi
- 416 Stainless Steel Stem
- 304 Stainless Steel Disc
- EPDM Seal
- Junction Box
- 120V AC Relay



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GAS REGULATOR

Submittal Sheet

BGR-Sub-05

Job Name: Parkhill High School Renovations

Model No. _____

Location: _____

Equipment Tag(s): _____

Engineer: _____

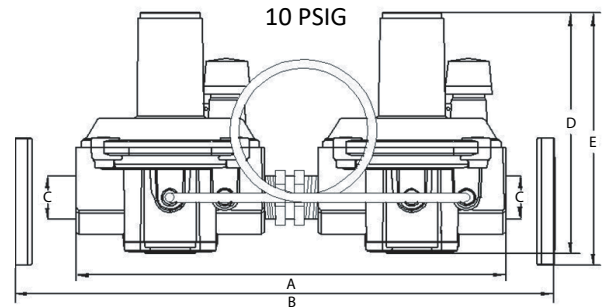
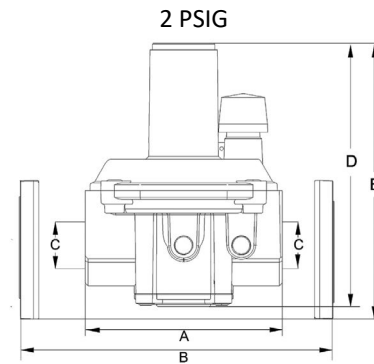
Agent/Wholesaler: AES

Contractor: _____

NOTES:

Standard Features

- ANSI Z21.80A-2019 / CSA 6.22A-2019 Class I Certified for outlet pressures up to 14"
- Integral vent limiter
- CSA approved External Vent Limiter – no vent line required*
- 500:1 Turndown
- Positive 100% bubble tight lock up regulator
- Suitable for NG and LP
- Suitable for indoor or outdoor installation
- Up to 2 PSIG and 10 PSIG inlet pressures available
- 10 PSIG inlet models are Over Pressure Device (OPD), Worker & Monitor style



	SAP Number	Inlet Pressure Rating	Outlet Pressure Rating	Unit Gas Conn. Size	(Threaded) A	(Flanged) B	C	D	E	Ship Wgt. (lbs.)
☐	100269922	3" W.C. to 2 PSIG	2" W.C. to 14" W.C.	1-1/4"	7-3/4"	–	1-1/4" NPT	10"	–	8
☒	100269923	3" W.C. to 2 PSIG	2" W.C. to 14" W.C.	1-1/2"	7-3/4"	–	1-1/2" NPT	10"	–	8
☐	100269924	3" W.C. to 2 PSIG	2" W.C. to 14" W.C.	2"	9-1/4"	–	2" NPT	12-1/2"	–	13
☐	100269925	3" W.C. to 2 PSIG	2" W.C. to 14" W.C.	2-1/2"	–	17"	2-1/2" Flanged	–	17-1/4"	28
☐	100320057	3" W.C. to 2 PSIG	2" W.C. to 14" W.C.	3"	–	17"	3" Flanged	–	16-3/4"	28
☐	100320058	7" W.C. to 10 PSIG	2" W.C. to 14" W.C.	1-1/4"	16-3/4"	–	1-1/4" NPT	9-1/2"	–	16
☐	100320059	7" W.C. to 10 PSIG	2" W.C. to 14" W.C.	1-1/2"	16-3/4"	–	1-1/2" NPT	9-1/2"	–	16
☐	100320060	7" W.C. to 10 PSIG	2" W.C. to 14" W.C.	2"	20"	–	2" NPT	12"	–	25
☐	100320061	7" W.C. to 10 PSIG	2" W.C. to 14" W.C.	2-1/2"	–	34"	2-1/2" Flanged	–	16-3/4"	56
☐	100320062	7" W.C. to 10 PSIG	2" W.C. to 14" W.C.	3"	–	34"	3" Flanged	–	16-3/4"	56

* Brass Vent Limiters must be removed for outdoor installation. Information subject to change without notice. Dimensions shown are approximate and should not be used for construction purposes.



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MagnaClean DRX Product Specification

Innovative and compact magnetic filtration for essential protection

MagnaClean DRX is the latest addition to ADEY's range of water treatment solutions for commercial mechanical rooms. It is designed to protect and maintain commercial hydronic heating systems, by removing debris and black iron oxide sludge from the system.

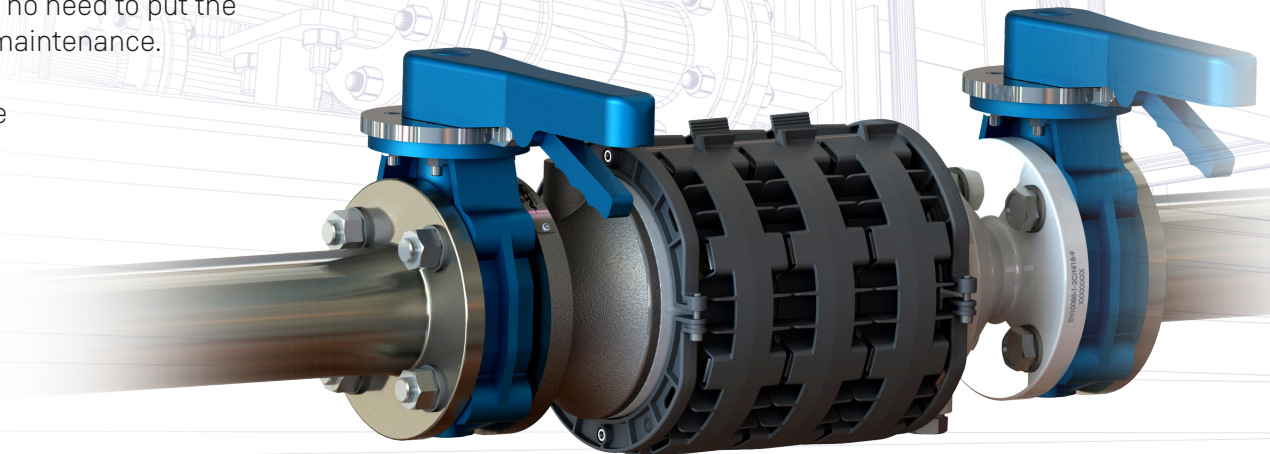
MagnaClean DRX introduces a new and compact design for protecting hydronic heating systems, based on industry-proven magnetic filtration technologies and components. The filter consists of an innovative magnetic belt, containing multiple high-performing neodymium magnets, wrapped around a precision-engineered stainless-steel canister.

The unique magnetic belt technology makes servicing quick and easy. The belt simply needs to be unclipped to release the magnets so that the sludge can be drained away. Minimal space is required around the filter to complete the service, making the compact design ideal where space is limited. The filter is installed in-line, so there is no need to put the hydronic heating system on bypass to complete maintenance.

MagnaClean DRX is available in 2", 3" and 4" pipe dimensions to meet the demands of different applications. The product comes supplied with EDPM full-flange gaskets for robust sealing at high temperatures.

Benefits

- Helps restore hydronic heating system efficiency and performance
- On-going maintenance costs are reduced
- Effective capture of black iron oxide (sludge)
- Collects large and micro particles
- Patented design ensures low pressure loss
- Simple installation and servicing
- Install on vertical and horizontal pipe runs
- Compatible with all hydronic heating systems
- Available accessory:
 - Thermal Jacket
- Manufactured in the UK

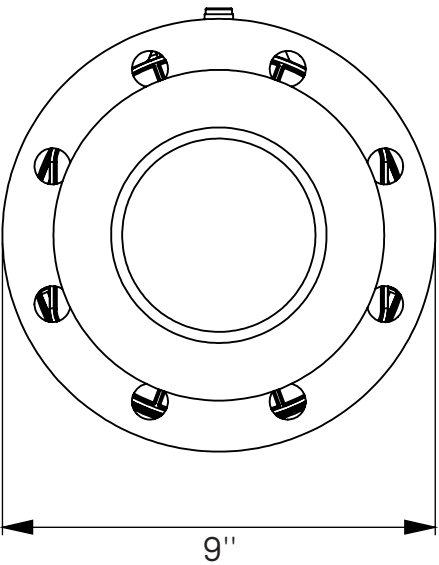
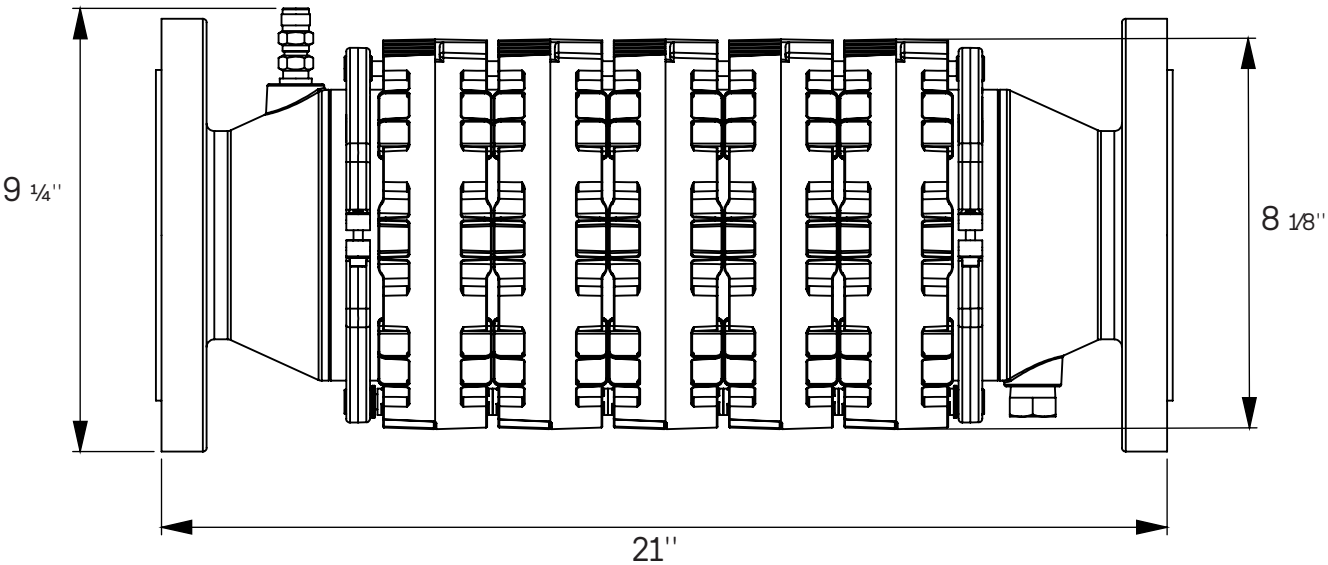


MagnaClean DRX Technical Specification

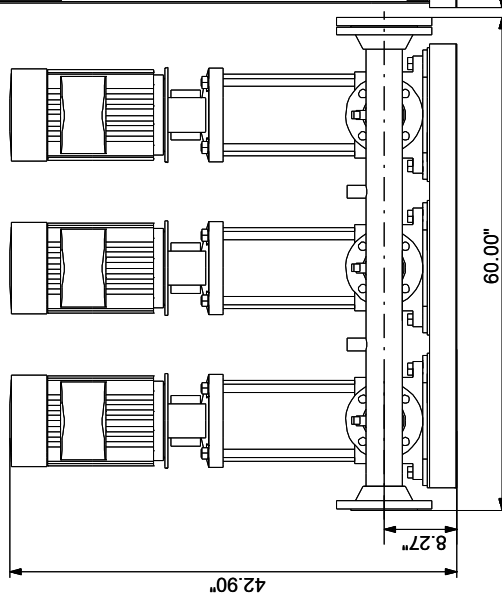
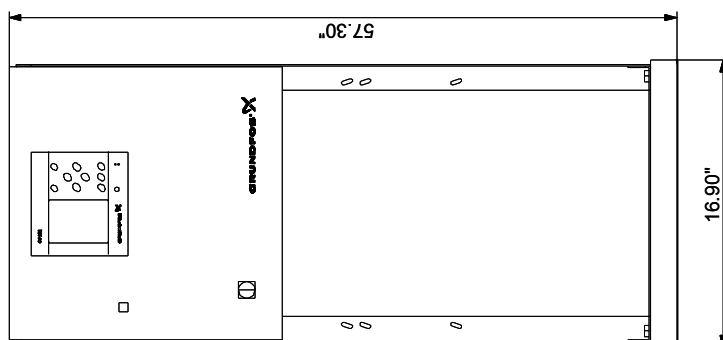
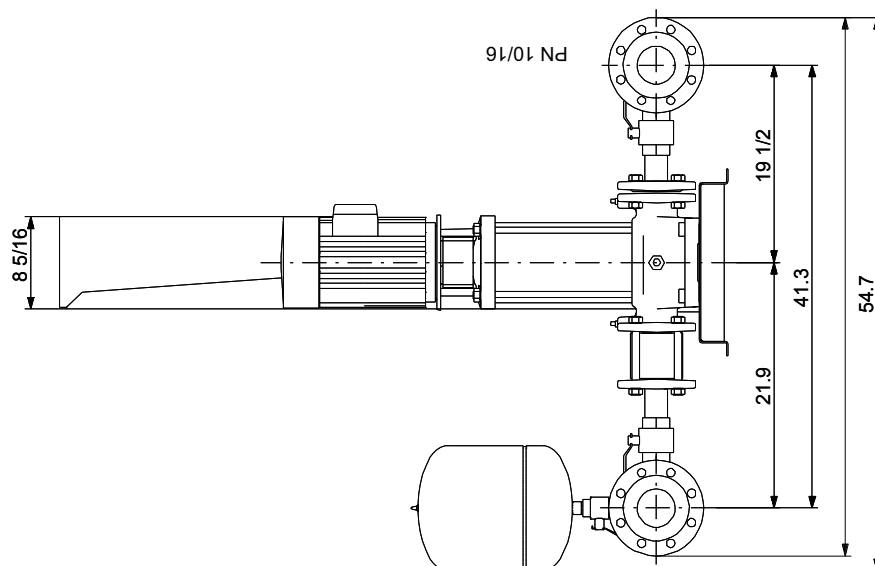
Available in 2", 3", and 4" versions

MagnaClean DRX	2"	3"	4"
Casing			
Material	Stainless Steel		
Volume (ASME) Liters (approx)	4.97	6.36	7.76
Flow configuration	In-line		
Seals	EPDM Flange gaskets		
Drain point thread	¾" NPT		
Maximum working pressure	10 Bar		
Maximum working temperature	212°F		
Air vent	Automatic air vent		
Magnet Assembly			
Casing	Glass reinforced nylon		
Magnets - type	Neodymium		
Magnets - number of	48	64	80
Magnets - dimensions	¾" Dia x ½" Thk		
Flow Flange ANSI			
Flange diameter	(6")	(7½")	(9")
Flange thickness	(¾")	(1")	(1")
Flange type	B16.5 Class 150		
Bolt size	(5/8")		
Bolt quantity	4	8	8
Bolt hole PCD	(4¾")	(6")	(7½")
Approvals			
ASME	ASMES VIII DIVISION 1-2017		
Weight (lbs) ASME/CRN	24.5	36.2	46.1
Dimensions	See technical drawings		

4" ASME



95044618 HYDRO MPC-E 3 CRE 45-2-2 50 Hz



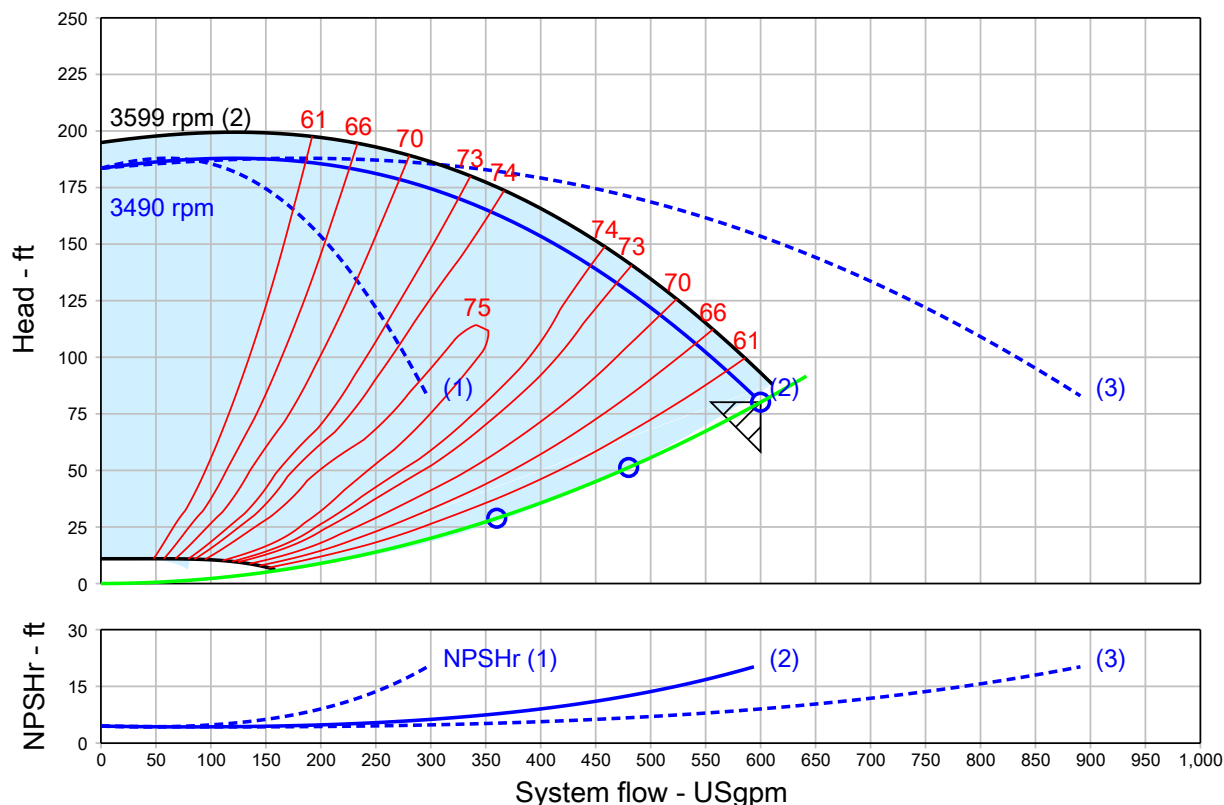
Note! All units are in [in] unless others are stated.

Disclaimer: This simplified dimensional drawing does not show all details.

Pump Performance Datasheet

Customer	: ASSOCIATED EQUIPMENT SALES	Quote Number / ID	: 2383667
Customer ref. / PO	:	Model	: Hydro MPC-E 3CRE 45-2-2 3x460V
Tag Number	: 009		60Hz
Service	:	Part Number	: Custom system
Quantity	: 1	Stages	: 2
Quantity of pumps	: 2 active + 1 standby	Based on curve number	: RC10475
		Date last saved	: 02/24/2025 4:51 PM

Operating Conditions		Liquid	
System flowrate	: 600.0 USgpm	Liquid type	: Cold Water
Flowrate per pump	: 300.0 USgpm	Additional liquid description	:
Differential head / pressure, rated (requested)	: 80.14 ft	Temperature, max	: 68.00 deg F
Differential head / pressure, rated (actual)	: 80.18 ft	Fluid density, rated / max	: 1.000 / 1.000 SG
Suction pressure, min / max	: 0.00 / 0.00 psi.g	Viscosity, rated	: 1.00 cP
NPSH available, rated	: Ample	Vapor pressure, rated	: 0.34 psi.a
Site Supply Frequency	: 60 Hz	Material	
Power Supply	: 3ph 460V	Material selected	: Standard - Cast Iron / 304 Stainless Steel
Performance		Pressure Data	
Speed, rated	: 3490 rpm	Pump shut off pressure	: 81.34 psi.g
Speed, maximum	: 3599 rpm	Maximum allowable suction pressure	: 145.0 psi.g
Speed, minimum	: 900 rpm	Driver & Power Data (@Max density) (Per Pump)	
Pump efficiency	: 53.67 %	Motor sizing specification	: Max power (non-overloading)
NPSH required / margin required	: 20.69 / 0.00 ft	Margin over specification	: 0.00 %
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,920 / 9,774 US Units	Service factor	: 1.00
Head maximum, rated speed	: 188.0 ft	Rated power (based on duty point)	: 11.31 hp
Head rise to shutoff	: 128.95 %	Max power (non-overloading)	: 11.25 hp
Flow, best eff. point	: 201.0 USgpm	Motor rating	: 15.00 hp / 11.19 kW (Fixed)
Flow ratio, rated / BEP	: 149.24 %	Panel Max FLA	: 54.7 A
Speed ratio (rated / max)	: 96.97 %	MCA	: 68.3 A
Head ratio (rated speed / max speed)	: 86.07 %	MOCP	: 80 A
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00	*Addition of pilot pump or up-sizing HP will affect system FLA, MCA, and MOCP.	
Selection status	: Near miss		
Energy Indexes			
PEI (VL)	: 0.40		
ER (VL)	: 60		





Panel Part Number:
99554629

Description
Control MPC E
3 X 15HP
3 X 480V

Selected Options: System Fault Light, Audible Alarm, Surge Protection, Pump Run Light, Normal/Emergency Switch, Service Disconnect Switch

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Date	12/13/2021			EDW-WD-GPC-1009			
Status	Approved					Panel Part Number: 99554629	

Feeder Circuit Protection:
Feeder circuit protection to be provided by others.
Type and size to be based on local, state and national electrical codes

SCCR Rating: 100 kA RMS Symmetric, 480V

UL Type Rating: 3R

Largest Motor FLA and Panel Maximum FLA:

Motor Horsepower	15HP
Motor FLA	17.9FLA
Panel Max. FLA	54.7FLA

Wire Type	Color	Abbr.
+12/24VDC Power/PLC Input(s)	Blue	BU
-12/24VDC Power/PLC Input(s)	Blue w/White Stripe	BUWH
115VAC Primary Line Power	Black	BK
115VAC Neutral	White	WH
Ground/PE	Green/Yellow Stripe	GNYE
Analog Inputs	Orange	OG
Analog Outputs	Orange	OG
Digital Inputs (CU Components)	Violet	VT
Ground for Digital Inputs (CU Components)	Violet w/White Stripe	VTWH
Digital Outputs	Yellow	YE
Power L1	Black	BK
Power L2	Orange	OG
Power L3	Red	RD
Power Neutral	White	WH
All Other Wiring	Brown	BN

Safety / Application Notes:
**** Please Reference the "BOOSTERPAQ - HYDRO MPC"**
Installation and Operation Instructions
"BEFORE" Applying power to Panel.

**** Power supply wires in front of main disconnect switch have dangerous voltage even though the main disconnect switch is off.**

**** Control panel must be connected professionally to the earth / ground.**

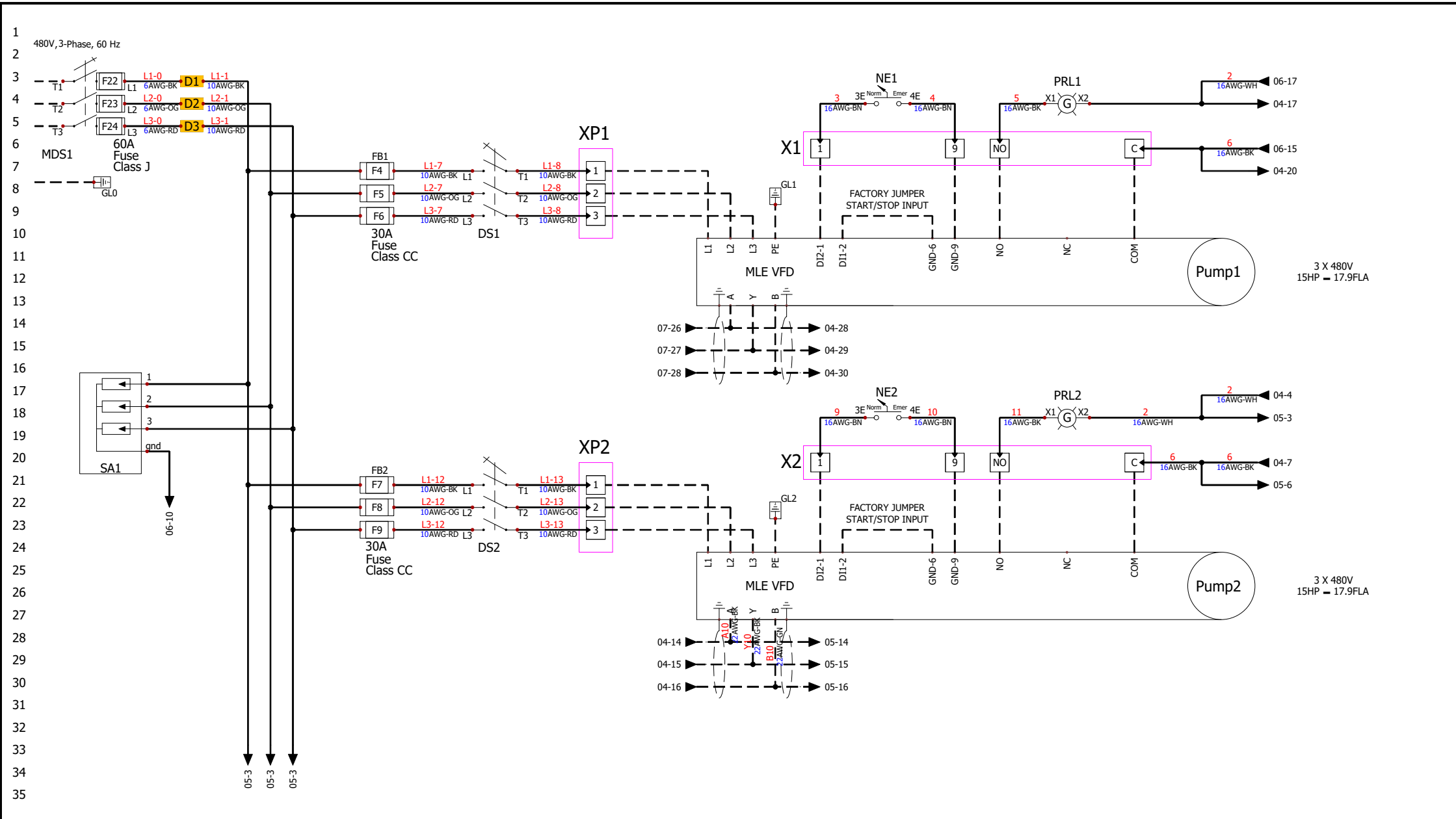
**** GRUNDFOS MLE motors have an integrated variable frequency drive (VFD) which provides motor overload protection. If a system utilizes MLE motors, the motor overload protection is provided by the VFD and does not require any additional motor overload protection.**

Cross Reference Definition
(##-##)
Sheet-Row

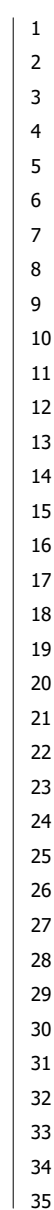
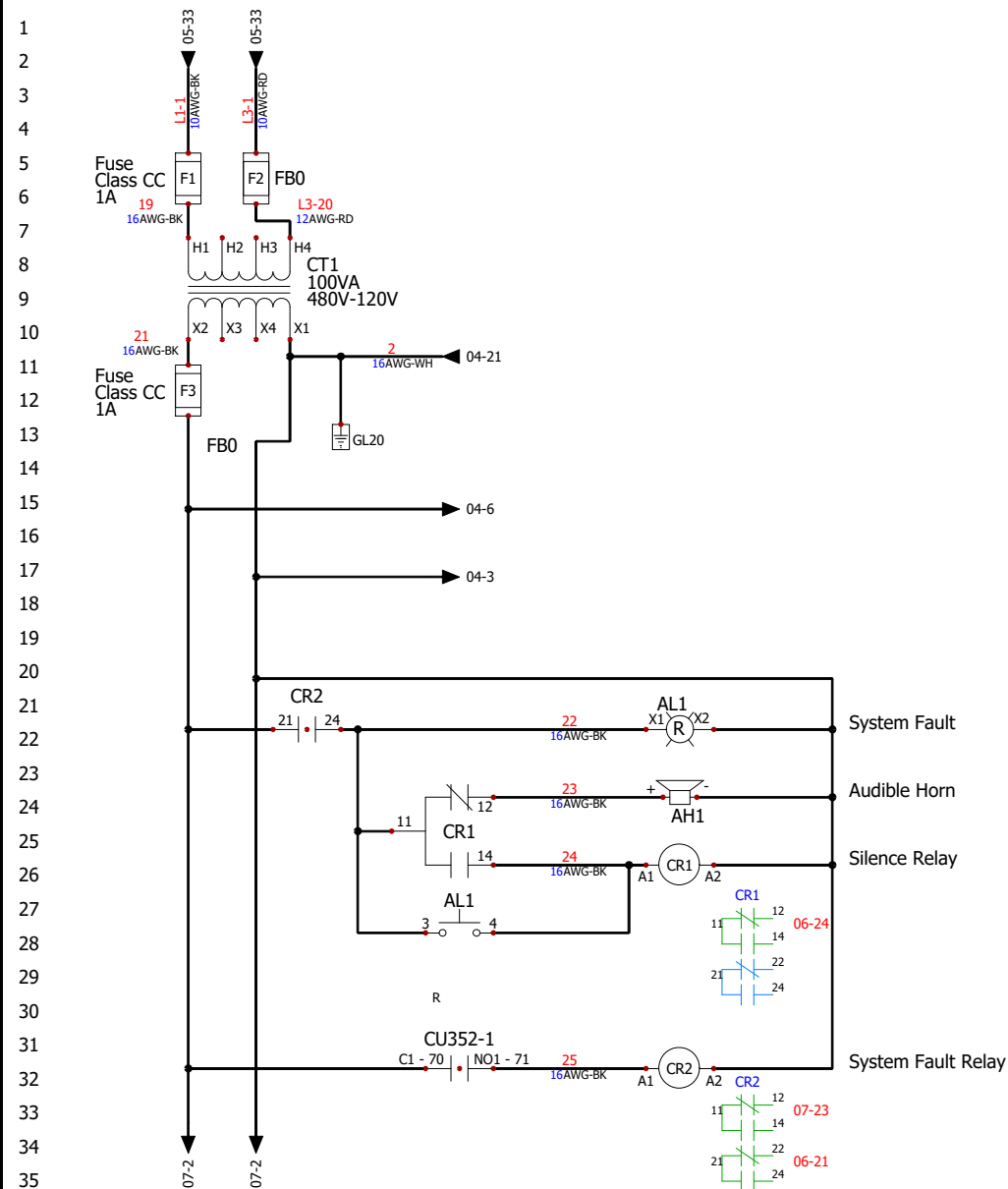
Wire Types
Internal Panel Wire _____
External Wire - - - - -

1-Table of Contents

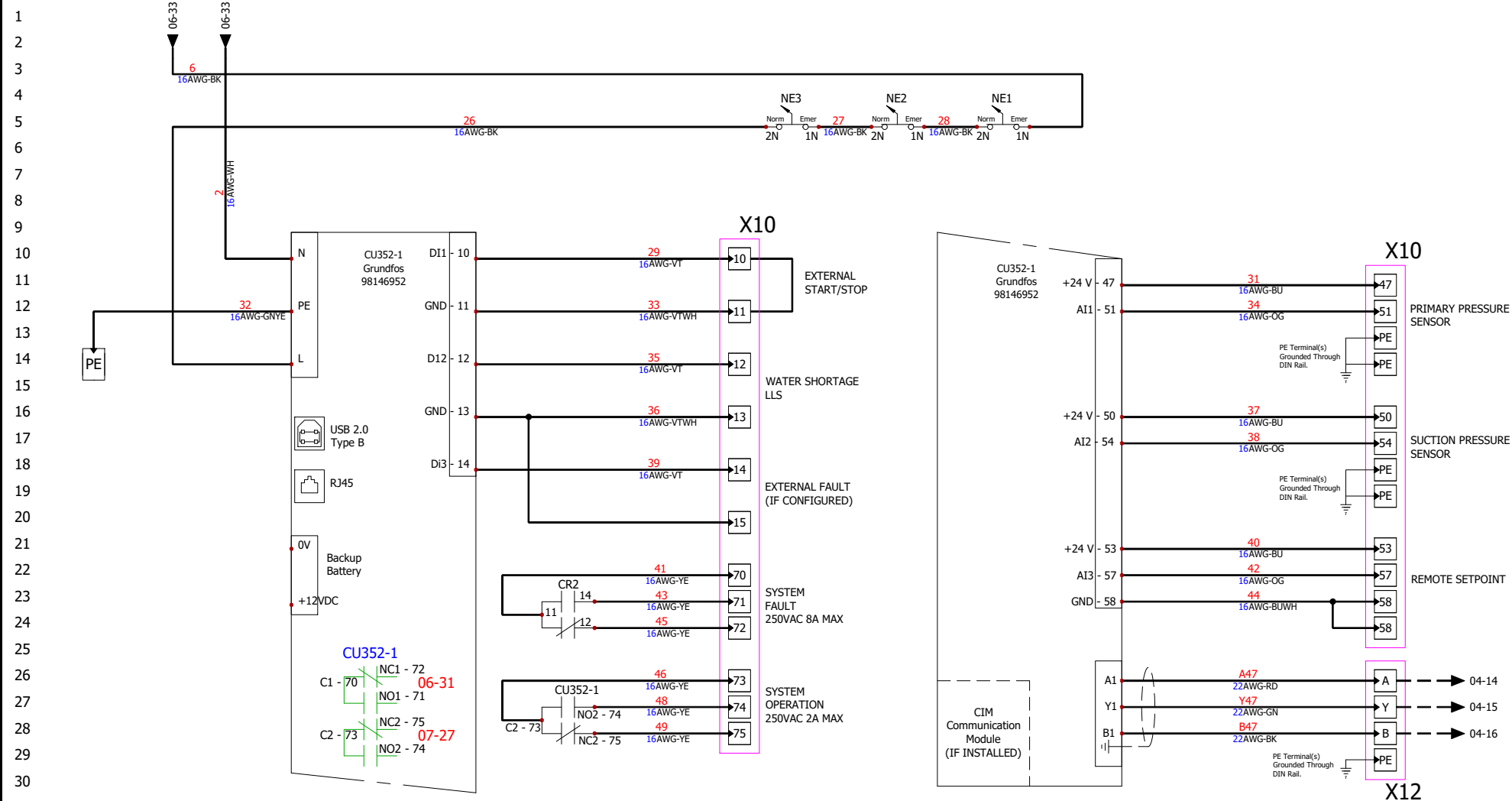
Drawing	Revision	Date	Created by	Description
01	2	9/9/2019	kharen	Cover Page 01
02	2	9/9/2019	kharen	Cover Page 02
03	2	9/9/2019	kharen	Drawings list
04	2	9/9/2019	kharen	Power 01
05	2	9/9/2019	kharen	Power 02
06	2	9/9/2019	kharen	Control 01
07	2	9/9/2019	kharen	Control 02
08	2	9/9/2019	kharen	Panel Layout
09	2	9/9/2019	kharen	Panel Views
10	2	9/9/2019	kharen	Bill Of Materials grouped by manufacturer Rev1.0 (Components)
11	2	9/9/2019	kharen	Bill Of Materials grouped by manufacturer Rev1.0 (Components)
12	2	9/9/2019	kharen	Main electrical closet



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Date	12/13/2021			EDW-WD-GPC-1009		
Status	Approved				Panel Part Number: 99554629	SHEET: 4/11



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Date	12/13/2021			EDW-WD-GPC-1009		
Status	Approved				Panel Part Number: 99554629	SHEET: 6/11



CIM COMMUNICATION MODULE TERMINATIONS

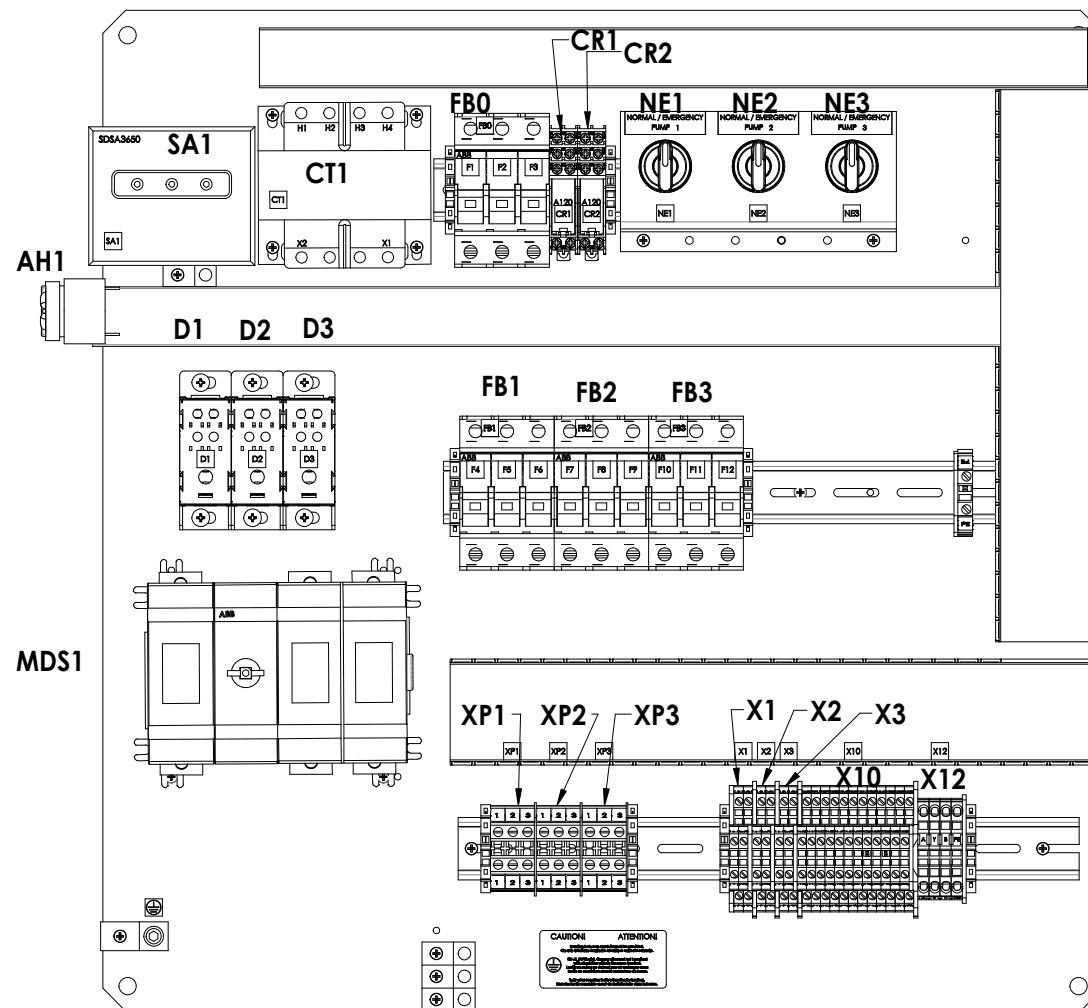
CIM	Terminal 1	Terminal 2	Terminal 3	Terminal 4
CIM 110 LON	LON terminal A	LON terminal B	LON terminal for cable screen	N/A
CIM 150 PROFIBUS DP	PROFIBUS terminal B	PROFIBUS terminal A	PROFIBUS terminal DGND	+5VDC
CIM 200 Modbus RTU	Modbus terminal D1	Modbus terminal D0	Modbus terminal common/GND	N/A
CIM 300 BACnet MS/TP	BACnet Plus terminal	BACnet Minus terminal	BACnet Ground terminal	N/A
CIM 500 BACnet IP, Modbus TCP, PROFINET IO	RJ45	RJ45		

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Date	12/13/2021	3 X 15HP 3 X 480V	
Status	Approved		

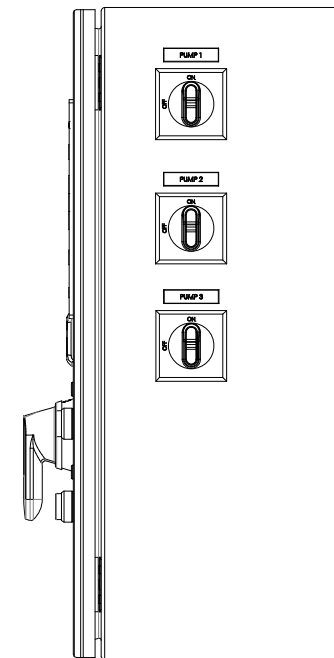
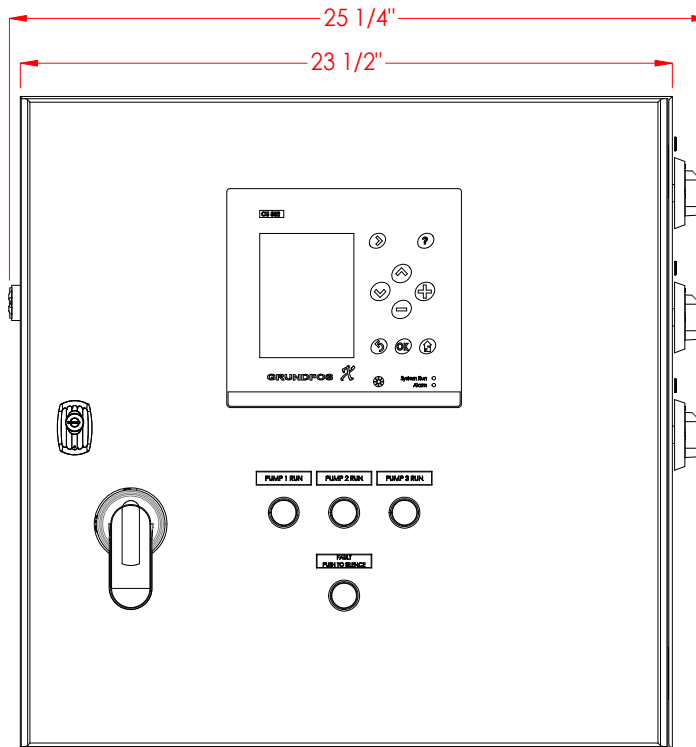
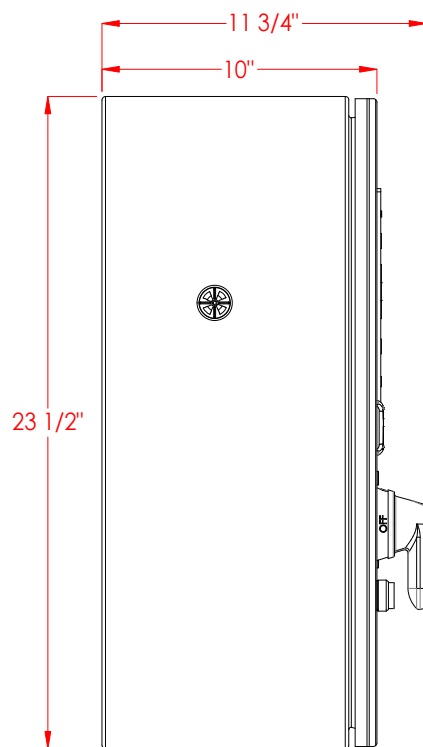
Document ID
EDW-WD-GPC-1009

GRUNDFOS	
Panel Part Number: 99554629	SHEET: 7/11

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Status	Approved					Panel Part Number: 99554629



CLEARANCE FROM FRONT OF ENCLOSURE MUST BE 36".
CLEARANCE FROM DISCONNECT HANDLE MUST BE 6".

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Status	Approved					Panel Part Number: 99554629	

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Article Number	Mark	Manufacturer	Reference	Description	Quantity	Component Type
13-16-26-1241	FB0, FB1, FB2, FB3	ABB	E9330CCS	Fuse Block; 3P, 30 A, Class CC, Indicator, Padlockable	4	Fuse Block 3-pole
13-16-66-1615	MDS1	ABB	OHY80L6	Disconnect Handle; Red/Yellow, 30/60/100/250A, Type 4, 4X, 3R, 12	1	Main Disconnect
13-16-66-1348	DS1, DS2, DS3	ABB	OHYS2RJ	Disconnect Handle; Red/Yellow, for Side Mount, Type 3R, 12	3	Service Disconnect
13-16-66-1506	MDS1	ABB	OHZX10	Alignment Ring; Use on all Pistol Grip Handles	1	Main Disconnect
13-16-66-1432	MDS1	ABB	OS60GJ12	Disconnect Switch; 60A, Fuseable, 600V, 3-Pole, Class J, Center Shaft	1	Main Disconnect
13-16-66-1383	DS1, DS2, DS3	ABB	OT63FT3	Disconnect Switch; 60A, 600V, 3-Pole, Front Mount	3	Service Disconnect
13-16-66-1610	MDS1	ABB	OMP6X500	Disconnect Shaft; 19.7", 6x500	1	Main Disconnect
13-16-26-1262	F22, F23, F24	F.Shaw	A4J60	Fuse; 60A, 600V, Class J	3	Fuse
13-16-26-1060	F1, F2, F3	F.Shaw	ATQR1	Fuse; 1A, 600V, 13/32" x 1 1/2", Class CC	3	Fuse
13-16-26-1069	F4, F5, F6, F7, F8, F9, F10, F11, F12	F.Shaw	ATQR30	Fuse; 30A, 600V, 13/32" x 1 1/2", Class CC	9	Fuse
13-16-71-1536	D1, D2, D3	F.Shaw	FS PDB 2A	Distribution block; 175A, 600V, 1in/4out	3	Distribution Block
13-16-56-1029	AH1	Floyd Bell	SP-1081	Alarm; 120V, 95db, Reduced Sensitivity, Extra Fast Warble, Panel Mount	1	Audible Horn
13-16-39-1093	CU352-1	Grundfos	98146952	(CM) Logic Module; Grundfos MPC Controller (CU352)	1	CU352
13-16-36-1500	AL1	Idec	HW1L-M2F10QD-R-120V	Pushbutton; Red, Illuminated, 120V, Complete	1	System Fault
13-16-36-1490	PRL1, PRL2, PRL3	Idec	HW1P-2FQD-G-120V	Pilot Light; Green, Illuminated, 120V, Complete	3	Pump 1 Run Light, Pump 2 Run Light, Pump 3 Run Light
13-16-46-1073	CR1, CR2	Idec	RJ2S-CL-A120	Relay; 120V, DPDT, 8A, Indicator	2	Silence Relay, System Fault Relay
13-16-46-1283	CR1, CR2	Idec	SJ2S-07LW	Socket; 8 Pin, DIN/Pnl Mt, for RJ Relays	2	Silence Relay, System Fault Relay
65-BRKT-3HOA	SWB1	Orenco	65-BRKT-3HOA	Bracket; HOA or N/E Switch, x3	1	NE Bracket
13-66-11-1130	SAB1	OSI	13-66-11-1130	Bracket; Surge Arrestor	1	SA Bracket
65-BP-2424-A01	L1	OSI	65-BP-2424-A01	Backplate; 24x24, Aluminum, Pre-Drilled, Layout 01	1	Main electrical closet
65-SWITCH-2-12	NE1, NE2, NE3	OSI	65-SWITCH-2-12	Switch; Two Position, 1-NO, 1-NC	3	Normal/Emergency Switch
65-TB-CU352-DB	X10 1	OSI	65-TB-CU352-DB	Terminal Blocks; Double Stack, X10 CU352 Terminals	1	CU352 Terminal Blocks

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Date	12/13/2021			EDW-WD-GPC-1009		
Status	Approved				Panel Part Number: 99554629	SHEET: 10/11

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Article Number	Mark	Manufacturer	Reference	Description	Quantity	Component Type
65-TB-GENI	X12 1	OSI	65-TB-GENI	Terminal Blocks; X12 Geni Bus Terminals	1	Geni Bus Terminal Blocks
65-TB-PT-50A	XP2 1, XP1 1, XP3 1	OSI	65-TB-PT-50A	Terminal Blocks; Single Pump Pass Through, 50A	3	Pump Power Terminal Blocks
65-TB-SINGLE-PUMP-DB	X3 1, X1 1, X2 1	OSI	65-TB-SINGLE-PUMP-DB	Terminal Blocks; MLE Pump Control	3	Pump Control Terminal Blocks
13-16-71-1465	PE 1	Phoenix	3044157 (Type UT6-PE)	Terminal Block; Ground, for terminal width 8.2 mm	1	
13-16-86-1680	GL0, GL1, GL2, GL3, GL20	Raco	TA2-Bulk	Ground Lug; 2AWG, Burndy	5	Ground Lug
13-16-61-1010	SA1	Schneider	SDSA 3650	Surge Arrestor; 3 Phase, 600V, WYE	1	Surge Arrestor
65-ENCL-2424-RSH	L1	Schneider Electric	65-ENCL-2424-RSH	Enclosure; 24X24 Right Side Hinge	1	Main electrical closet
13-16-81-1442	CT1	Schneider Electric	9070T100D20	Transformer; 100VA, P/208/230/460V, S/115V	1	

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Status	Approved					Panel Part Number: 99554629	

Grundfos CU 352 Pump Controller

Advanced pump system controller for parallel connected pumps for HVAC and Pressure Boosting Applications



Compatibility

The CU 352 pump controller can control up to six (6) parallel connected pumps in the following manner:

- Direct BUS control: **CRE, CME, VLSE or LCSE** pumps
- Direct BUS control: Pumps with Grundfos **CUE** drives
- Digital/Analog control: Pumps with external drives (requires **IO 351B** Input/Output module)

HVAC Control Modes

- o Constant Differential Pressure control via remote sensor
- Multi-zone Differential Pressure control up to 6 zones
 - Priority, Minimum or Energy Saving Mode
- o Quadratic, proportional or constant differential pressure control via local sensor
 - Adjustable control curve (Max flow and control head)
 - Efficiency based sequencing automatically updated
- o Constant Flow
- o Constant Temperature
- o Constant Differential Temperature

Pressure Boosting Control Modes

- o Constant Pressure (pump discharge)
- o Quadratic or Proportional discharge pressure
 - Adjustable control curve (Max flow and min. static head)
- o Constant Pressure (remote sensor)

Pump Cascade Control

- o Efficiency based pump sequencing
 - * Updated automatically when setpoint and/or control head are changed
- o Automatic Pump alternation (run hour based)
- o Standby Pumps (single or multiple)
- o Adjustable minimum time between starts / stops
- o Adjustable maximum starts per hour
- o Pump test run (exercise idle pumps)
- o Clock program
- o Proportional Gain and Integral Time adjustment

Application optimized functions:

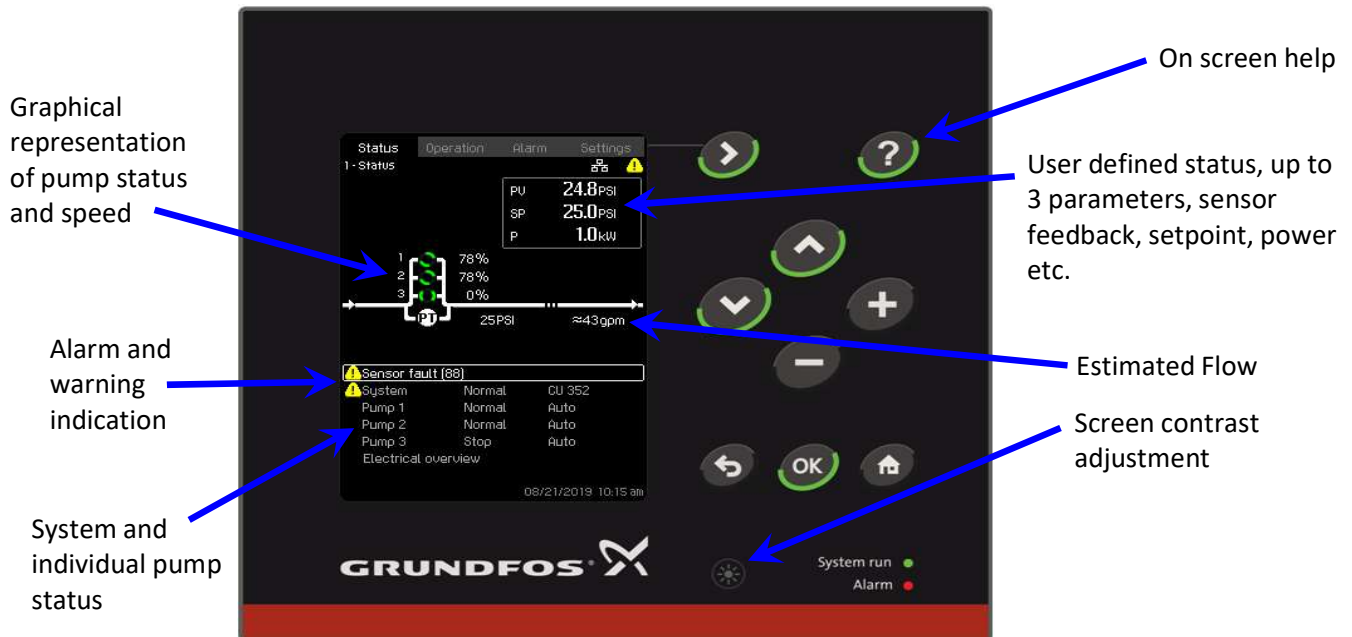
- o Secondary (Fallback) Sensor
- o Pump curve data (5th or 2nd order polynomial)
 - * Pre-programmed from factory
- o Flow estimation via pump curve data and pressure measurement across pump(s)
- o Reduced operation (generator backup power)
 - Max. kW limit or max. number of pumps
- o Specific energy calculation (kWh per unit volume)
 - *requires flow sensor input
- o Low Flow Stop (Pressure Boosting)
 - Adjustable low flow setting: Energy saver mode, medium flow or high comfort level

Protection and Monitoring

- o Check valve failure detection (MLE motors)
- o Pump outside duty range protection
 - *keeps all operating pumps on their curve
- o Low suction pressure warning and alarm
- o Primary sensor failure reaction setting
- o Soft pressure build-up (Pipe fill mode)
- o Low system pressure warning and alarm
- o High system pressure shutdown
- o Alarm log, last 24, time stamped
- o Data log graph (20 - 3600 samples/hour)
 - (Flow, speed, setpoint, sensor feedback, kW)
- o BMS/EMS communication (see page 4)

Grundfos CU 352 Pump Controller

CU 352 Control user interface



Status of inputs and outputs

Electrical overview

Shows status of inputs along with wiring landing points [in brackets]

Status	Operation	Alarm	Settings
1.11.1 - Analog inputs			
Analog inputs and measured value			
AI1 (CU 352), [51]		35PSI	
(Diff. pressure, pump, high)		7.9mA	
AI2 (CU 352), [54]		35PSI	
(Diff. pressure, pump, low)		7.9mA	
AI3 (CU 352), [57]		0PSI	
(Diff. pressure, external)		0.0mA	

Status	Operation	Alarm	Settings
1.11.2 - Digital inputs			
DI1 (CU 352), [10]			
(External start/stop)	Active		
DI2 (CU 352), [12]			
(Reduced operation)	Not active		
DI3 (CU 352), [14]			
(Alternative setpoint 2)			
DI1 (IO 351-41), [10]			
(Not used)			

Alarms and warnings

Alarm log - Stores last 24 alarms and warnings.

- > Time event occurred
- > Time event cleared
- > Alarm code for more detailed description.

Status	Operation	Alarm	Settings
3.2 - Alarm log			
AI3-CU352			
Sensor fault (88)			
Occurred at		08/21/2019 10:12 am	
Disappeared at		-- --	
System			
Water shortage (214)			
Occurred at		08/21/2019 8:54 am	
Disappeared at		08/21/2019 8:55 am	
System			
Water shortage (214)			
Occurred at		08/21/2019 8:54 am	
Disappeared at		08/21/2019 8:55 am	
System			
Pumps outside duty range (208)			
Occurred at		08/21/2019 8:54 am	
Disappeared at		08/21/2019 8:54 am	
08/21/2019 10:58 am			

Startup Wizard

Startup Wizard

Step by Step installation guide

- > Set time and date format
- > Remove air/Prime pumps
- > Check pump rotation
- > Set primary sensor

Step-by-step installation guide	
17/26 - Priming sequence	
Close the valve on the outlet side of all the pumps. Prime all pumps and make sure that the suction manifold and the suction pipes are primed as well. Make sure that a correctly sized diaphragm tank has been installed, if necessary, and that the tank precharge pressure is correct. Press [ok] to go to the next page.	
Go to next page	
08/21/2019 11:13 am	

Grundfos CU 352 Pump Controller

Sequence of operation

Hydronic Circulation

The system controller shall operate equal capacity variable speed pumps to maintain a variable (quadratic or linear) or constant differential pressure. The system controller shall receive an analog signal [4-20mA] from a remote or pump system mounted differential pressure sensor. The controller shall be able to receive a system suction pressure and system discharge pressure to determine the system differential pressure (two independent analog signals). The controller shall have the means to protect pumps against dry running via a user defined low suction pressure setting.

Pressure Boosting

The system controller shall operate equal capacity variable speed pumps to maintain a constant or variable (quadratic or linear) pressure. The system controller shall receive an analog signal [4-20mA] from a remote or pump system mounted pressure sensor. The controller shall be capable of simulating the effect of a remote mounted pressure sensor by quadratically reducing the system discharge pressure setpoint as a function of reduced flow (friction loss compensation).

Cascade Control

Standard Cascade Control (Pumping Efficiency Based):

The pump system controller shall adjust pump speed as necessary to maintain system set-point pressure as flow demand changes. The pump system controller shall start additional pumps upon determination of an increase in efficiency utilizing factory programmed (5th order polynomial) curve data. When the system pressure is equal to the system set-point, all pumps in operation shall reach equal operating speeds. The pump system controller shall have field adjustable Proportional gain and Integral time (PI) settings for system optimization.

Optional Cascade Control (Pump Start Speed Based):

As flow demand increases the pump speed shall be increased to maintain the system set-point pressure. When the operating pump(s) reach the programable start speed, an additional pump will be started and will increase speed until the system set-point is achieved. When the system pressure is equal to the system set-point, all pumps in operation shall reach equal operating speeds. The pump system controller shall have field adjustable Proportional gain and Integral time (PI) settings for system optimization.

Pumps outside duty range (End of curve protection):

When the pumps are outside their allowable operating range, the controller shall switch on an additional pump, distributing a reduced flow through all pumps in operation moving each pump back into its allowable operating region.

Pump Alternation

All pumps in the system shall alternate automatically based on demand, time and fault. If flow demand is continuous with only one pump in operation, the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once per week. The interval and actual time of the pump change-over shall be field adjustable.

Low Flow Stop (Pressure Boosting)

The system controller shall be capable of detecting low flow allowing for pumps to be switched off in an energy saving mode. Upon detection of low flow, the controller shall increase the system setpoint by 5% (adjustable) to store water in a diaphragm or bladder tank and switch off. The pump shall remain off until the system pressure falls 5% below the system setpoint (adjustable). If system flow is still low when the pump switches back on, the pump shall refill the diaphragm tank to 5% above setpoint and switch off again. If system flow increases above the low flow setting, the pump shall return to normal constant pressure mode maintaining the system setpoint.

Grundfos CU 352 Pump Controller

Technical data

Altitude above sea level

Maximum 6,560 feet (2000 m.)

Ambient Temperature

During operation: -4°F to +140°F (-20°C to +60°C)

During transportation: -4°F to +140°F (-20°C to +60°C)

- * At temperatures below 32°F (0°C) the display may react slowly.
- * The display should not be exposed to direct sunlight

Relative air humidity

5 to 95%

Enclosure class

UL type 3R when mounted in the front of a panel with UL type rating 1, 2, 3, 3R, 5, 12, 12K or 13. Overall control panel rating of Type 4/4X available on request.

Supply voltage

1 x 100-240 VAC +/- 10% 50/60Hz, PE
(Class 1 equipment)

Power consumption

Maximum 22 W

Backup battery

The optional backup battery can keep the CU352 powered during intermittent power outages.

The CU 352 will monitor the following:

- short circuit
- wrong polarity
- defective battery
- battery missing
- low battery voltage

Digital inputs (3)

Open-circuit voltage	24 VDC
Closed-circuit current	5 mA, DC
Frequency range	0-4 Hz

Analog inputs (3)

	0-20 mA
Input current and voltage	4-20 mA
	0-10 V
Tolerance	± 3.3 % of full scale
Repetitive accuracy	± 1 % of full scale
Input resistance, current	< 250 Ω
Input resistance, voltage	> 50 kΩ ± 10%
	24 V, 30 mA
Supply to sensor	short-circuit protected

Relay outputs (2)

Normally open contacts	C, NO
Maximum contact load	240 VAC, 2 A
Minimum contact load	5 VDC, 10 mA

Communication protocols

For connection to building management systems, Communication Interface Modules (CIM) can be supplied with the CU 352 controller.

Protocol	CIM Type
LONworks	110
PROFIBUS DP	150
PROFINET IO	500
Modbus RTU	200
Modbus TCP	500
BACnet MS/TP	300
BACnet IP	500
Ethernet IP	500

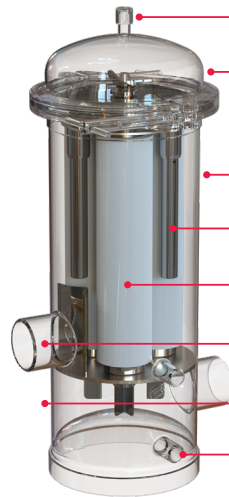
MagnaClean CMX - MIDI

Innovative, adaptive sidestream & inline filtration

The *MagnaClean CMX* Midi filter is constructed from high quality, polished 316L stainless steel and has been carefully designed and scaled to work within medium-sized industrial and commercial heating and chilled systems up to 93,000 litres in size.

The Midi filter provides highly flexible, magnetic and non-magnetic filtration via a powerful neodymium magnet assembly and three cartridge filters, both of which can be configured either independently or in combination to deliver market leading, adaptive system filtration performance.

Replaced with 1" SS ball valve and funnel



Vent port

304° stainless clamp assembly

316L stainless steel housing

3 x neodymium magnets

3 x cartridge filters

Water inlet

Water outlet

Drain port



93,000 Litre
Capacity



Up to 65 l/min
Flow Rate



10 Bar Max.
Pressure

Features & Benefits

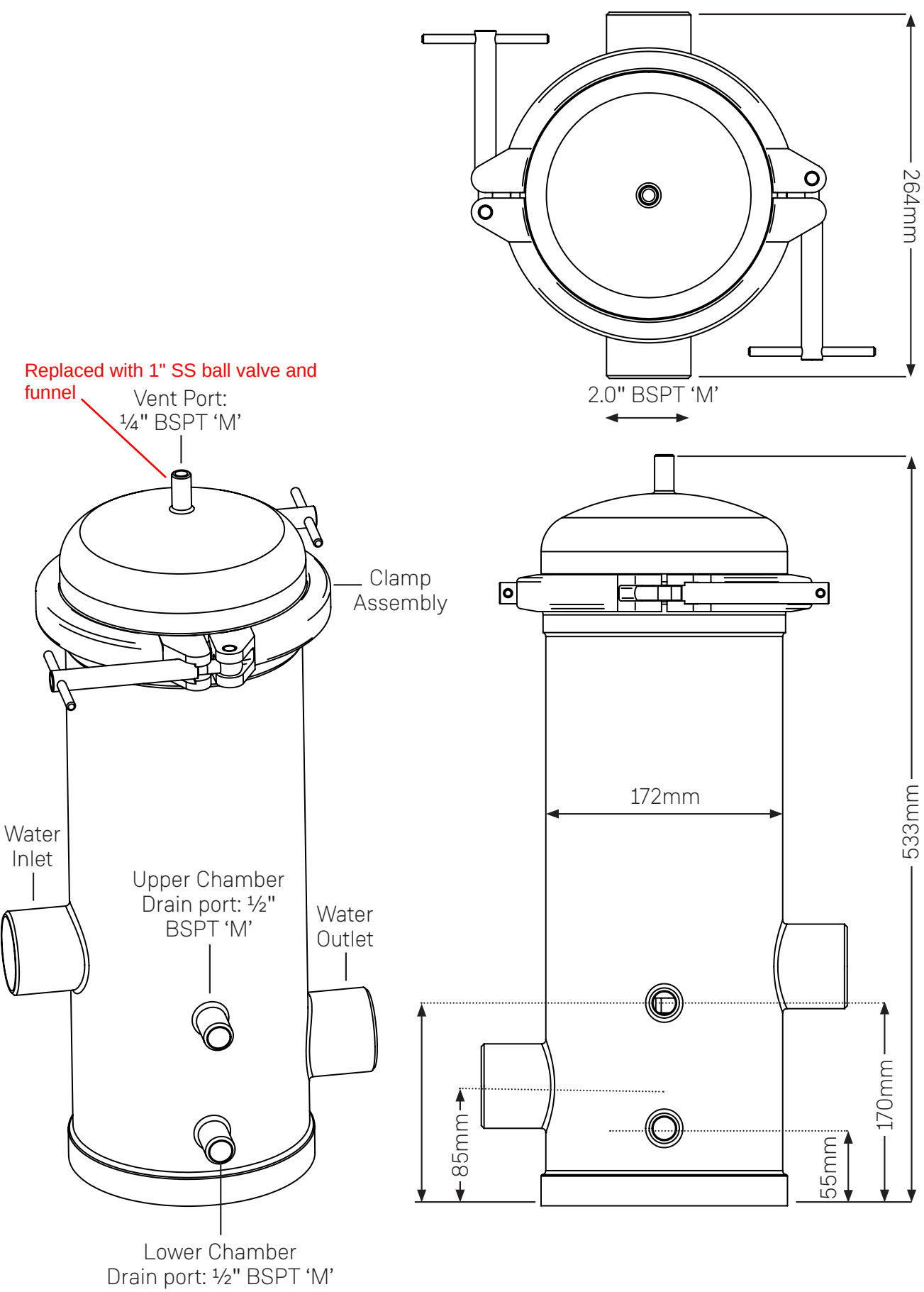
- Marine-grade, 316L stainless steel construction
- Low-cost installation, reduced maintenance and improved energy efficiencies
- Adaptive filtration options – magnetic or non-magnetic and combined, dual-filtration
- Configurable cartridge filter specification to suit exact system filtration requirements
- Effortless, tool-free servicing and maintenance
- 10.0 bar maximum working pressure
- Temperature range -10°C to 150°C
- Optional insulation jacket accessory

ADEY System Kit

An ADEY system kit is available for the *MagnaClean CMX* Midi filter comprised of three 20-micron cartridge filters, an automatic air vent, magnetite scraper tool and five litres of ADEY's award winning *MC1+ Protector* which passivates and protects bare metal surfaces.



Technical Specification



MagnaClean™ CMX



Midi

Technical Specification

<i>MagnaClean CMX</i>			
Product code	FL1-03-05010	FL1-03-05013	FL1-03-05014
Model	NANO	MIDI	MAXI
System Capacity (Litres)	43,200	93,000	324,000
Connection Size & Type	1" BSPP Female	2" BSPT Male	2" BSPT Male
Vent Port Size & Type	¼" BSPP Female	¼" BSPT Male	¼" BSPT Male
Drain Port Size & Type	¼" BSPP Female	½" BSPT Male	½" BSPT Male
Material specification			
Body	316L Stainless steel		
Lid Clamps	304 Stainless steel		
Finish	Polished		
Design specification			
Maximum working pressure	10.0 Bar		
Minimum working temperature	-10°C		
Maximum operating temperature	150°C		
Dry Weight (Kg)	<3.0	<11.4	<17.5

Chimney and Gas Vent Calculation

Please note the following calculation program is based on the ASHRAE Chimney Design Equation as well as the ASHRAE Duct Design Equations. US Draft Co., disclaims any responsibility for any improper vent system performance as a result of the use of this software.



Reference: #27966

Project Name: Parkhill High School

Project City: NA

Project State: Kansas

Project By: William Gustafson

Project Description: (4) FCB-2000 Hellcats

Memo:

Appliance Input Data

Appliance Fuel Type:	1 - Natural Gas or Equivalent.	Chimney/Vent Type:	UL 1738 Vent
Appliance Input:	8000 MBH	Ambient Temperature:	60°F
Appliance CO2%:	8.5 %	Altitude:	1969 Ft
Flue Gas Temperature:	275 °F	Allowable Back Pressure:	0 to 0

Combustion Air Vent Data

Combustion Air Duct Length:	0 Ft	15 Degree Elbow:	0
Additional Resistance:	0 K	30 Degree Elbow:	0
Additional Pressure Loss:	0 In. W.C.	45 Degree Elbow:	0
		90 Degree Elbow:	0

Exhaust Vent Data

Horizontal Vent Length:	57 Ft	15 Degree Elbow:	0
Total Stack Height:	10 Ft	30 Degree Elbow:	0
Straight Tee:	0	45 Degree Elbow:	1
Lateral Tee:	0	90 Degree Elbow:	2
Stack Cap Termination:		Additional Resistance:	0 K
Boot Tee:	0	Additional Pressure:	0 In. W.C.

System Information

Barometric Pressure:	28.187 In. Hg	Exhaust Mass Flow:	138.43 lbs. @ 8.5 %CO2
Combustion Air Density:	0.071 Lb/ft ³	Flue Gas Density:	0.05 Lb/ft ³
Combustion Air Flow:	1833.7 CFM	Exhaust Gas Flow:	2768.6 CFM
Combustion Air Fitting Friction:	0.5 K	Exhaust Fitting Friction:	1.25 K
Combustion Friction Loss:	0 K	Exhaust Vent Friction Loss:	2.249 K

Solution

Exhaust Vent Diameter:	16 Inches		
Exhaust Gas Velocity:	1983.86 FPM		
Theoretical Draft, Dt:	0.04 In. W.C.		
Pressure loss, dP:	0.36 In. W.C.	Exhaust CFM Required:	2768.6 CFM
Available Draft, Da:	0.32 In. W.C.	Pressure Control Required @ 70°F:	0.45 In. W.C.
Total Pressure:	0.32 In. W.C.		
Pressure Control Required:	0.32 In. W.C.		



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CBX Extended Range

High Temperature Chimney Fan

The CBX chimney fan is designed to mount outdoors at the termination of the chimney or gas vent to discharge flue gas away from the building.

The CBX may be mounted for vertical or sidewall discharge. Provides negative pressure throughout the chimney or gas vent system to ensure safe operation. The CBX is available in 430 or 316L stainless steel to prevent corrosion of housing and impeller. Drain holes prevent rain from entering chimney. A direct drive motor is used for quiet, belt-free operation. The CBX is ETL listed for all types of fuel-fire appliances.

FEATURES

Applications - Chimneys or gas vents serving gas or liquid burning appliances such as Category I, II, III & IV appliances or Building Heating Appliances

Performance - Maximum capacity up to 7,900 CFM and up to 7.0" w.c. of static pressure

Construction - The housing and dynamically balanced backward inclined (BI) or backward curved (BC) impeller is available in 316L stainless steel

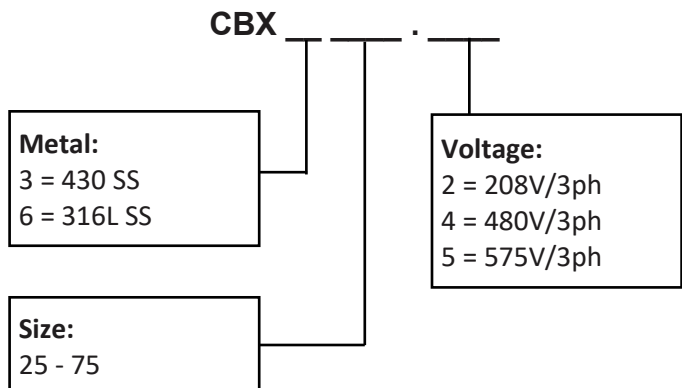
Motor - Inverter duty 208, 480 or 575VAC 3ph, NEMA premium induction, totally enclosed fan cooled

Listings and Ratings - UL378, Standard for Draft Controls; UL 705, Standard for Safety Power Ventilators; CSA C22.2, Fans and Ventilators; CSA B255, Mechanical Flue Gas Exhausters

Warranty - Two year mechanical warranty

Made in America

ORDER MATRIX



STANDARD EQUIPMENT

Three foot flexible conduit

Motor isolation plate

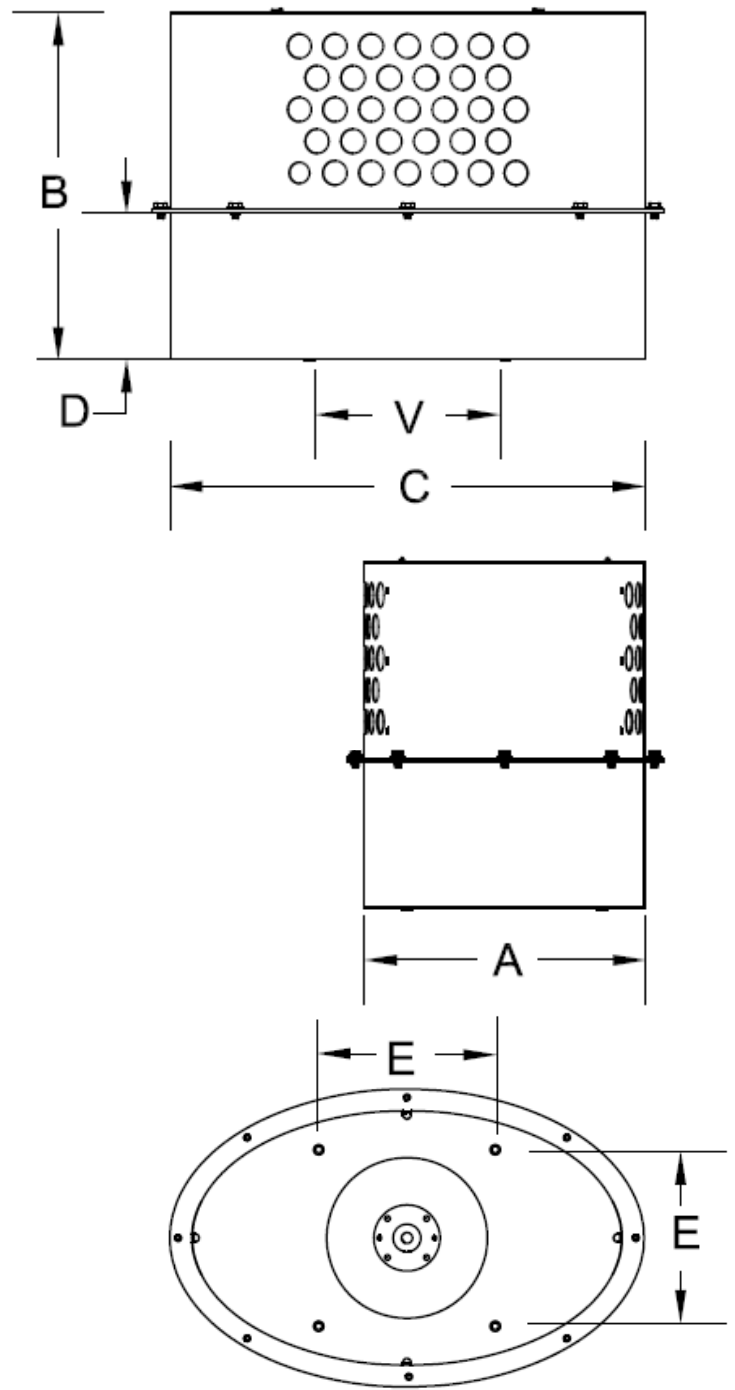
Fan guard

Integrated inlet ring



Dimension Information				
Model	CBX*25	CBX*35	CBX*50	CBX*75
A	18"	23"	28-7/8"	32-7/8"
B	20-3/4"	26-3/8"	34-3/8"	36-3/8"
C	28-1/2"	34"	47"	52"
D	9-1/2"	10-1/8"	17-1/4"	18-3/4"
E	12"	16"	24"	24"
V	16"	17"	24"	28"
Weight	75 lbs	135 lbs	355 lbs	490 lbs
Voltage	208/480	208/480	208/480	208/480
Amps	6.2/3.1	8.6/4.3	14.0/6.5	29.0/14.0
HP	2	3	5	10
Freq	50/60	50/60	50/60	50/60
Phase	3	3	3	3
RPM	2500	1800	1800	1750
Impeller	BI	BC	BC	BC
Motor	ID	ID	ID	ID

Capacity				
SP	CBX*25	CBX*35	CBX*50	CBX*75
0	2,580	3,800	5,900	7,900
1.00	2,050	3,450	5,420	7,450
2.00	1,450	3,020	4,900	6,850
3.00	600	2,480	4,250	6,200
4.00	N/A	1,680	3,500	5,450
5.00	N/A	N/A	2,300	4,600



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Application

Mechanical draft systems serving all types of chimneys and gas vents

Supply air systems for mechanical rooms with gas or liquid burning appliances

Function

Integrated with EC-Flow Technology™, the V250 controller is designed to rapidly respond to pressure changes in exhaust or supply systems 4" Color Touchscreen provides simplified interface and easy to view system information.

Construction

The NEMA4X housing is constructed of fiberglass reinforced polycarbonate for indoor use only.

Listings and Ratings

UL378, Standard for Draft Controls

UL508, Industrial Control Equipment

Communication

Modbus RTU RS485 Serial protocol supported

Warranty

Two year mechanical warranty

V250

Constant Pressure Controller

Description

The V250 is a constant pressure controller used for exhaust and/or supply air systems for heating appliances

For chimneys or gas vents, the V250 maintains a constant pressure for increased efficiency and proper operation.

For supply or make-up air applications, the V250 maintains a neutral room pressure to insure safe appliance operation throughout operation cycle. The V250 also offers a step air function to incrementally increase the supply air fan based on the number of appliances in operation.

The V250 includes an integrated safety function to verify the pressure transducer is operating correctly. The Bi-directional pressure transducer improves operation for condensing applications

Standard Features & Equipment

4" Color Touchscreen Interface

Interlock up to 6 appliances

Modbus RTU via RS485 Serial Port

Alarm Snapshot

EC-Flow Technology™

High and Low Pressure Alarms

Accessories

LP4 - Bi-directional pressure transducer

VP - 316L SS vent probe

SLT - 5' high temperature silicone tubing

ZPS - Outdoor static pressure sensor

GFS - Differential pressure switch

CS75 - Current sensing relay

TT - Tubing Tee

DP - Duct Probe

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Configuration		
Control System	# of Appliances	Accessories
V250-V	6	LP4, SLT, VP
V250-P	6	LP4, SLT, DP,
V250-O	6	LP4, GFS, SLT,
V250-VP	6	(2) LP4, (2) SLT, VP,
V250-OV	6	LP4, GFS, SLT,

Dimensional Information			
A	B	C	
11"	15"	5-1/8"	
Power Requirements			
Voltage	Amps	Frequency	Phase
120VAC	0.4	60	1
Power Output		Control Signal	
Voltage	Amps	Voltage	Amps
24VDC	0.65	0-10VDC	0.1



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V250 Constant Pressure Controller

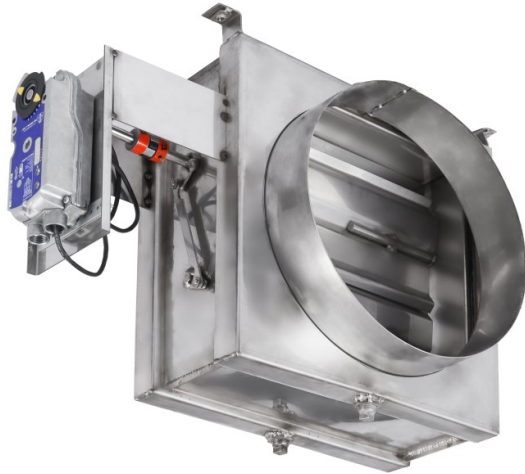


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OBD

Opposed Blade Damper



Application

Chimneys or gas vents serving gas or liquid burning appliances such as Category I, II, III & IV appliances or Building Heating Appliances Suitable for placement in connectors and/or manifold/breechings

Listings and Ratings

UL378, Standard for Draft Equipment
Listed up to 1,000°F for continuous operation (G Model listed up to 575°F for continuous operation)

Function

Restricts the flow of flue gas in chimneys and gas vents where excessive negative pressure exists.

Construction

16 gauge 316L stainless steel housing and blades 1/2" stainless steel bearings
External linkage

Warranty

Two year mechanical warranty

Description

The Opposed Blade Damper (OBD) is a multi-blade damper for chimneys or gas vents. When used with the V-Series constant pressure controllers, the OBD maintains constant negative or positive pressure in the connector or manifold/breeching

Includes a capacitor type return safety mechanism. Linkages are located outside of the flue gas stream. Optional 1/2" flanged collars for easy connection to all types of chimneys and gas vents

Available in sized from 8"ID to 36"ID

* Larger sizes available upon request

Standard Equipment

316L stainless steel construction with 316L stainless steel oilite bearings
0-10VDC fast acting modulating actuator with optional end switches. Open and closed position end switches

Fast acting, 2 second 0°-90° span

Ordering Matrix

OBDXX-AA

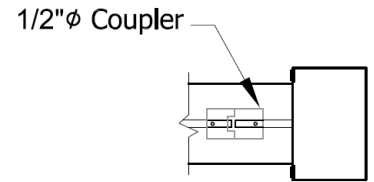
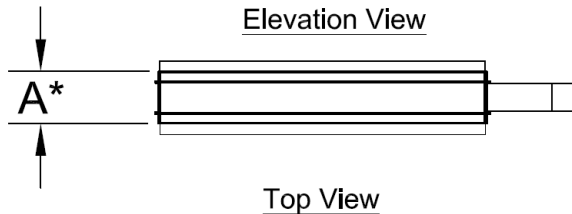
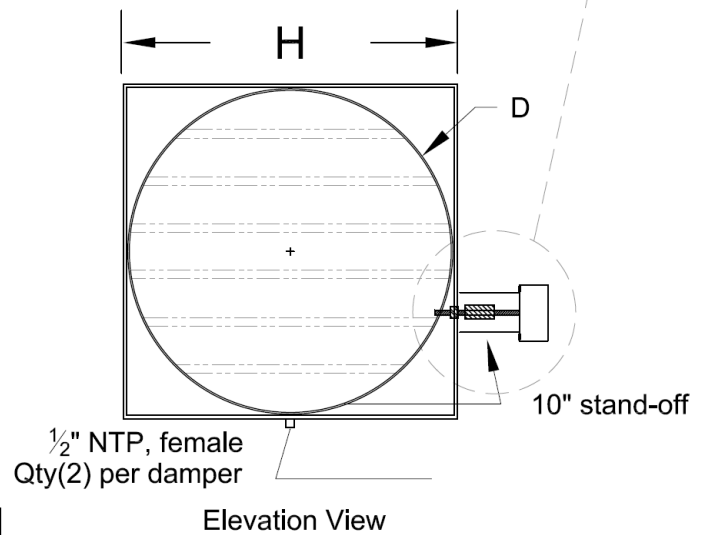
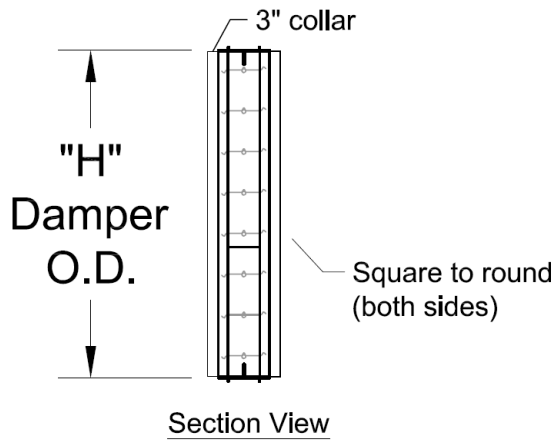
XX = Size - 8-36

AA = Material - S6 (316L stainless steel)



Dimensional Information

Model	A	D	H
OBD8	7-1/2"	8"	13-1/8"
OBD9	7-1/2"	9"	13-1/8"
OBD10	7-1/2"	10"	13-1/8"
OBD12	7-1/2"	12"	13-1/8"
OBD14	7-1/2"	14"	15-1/8"
OBD16	7-1/2"	16"	17-1/8"
OBD18	7-1/2"	18"	19-1/8"
OBD20	7-1/2"	20"	21-1/8"
OBD22	7-1/2"	22"	23-1/8"
OBD24	7-1/2"	24"	25-1/8"
OBD26	7-1/2"	26"	27-1/8"
OBD28	7-5/8"	28"	29-1/8"
OBD30	7-5/8"	30"	31-1/8"
OBD32	7-5/8"	32"	33-1/2"
OBD36	7-5/8"	36"	37-1/8"



A* - Installed Length

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20APR2022

System Descriptions

Vent Control System (VCS)

The Vent Control System (VCS) maintains a constant negative pressure in the exhaust common manifold or individual chimney/vent. Designed with EC-Flow Technology™, the VCS takes advantage of US Draft Co. bi-directional pressure transducer and proprietary PID technology to rapidly respond to varying manifold or individual system pressure on Category I, II, III & IV as well as building heating appliance systems. Utilizing the Truline™ inline or termination draft inducer, a V-series control and pressure transducer, the system interlocks with fossil fuel fired heating appliances to maintain the required outlet pressure of the manufacturer. The VCS meets all requirements for the National & International Fuel Gas Codes and the Uniform & International Mechanical Codes.

Draft Inducers: CB, TRV, T9F

Pressure Air System (PAS)

The Pressure Air System (PAS) maintains a constant pressure in the mechanical room or ducted supply. Designed with EC-Flow Technology™ the PAS takes advantage of US Draft Co. proprietary bi-directional pressure transducer and PID technology to rapidly respond to varying outdoor pressures to maintain a neutral pressure in the mechanical room or appliance inlet duct when compared to atmosphere. Utilizing an inline or wall mounted supply fan, the V-series controller, pressure transducer and outdoor sensor, the system interlocks with fossil fuel fired heating appliances to maintain the required combustion air of the manufacturer. The PAS may also be programmed to incrementally increase the supply air fan based on the number of appliances in operation. The PAS meets all requirements for the National & International Fuel Gas Codes and the Uniform & International Mechanical Codes.

Supply Fans: ISAB, ISAF, WSAF

Over Draft Control System (ODCS)

The Over Draft Control System (ODCS) maintains a constant pressure in the exhaust common manifold or required pressure (negative or positive) at the individual connector. Designed with EC-Flow Technology™, the ODCS takes advantage of US Draft Co. bi-directional pressure transducer and proprietary PID technology to rapidly respond to varying manifold or individual system pressure on Category I, II, III & IV as well as building heating appliance systems. Utilizing the Opposed Blade Damper (OBD), a V-series control and pressure transducer, the system interlocks with fossil fuel fired heating appliances to maintain the required outlet pressure of the manufacturer. The ODCS meets all requirements for the National & International Fuel Gas Codes and the Uniform & International Mechanical Codes.

Over Draft Damper: OBD, SBD

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V250 Constant Pressure Controller

V250
Rev 0419.2



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CGM-505

CO Monitor



Application

Monitors natural gas or LP fired equipment rooms in hospitals, hospitality, schools and office buildings

Function

Pre-programmed dry contact relays to shutdown natural gas or LP fired equipment during unsafe operation

Construction

The NEMA1 enclosure is constructed of ABS plastic

Code Compliance

The CGM-505 is designed to comply with all national code requirements

Complies with Texas State Boiler Code 65.603-2015

Warranty

Two year factory warranty

Description

The CGM-505 is an environmental, industrial and commercial indoor carbon monoxide gas detector specially designed to interlock with building management systems or other devices monitoring fossil fuel appliances.

The CGM-505 is designed to detect unsafe levels of carbon monoxide in the mechanical room or monitoring room.

The onboard dry contacts are programmed to energize upon start-up and will de-energize if unsafe levels of CO are present.

Relay #1 is preprogrammed to close a dry contact if the carbon monoxide level reached 50 ppm for five minutes, and relay #2 will close a dry contact at 100 ppm instantaneously.

An audible alarm activates at 50 ppm.

Standard Features & Equipment

0-10VDC control signal

Interlocks up to two appliances

24VDC or VAC power

Visual and audible alarm

NEMA1 enclosure

Optional Equipment

24VDC Power Supply

NIST calibration certificate

Replaceable electromechanical sensing element

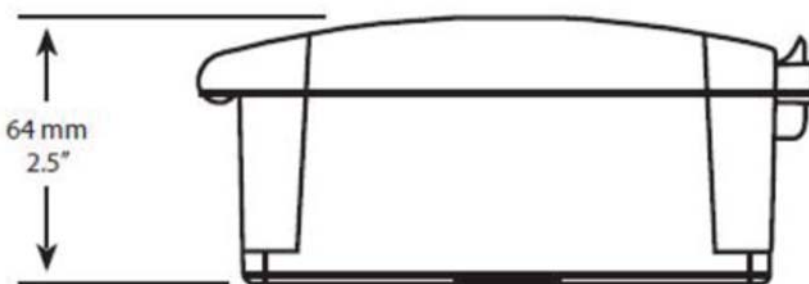
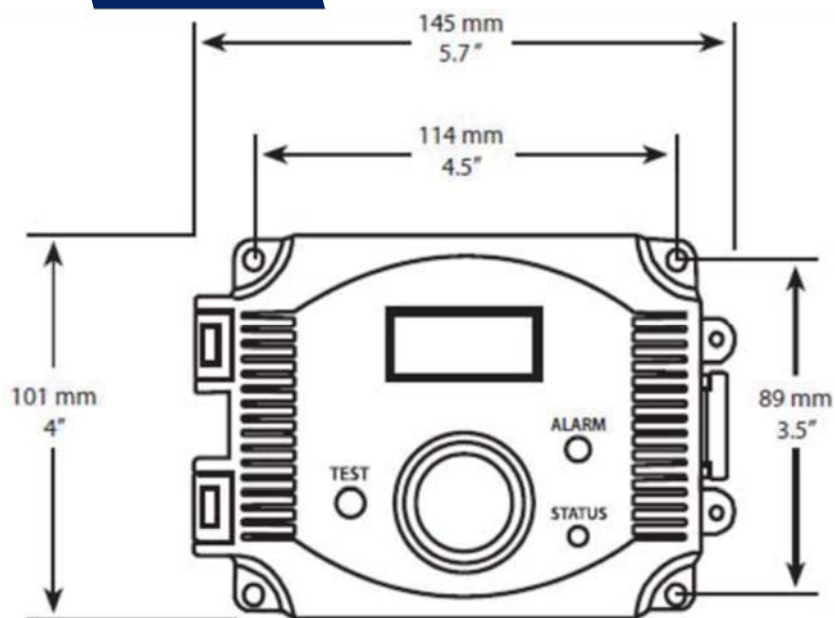
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Power Requirements			
Voltage	Amps	Frequency	Phase
24VAC/VDC	.15/.13	60/NA	1/NA
Relay		Control Signal	
Voltage	Amps	Voltage	Amps
250VAC	5	0-10VDC	0.1

Specifications	
Agency Approvals	ANSI/UL 2034 & 2075
Coverage	7,500 ft ² or 50' radius
Accuracy 32-120°F	+/- 5 ppm or 5% of reading
Calibration Cycle	12-18 months
Response Time	<35 seconds @ 90% step
Warm Up Time	200 seconds
Buzzer Alarm	85dB @ 10'



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CGM-505

CO Monitor

202CGM
 Rev 0916



14535 West 96th Terrace
Phone: 913-894-4455
Fax: 913-894-4459

SUBMITTAL

PROJECT NAME: Parkhill Graden Elementary School Renovations
PROJECT NUMBER: JL24-25083
PRODUCTS: Lochinvar - KHB Boiler
CUSTOMER: AJ Purdon
ENGINEER: NA
DATE: 2/21/2025

APPROVALS:

Contractor

Engineer



14535 West 96th Terrace
Phone: 913-894-4455
Fax: 913-894-4459

SUBMITTAL DETAILS

PROJECT NAME: Parkhill Graden Elementary School Renovations

CONTENTS: QTY (1) Lochinvar KHB285N Boiler (AHU Room 2)

- 285 MBH input / 270 MBH output (maximum)
- 10:1 turndown
- Natural gas
- Adapter-free Vent Connection
- Adjustable High Limit w/Manual Reset
- ASME Pressure Relief Valve - 30 PSI
- Automatic Reset High Limit
- Contacts on Any Failure
- Inlet & Outlet Temperature Sensors
- Outdoor Reset
- Pump Relay w/Freeze Protection
- Runtime Contacts
- SMART SYSTEM™ Controls
- Temperature and Pressure Gauge (KHB)
- 15 Year Limited Warranty

ACCESSORIES (shipped loose for field installation)

- (1) Condensate Neutralization Kit (1/boiler)

- Boiler Pump (ships loose)
- Gas regulator (ships loose)
- BacNet interface
- Grundfos Boiler Pump

MAGNA3 40-120 variable speed inline circulator pump

- 28 gpm @ 30' tdh
- 120/1/60
- Integrated variable speed drive
- 4-pole synchronous permanent-magnet motor (PM motor)
- Canned-rotor type pump
 - Carbon-fiber reinforced composite rotor can
 - Stainless steel bearing plate and rotor cladding
 - Aluminum alloy stator housing
- Air-cooled power electronics
- Controller integrated in the control box
- Control panel with TFT display on control box
- Built-in differential pressure and temperature sensor
- BACnet MSTP Communication

Qty(1) FL1-03-05013-US MagnaClean Maxi Side-Stream Magnetic Filter/ Chemical Pot Feeder

- 2" NPT connection with maximum flow rate of 59.4 GPM
- 145 psi maximum working pressure
- Working temperature of 14F to 302F
- 316L SS canister with 304L SS clamp assembly
- Spun-bonded cartridge filters (5-50 micron)
- Needlefelt bag filters (3-50 micron)
- Adaptive filtration (magnetic, non-magnetic or both)

- Tool-free servicing and maintenance
- Air vent kit included
- Plastic funnel with 1" stainless steel valve

System Accessories Include:

- Caleffi 2" brass air separator with automatic 1/2" check valve
- Amtrol 7.4 gal expansion tank



Lochinvar®

HIGH EFFICIENCY BOILERS & WATER HEATERS

KNIGHT FIRE TUBE BOILER

Submittal Sheet

KHBWHB-Sub-02

KNIGHT FIRE TUBE BOILERS - FLOOR AND WALL MOUNT MODELS

Job Name:

Parkhill Graden Elementary School

Engineer:

NA

Contractor:

Model #:

KHB285N

Location:

Agent/Wholesaler:

AES

Type Gas:

Natrual Gas

Equipment Tag(s):

B-1,-2

JOB NOTES:

Smart System Features

- > Smart System Digital Operating Control
 - Multi-Color Graphic LCD Display w/Navigation Dial, Soft Keys and Loch-N-Link USB programming
- > Three Boiler Setpoint Temperature Inputs
 - Plus Domestic Hot Water Prioritization
- > Built-in Cascading Sequencer for up to 8 Boilers, with Cascade Redundancy
 - Multiple Size Boiler Cascade
 - Lead Lag
 - Efficiency Optimization
 - Front End Loading Capability
- > Outdoor Reset Control with Outdoor Air Sensor
 - Programmable for Three Reset Temperature Inputs
- > Programmable System Efficiency Optimizers
 - SH Night Setback
 - DHW Night Setback
 - Anti-Cycling
 - Outdoor Air Reset Curve
 - Ramp Delay
 - Modulation Factor Control
 - Boost Temperature & Time

Standard Features

- > 95% DOE AFUE Efficiency (55-285)
- > Modulating Burner with up to 10:1 Turndown
 - Direct Spark Ignition
 - Low NOx Operation
- > ASME Stainless Steel Heat Exchanger
 - 30 PSI ASME Relief Valve
- > Top and bottom water connections (MNPT, WHB 55-285 Only)
- > Vertical & Horizontal Direct Vent
 - PVC, CPVC, Polypropylene or SS Venting up to 100 ft.
- > Universal Vent Adapter
 - Built-in Combustion Analyzer Port
- > SMART SYSTEM[®] Control
 - > Condensate Trap
 - > ECM Variable Speed Boiler Circulating Pump
 - > 110V Convenience Outlet
 - > High Altitude Models Available
 - > Other Features
 - Automatic Reset High Limit
 - Adjustable High Limit w/Manual Reset
 - Zero Clearances to Combustible Materials
 - 15-Year Limited Warranty (See Warranty for Details)
 - 5-Year Limited Parts Warranty

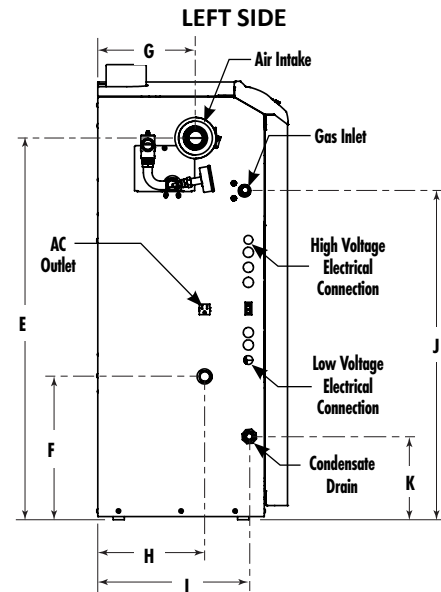
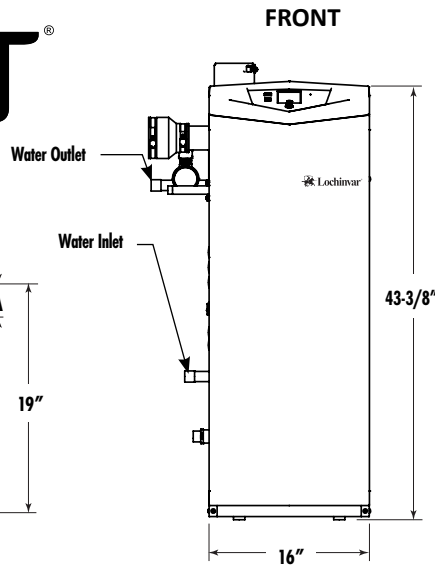
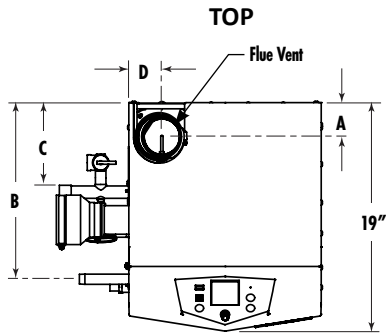


0-10 VDC BMS External Control Contact
0-10 VDC Boiler Rate Output Contacts
0-10 VDC Variable Speed System Pump Signal Input
0-10 VDC Signal to Control Variable Speed Boiler Pump
Modbus Contacts

- > Time Clock
- > Data Logging
 - Hours Running, Space Heating
 - Hours Running, Domestic Hot Water
 - Ignition Attempts
 - Last 10 Lockouts
- > Maintenance Reminder
 - Custom Maintenance Reminder with Contractor Contact Information
 - Installer Ability to De-activate Service Reminder
- > Low-Water Flow Safety Control & Indication
- > Password Security
- > Customizable Freeze Protection Parameters

Optional Equipment

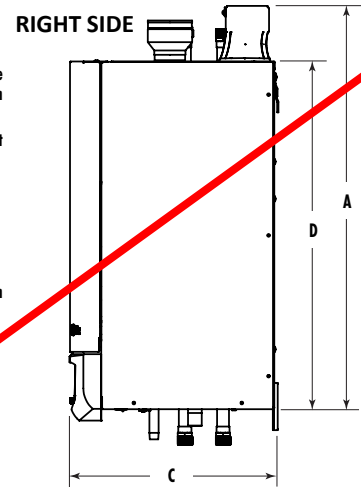
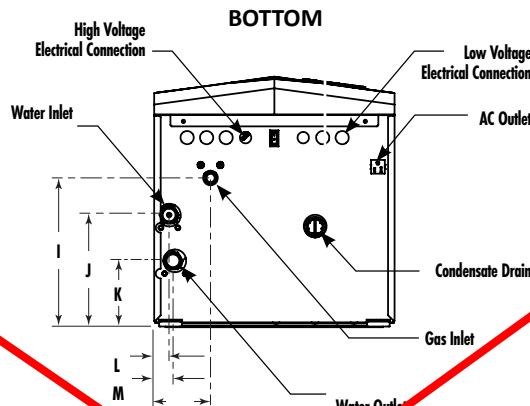
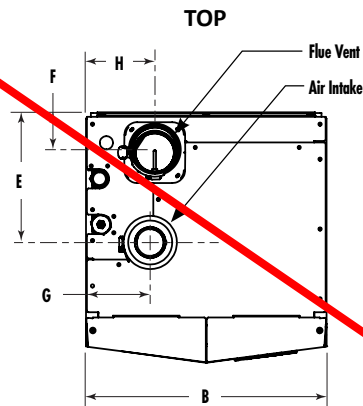
- ☐ CON-X-US Remote Connectivity
- ☐ Modbus Communication
- ☒ BACnet MSTP
- ☐ Flow Switch
- ☐ Low-Water Cutoff w/Manual Reset & Test
- ☐ Alarm Bell
- ☐ Concentric Vent Kit
- ☐ Condensate Neutralization Kit
- ☐ BMS Gateway to LON or BACnet IP
- ☐ Sidewall Vent Termination
- ☐ Wireless Outdoor Sensor
- ☐ LP Gas Conversion Kit
- ☐ Firing Codes
 - M9 Standard Construction
- ☐ M7 California Code



FLOOR MOUNT

AHRI CERTIFIED

Model Number	Input MBH		Heating Capacity MBH	Net AHRI Rating MBH	AFUE %	A	B	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Weight (lbs.)
	Min	Max																			
KHB055N	8.3	55	51	44	95	3-1/2"	13-1/4"	6"	2-3/4"	37-2/3"	13-1/2"	8-1/3"	10-1/2"	15"	32-1/2"	8-1/3"	1/2"	1"	2"	2"	160
KHB085N	8.5	85	79	69	95	3-1/2"	13-1/4"	6"	2-3/4"	37-2/3"	13-1/2"	8-1/3"	10-1/2"	15"	32-1/2"	8-1/3"	1/2"	1"	2"	2"	165
KHB110N	11	110	102	89	95	2-3/4"	14-3/4"	7-1/2"	2-3/4"	38"	14-1/3"	9-3/4"	10-1/2"	15"	33"	8-1/3"	1/2"	1"	3"	3"	170
KHB155N	15.5	155	143	124	95	2-3/4"	14-3/4"	7-1/2"	2-1/2"	38"	14-1/3"	9-3/4"	10-1/2"	15"	33"	8-1/3"	1/2"	1"	3"	3"	175
KHB199N	19.9	199	184	160	95	3"	15-1/2"	7-1/2"	2-1/2"	38-1/3"	14-1/3"	10-1/2"	11-1/2"	15"	33"	8-1/3"	1/2"	1-1/4"	3"	3"	195
KHB285N	28.5	285	264	230	95	3"	15-1/2"	7-1/2"	2-1/2"	38-1/3"	14-1/3"	10-1/2"	11-1/2"	15"	33"	8-1/3"	1/2"	1-1/4"	3"	3"	205



WALL MOUNT

AHRI CERTIFIED

Model Number	Input MBH		Net AHRI Rating, Water, MBH	AFUE %	Combustion Efficiency %	Thermal Efficiency %	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Ship Wt. (lbs.)
	Min	Max																							
WHB055N	8.3	55	51	44	95.0	-	40"	18-3/4"	16"	31-1/8"	8-1/2"	3-3/4"	4-1/2"	6-1/2"	7-1/4"	8-7/8"	3-1/2"	1-1/2"	1-1/2"	6"	1/2"	1"	2"	2"	139
WHB085N	8.5	85	79	69	95.0	-	39-3/4"	18-3/4"	16"	31-1/8"	8-1/2"	3-3/4"	4-1/2"	6-1/2"	7-1/4"	8-7/8"	3-1/2"	1-1/2"	1-1/2"	6"	1/2"	1"	2"	2"	142
WHB110N	11	110	102	89	95.0	-	41-1/4"	18-3/4"	19"	31-1/8"	10"	2-3/4"	5"	5-1/4"	11-1/2"	8-1/2"	5"	1"	1"	4-1/2"	1/2"	1"	3"	3"	159
WHB155N	15.5	155	144	125	95.0	-	41-1/4"	18-3/4"	19-1/8"	31-1/8"	10"	2-3/4"	5"	5-1/4"	11-1/2"	8-1/2"	5"	1"	1"	4-1/2"	1/2"	1"	3"	3"	166
WHB199N	19.9	199	184	160	95.0	-	41-1/4"	18-3/4"	19-1/8"	31-1/8"	10-1/2"	3"	5-1/4"	6"	11-1/2"	9-1/2"	6-1/4"	1-1/2"	1-1/2"	4-1/2"	1/2"	1-1/4"	3"	3"	175
WHB285N	28.5	285	264	230	95.0	-	41-3/4"	18-3/4"	21-1/8"	31-1/8"	15"	3"	3-3/4"	5-1/4"	12-1/4"	11"	6-1/4"	1-1/2"	1-1/2"	6-1/2"	1/2"	1-1/4"	3"	3"	184
WHB399N	39.9	399	377	328	96.0	96.0	43-5/8"	25-1/4"	21-7/8"	34-3/8"	3-1/8"	4-1/4"	23"	3-7/8"	8-3/4"	12-1/2"	9-1/4"	2"	2"	23"	3/4"	1-1/2"	4"	4"	213

• Information subject to change without notice. • Dimensions shown are approximate and should not be used for construction purposes. • "Output" is "Heating Capacity" for units with inputs <300 MBH and "Gross Output" for units ≥300 MBH. • Change "N" to "L" for LP gas models. • The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15. • Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. • The ratings have been determined under the provisions governing forced draft burners.

For technical information call 800-722-2101. Lochinvar, LLC reserves the right to make product changes or improvements without prior notice.



Lochinvar, LLC
300 Maddox Simpson Parkway
Lebanon, Tennessee 37090
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f t i n Lochinvar.com



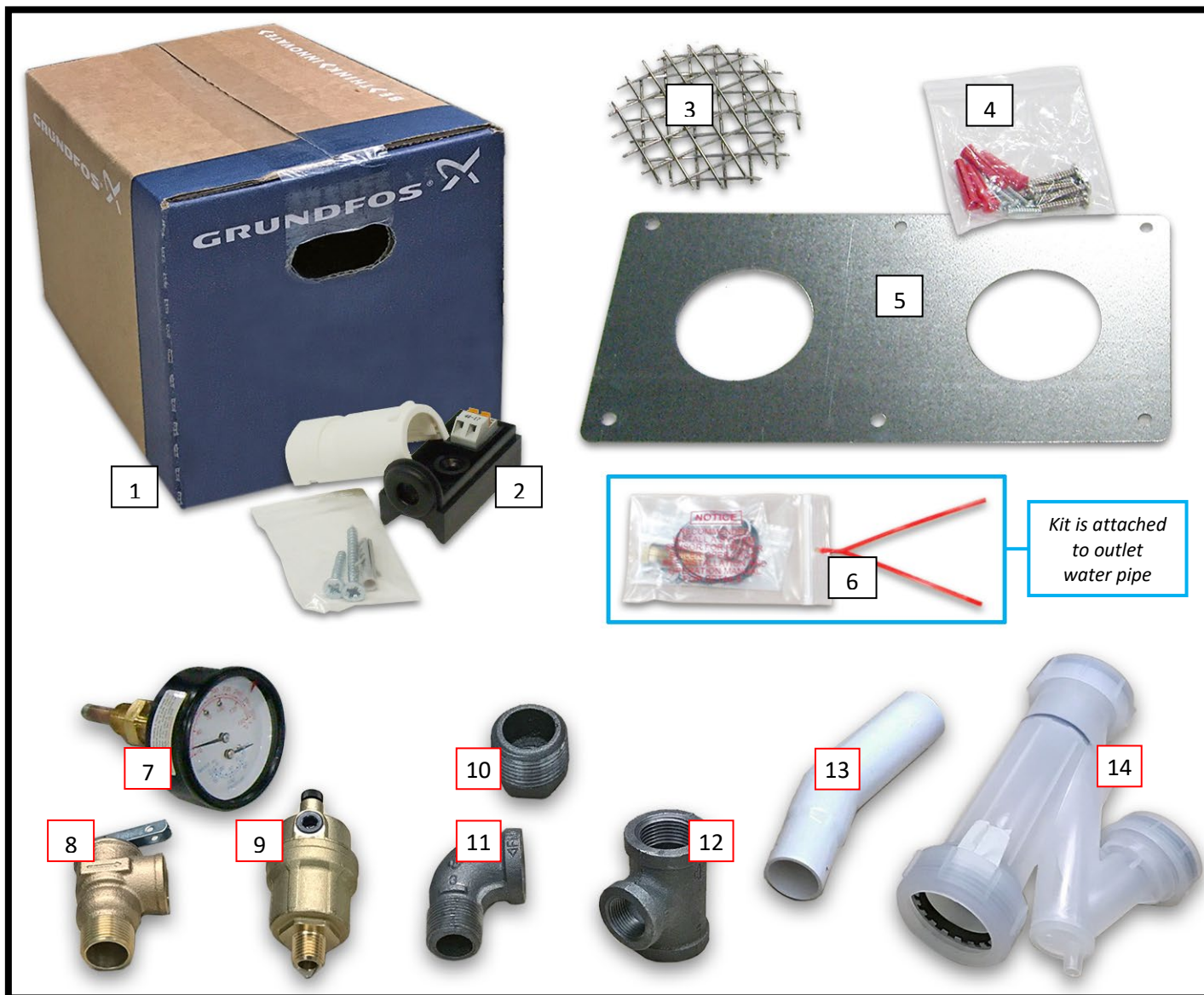
"IN THE BOX"

Models KHB/WHB 110-285



ITEM NO.	DESCRIPTION	SHIPPED W/MODELS
1	Pump	KHB/WHB
2	Outdoor Sensor	KHB/WHB
3	3" Bird Screens (Qty. 2)	KHB/WHB
4	Screw Pack	KHB/WHB
5	3" Plate	KHB/WHB
6	Sensor & Bulbwell Kit	KHB/WHB

ITEM NO.	DESCRIPTION	SHIPPED W/MODELS
7	T&P Gauge	WHB
8	Pressure Relief Valve	WHB
9	Air Vent Valve	WHB
10	Reducer Bushing	WHB
11	90° Elbow	WHB
12	Reducing Tee	WHB
13	Condensate Pipe	WHB
14	Condensate Trap Assembly	WHB



Refer to replacement parts list if re-order is needed.



Lochinvar®

HIGH EFFICIENCY BOILERS & WATER HEATERS

CONDENSATE NEUTRALIZATION KIT

Submittal Sheet

CON-Sub-05

CONDENSATE NEUTRALIZATION KITS FOR BOILERS UP TO 6.0 MBTU

Job Name: Parkhill Graden Elementary Model No. _____

Location: _____

Engineer: _____

Agent/Whls: AES

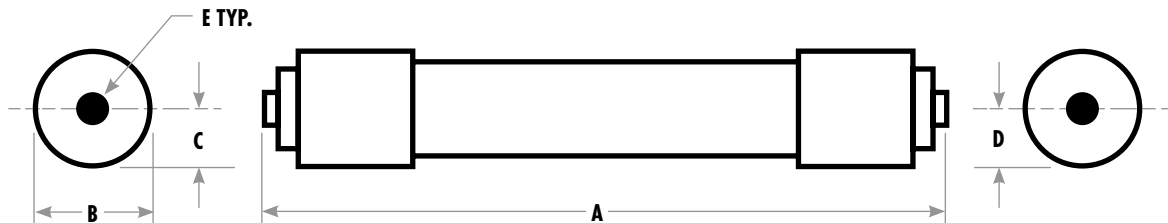
Contractor: _____

NOTES:

STANDARD FEATURES

- Clear tube for visual inspection
- Integrated unions with o-rings
- Calcite and magnesium oxide media
- Recharge kits sold separately
- Includes PVC adapters
- Includes mounting brackets for 2" tube style

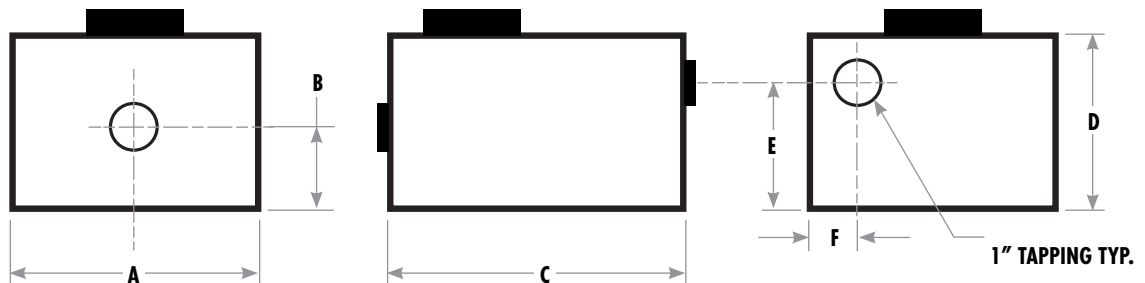
MODEL
CN2-300
CN4-850
CN4-2000



SAP NO.	BTU/HR RANGE	MODEL NO.	A	B	C	D	E	F	RECHARGE KIT
✓ 100289339	0 - 300,000	CN2-300	18-3/4"	2-3/4"	1-3/8"	1-3/8"	1/2" FNPT	—	100295915
○ 100374577	400,000 - 850,000	CN4-850	15-3/4"	5"	2-1/2"	2-1/2"	3/4" FNPT	—	100295916
○ 100289581	1,000,000 - 2,000,000	CN4-2000	26-3/4"	5"	2-1/2"	2-1/2"	3/4" FNPT	—	100295917
○ 100289582	2,500,000 - 6,000,000	CN6T	12"	1-3/4"	15"	8	5-3/4"	2-1/2"	100295918

All dimensions +/- 1/8"

MODEL
CN6T



 **Lochinvar®**
HIGH EFFICIENCY BOILERS & WATER HEATERS

Lochinvar, LLC
300 Maddox Simpson Parkway
Lebanon, Tennessee 37090
P: 615.889.8900 / F: 615.547.1000
f in Lochinvar.com

Grundfos Series MAGNA 3 - Wet Rotor, Inline with Integrated VFD

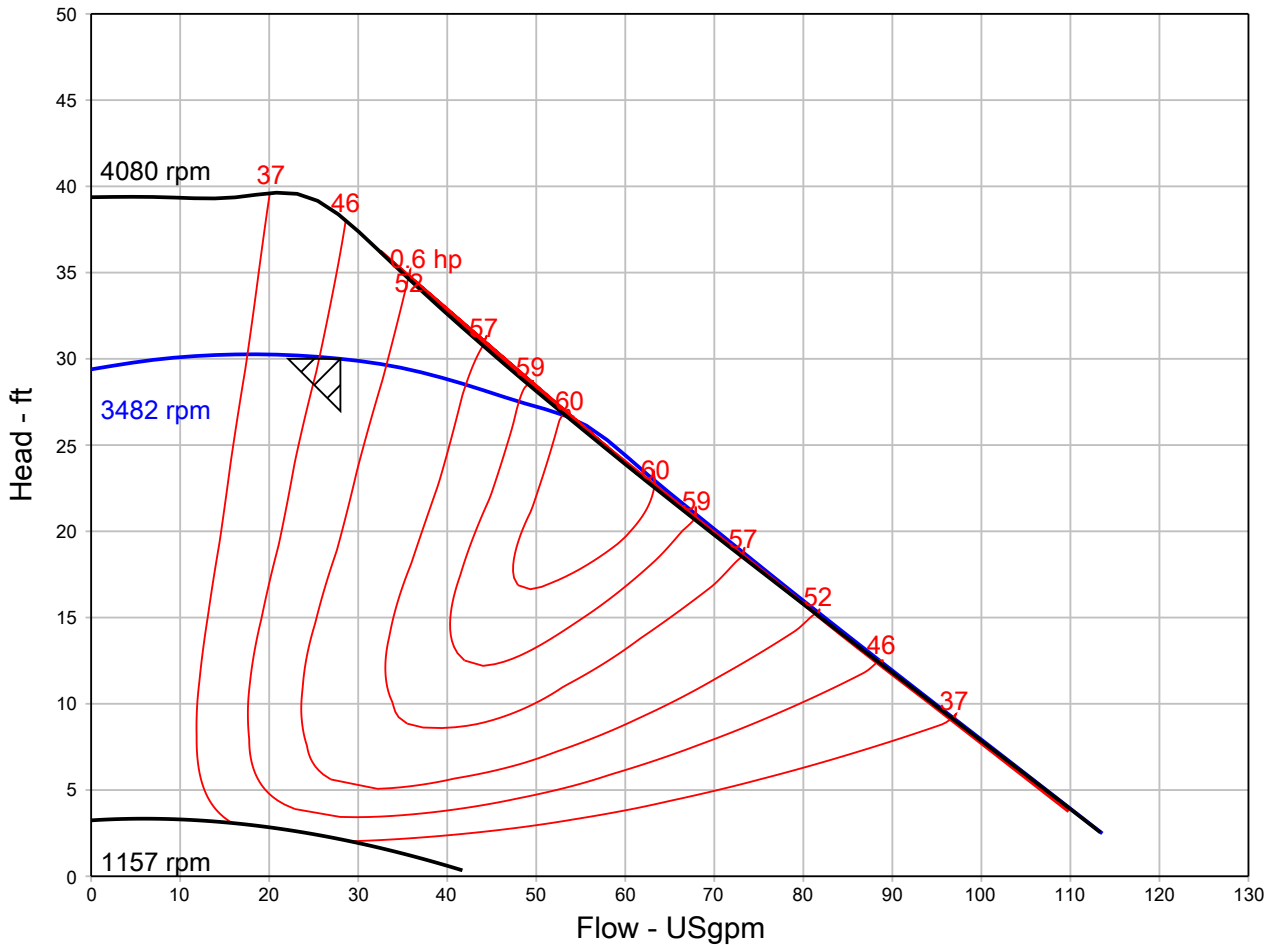
QUOTE NUMBER / ID 2383667	UNIT TAG 008	QUANTITY 1
REPRESENTATIVE	SERVICE	
ENGINEER	SUBMITTED BY	DATE
CONTRACTOR	APPROVED BY	DATE
	ORDER #	DATE



MAGNA3 40-120 GF 115V
4080 rpm

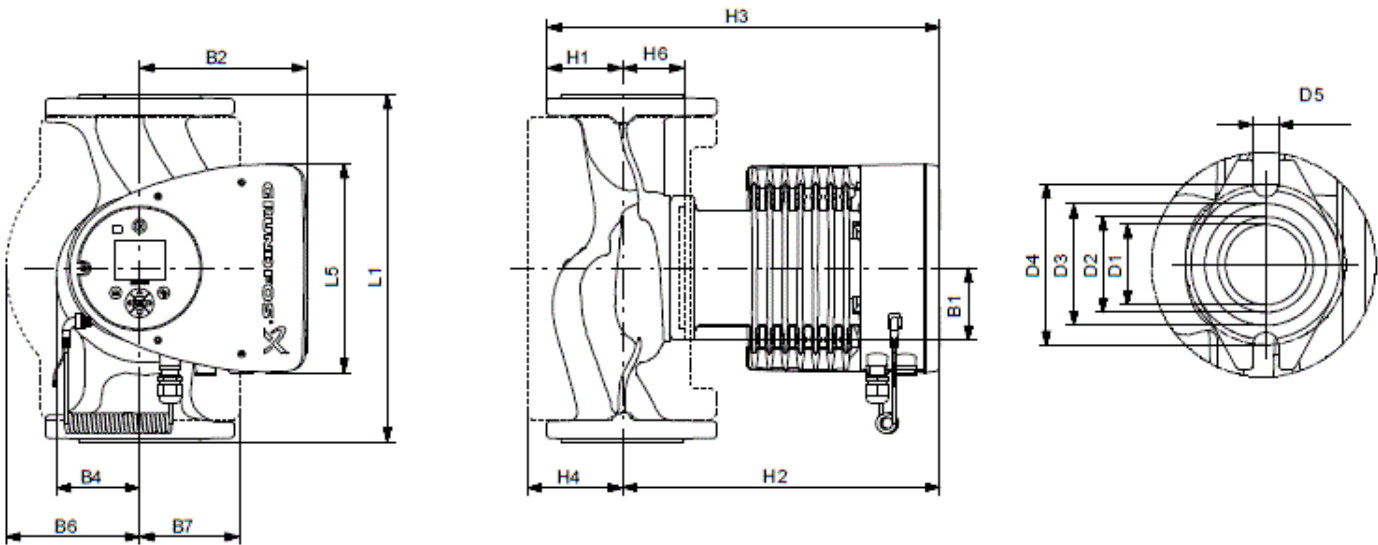
Part Number 98126804

Conditions of Service		Pump Data		Motor Data	
Flow	28.00 USgpm	Efficiency (wire-to-water)	48.07 %	Motor HP	0.6 HP
Head	30.00 ft	Pump Housing	Cast Iron	EHP (Electrical HP)	0.44 HP
Liquid	Cold Water			Voltage	115 V
Temperature	68.00 deg F			Phase	1 Phase
NPSHr	0.00 ft			Cycle	60
Viscosity	1.00 cP				
Specific Gravity	1.000 SG				



Grundfos Series MAGNA 3 - Wet Rotor, Inline with Integrated VFD

Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.



TM 057651

NOT FOR CONSTRUCTION, unless certified and referenced on order

Units	L1	L5	B1	B2	B4	B6	B7	D1	D2	D3	D4	D5	H2	H4	H6	Weight (lb)
inches	8.50	8.03	3.31	6.46	2.87	4.37	4.37	1.57	1.93	2.4	3.15	0.5	11.97	2.76	1.97	38.7



GOVERNOR & PF400

Line Pressure Regulators

GOVERNOR STANDARD MODEL

2^{PSIG}



STANDARD MODEL

MAIN FEATURES

- ANSI Z21.80A-2012 / CSA 6.22A-2012 (R2016) Class I for outlet pressures up to 14" W.C. Certified
- Integral Vent Limiter
- External Vent Limiter – no vent line required**
- Positive 100% bubble tight lockup
- Inlet and Outlet test ports
- 500 to 1 Turndown
- Filter included in all models

SPECIFICATIONS

- Suitable for use with Natural Gas, LPG, and other non-corrosive, clean gas
- Max. Inlet Pressure:
CSA rated - 2 PSIG
Pietro Fiorentini - 7.25 PSIG
- Outlet Pressure: 2" W.C. to 14" W.C. and up to 4.25 PSIG for non-CSA applications
- Temperature Range: -40°F to 150°F
- Connections: 1/2" - 4"
- Maximum Emergency Inlet Exposure Pressure: 80 PSIG
- Suitable for Indoor or Outdoor Installation***

VENT SIZE

- 1/4" NPT 1/2" – 1"
- 1/2" NPT 1 1/4" – 4"

OUTLET SPRING RANGE

- Green 2" W.C. to 5.1" W.C.*
- Red 2.75" W.C. to 7.87" W.C.*
- Black 6" W.C. to 14" W.C.*
- Yellow 9.8" W.C. to 27.5" W.C.
- Violet 23.6" W.C. to 59" W.C.
- Orange 55" W.C. to 118" W.C.

*Spring is CSA outlet pressure certified

**As Approved by Local Codes and Standards

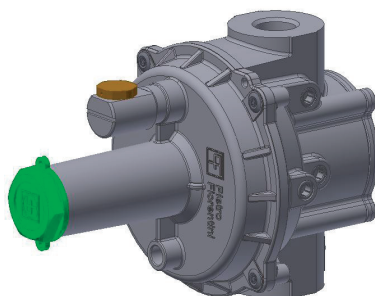
***Brass vent limiter must be removed for outdoor installation

GOVERNOR STANDARD MODEL

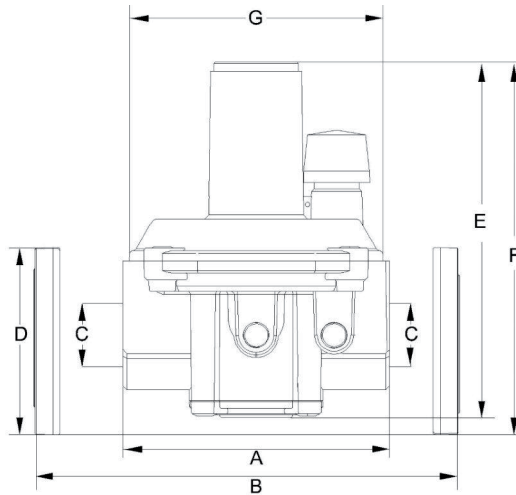
CAPACITY IN CFH FOR .60 SPECIFIC GRAVITY GAS WITH FILTER (CAPACITY WITHOUT FILTER IN BRACKETS)

	Outlet Pressure Set Point	Operating Inlet Pressure		
		14" W.C.	1 PSIG	2 PSIG
31051 1/2"	8" W.C.	306 (360)	552 (649)	785 (923)
	11" W.C.	218 (256)	511 (601)	788 (927)
31052 3/4"	8" W.C.	369 (450)	665 (812)	946 (1,154)
	11" W.C.	363 (321)	616 (751)	950 (1,158)
31053 1"	8" W.C.	495 (585)	893 (1,055)	1,270 (1,154)
	11" W.C.	353 (417)	826 (977)	1,274 (1,506)
31150 1/2" High Capacity	8" W.C.	675 (855)	1,218 (1,543)	1,731 (2,193)
	11" W.C.	481 (609)	1,127 (1,428)	1,738 (2,201)
31151 3/4" High Capacity	8" W.C.	788 (1,080)	1,421 (1,949)	2,020 (2,771)
	11" W.C.	561 (770)	1,315 (1,803)	2,028 (2,781)
31152 1" High Capacity	8" W.C.	990 (1,283)	1,786 (2,314)	2,540 (3,290)
	11" W.C.	706 (914)	1,653 (2,142)	2,354 (3,302)
31153 1 1/4"	8" W.C.	2,071 (3,062)	3,735 (5,522)	5,311 (7,851)
	11" W.C.	1,476 (2,183)	3,457 (5,110)	5,330 (7,880)
31154 1 1/2"	8" W.C.	2,567 (3,197)	4,629 (5,766)	6,581 (8,197)
	11" W.C.	1,829 (2,279)	4,284 (5,336)	6,605 (8,228)
31155 2"	8" W.C.	5,179 (5,854)	9,339 (10,557)	13,278 (15,009)
	11" W.C.	3,691 (4,173)	8,643 (9,770)	13,327 (15,065)
31156/F 2 1/2"	8" W.C.	6,530 (7,431)	11,775 (13,999)	16,741 (19,051)
	11" W.C.	4,655 (5,297)	10,898 (12,401)	16,803 (19,121)
31157/F 3"	8" W.C.	7,205 (9,007)	12,993 (16,242)	18,473 (23,092)
	11" W.C.	5,136 (6,240)	12,025 (15,032)	18,542 (23,177)
31158/F 4"	8" W.C.	12,835 (15,762)	23,245 (28,424)	32,906 (40,411)
	11" W.C.	9,149 (11,236)	21,420 (26,306)	33,027 (40,560)
				Tab.3

For additional sizing, visit www.gasinside.com • 888.618.8787



STANDARD MODEL DIMENSIONS



Model	Size	A	B	C	D	E	F	G*	Weight (Lbs)
PF400S	3/8 NPT	3.90	-	3/8	-	3.42	-	3.10	0.56
PF400S	1/2" NPT	3.90	-	1/2	-	3.42	-	3.10	0.56
31051	1/2" NPT	4.09	-	1/2	-	5.59	-	3.78	1.54
31052	3/4" NPT	4.09	-	3/4	-	5.59	-	3.78	1.54
31053	1" NPT	4.09	-	1	-	5.59	-	3.78	1.54
31150	1/2" NPT	4.72	-	1/2	-	6.89	-	4.49	2.75
31151	3/4" NPT	4.72	-	3/4	-	6.89	-	4.49	2.75
31152	1" NPT	4.72	-	1	-	6.89	-	4.49	2.75
31153	1 1/4" NPT	7.68	-	1 1/4	-	10	-	7.56	7.5
31154	1 1/2" NPT	7.68	-	1 1/2	-	10	-	7.56	7.5
31155	2" NPT	9.29	-	2	-	12.44	13.74	7.56	12.34
31156/F	2 1/2" FLANGED	-	16.9	3	ANSI 150	-	17.09	12.52	27.56
31157/F	3" FLANGED	-	16.9	3	ANSI 150	-	17.09	12.52	27.56
31158/F	4" FLANGED	-	16.9	4	ANSI 150	-	19.76	12.52	27.56
									Tab.6

* (G) Dimensions is the width of the regulator

MagnaClean CMX - MIDI

Innovative, adaptive sidestream & inline filtration

The *MagnaClean CMX* Midi filter is constructed from high quality, polished 316L stainless steel and has been carefully designed and scaled to work within medium-sized industrial and commercial heating and chilled systems up to 93,000 litres in size.

The Midi filter provides highly flexible, magnetic and non-magnetic filtration via a powerful neodymium magnet assembly and three cartridge filters, both of which can be configured either independently or in combination to deliver market leading, adaptive system filtration performance.

Replaced with 1" SS ball valve and funnel



Vent port

304° stainless clamp assembly

316L stainless steel housing

3 x neodymium magnets

3 x cartridge filters

Water inlet

Water outlet

Drain port



93,000 Litre
Capacity



Up to 65 l/min
Flow Rate



10 Bar Max.
Pressure

Features & Benefits

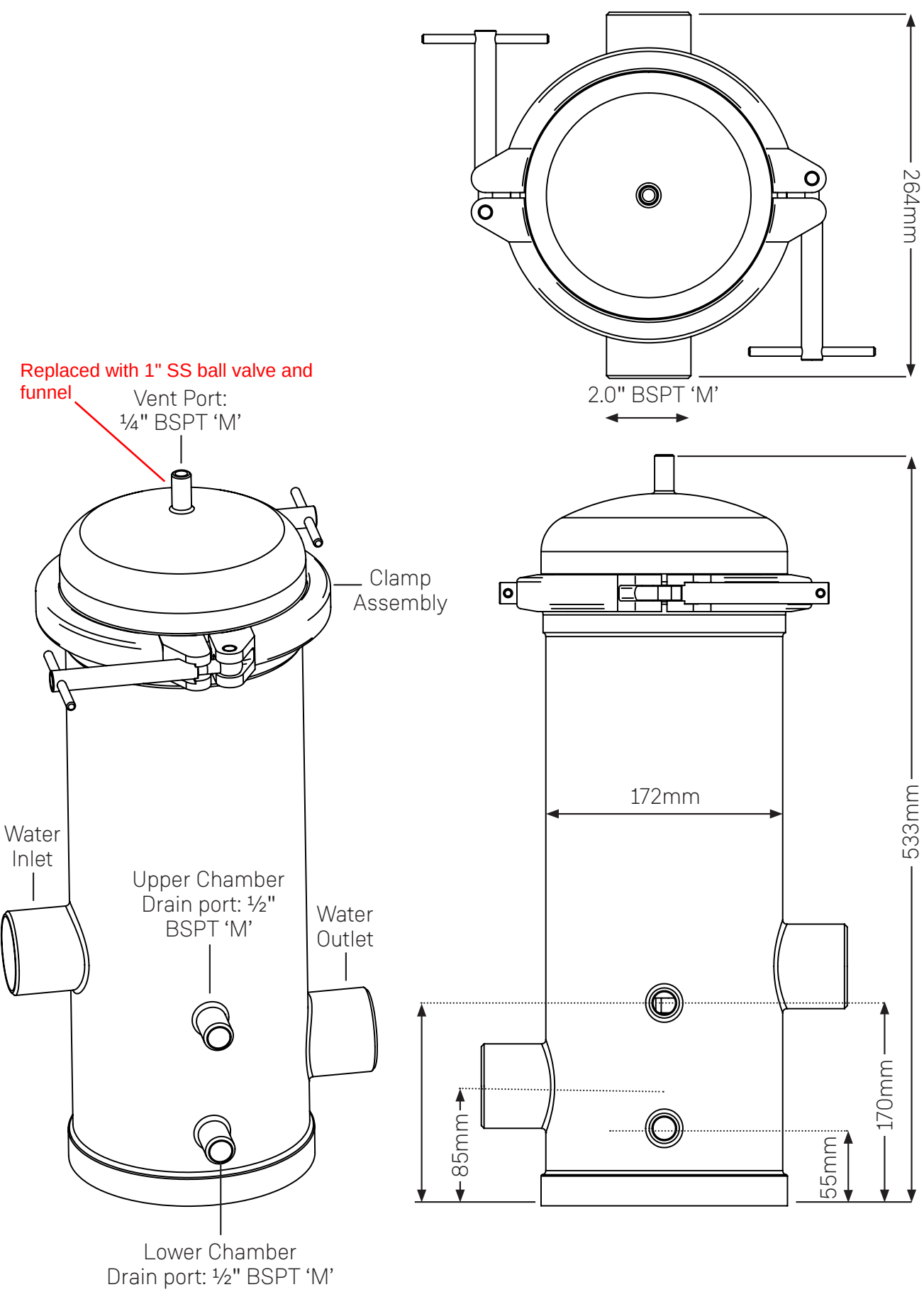
- Marine-grade, 316L stainless steel construction
- Low-cost installation, reduced maintenance and improved energy efficiencies
- Adaptive filtration options – magnetic or non-magnetic and combined, dual-filtration
- Configurable cartridge filter specification to suit exact system filtration requirements
- Effortless, tool-free servicing and maintenance
- 10.0 bar maximum working pressure
- Temperature range -10°C to 150°C
- Optional insulation jacket accessory

ADEY System Kit

An ADEY system kit is available for the *MagnaClean CMX* Midi filter comprised of three 20-micron cartridge filters, an automatic air vent, magnetite scraper tool and five litres of ADEY's award winning *MC1+ Protector* which passivates and protects bare metal surfaces.



Technical Specification



MagnaClean™ CMX



ART NO: FL1-03-05013
RIAL NO: ADMI-76533
DEL: MIDI
TE: January 2020

WORKING TEMPERATURE:	MIN	MAX
	-10°C	150°C

WORKING PRESSURE:	GROUP1	GROUP2
UID:	N/A BAR	10 BAR
S:	N/A BAR	7.5 BAR
LUME:	9.3 L	
Y WEIGHT:	< 11.4 KG	

CATEGORY I

MANUFACTURED BY:
ADEY COMMERCIAL LTD, GL51 8NR

CE



Midi

Technical Specification

<i>MagnaClean CMX</i>			
Product code	FL1-03-05010	FL1-03-05013	FL1-03-05014
Model	NANO	MIDI	MAXI
System Capacity (Litres)	43,200	93,000	324,000
Connection Size & Type	1" BSPP Female	2" BSPT Male	2" BSPT Male
Vent Port Size & Type	¼" BSPP Female	¼" BSPT Male	¼" BSPT Male
Drain Port Size & Type	¼" BSPP Female	½" BSPT Male	½" BSPT Male
Material specification			
Body	316L Stainless steel		
Lid Clamps	304 Stainless steel		
Finish	Polished		
Design specification			
Maximum working pressure	10.0 Bar		
Minimum working temperature	-10°C		
Maximum operating temperature	150°C		
Dry Weight (Kg)	<3.0	<11.4	<17.5

DISCAL® Air Separator

551 Series, Brass

Submittal Data 02904 NA — Issue Date 10/2011



Application

Air separators are used to continuously remove the air contained in the hydronic circuits of heating and cooling systems. The air discharge capacity of these devices is high. They are capable of automatically removing all the air present in the system, down to the micro-bubble level. The circulation of fully de-aerated water enables the equipment to operate under optimum conditions, free from any noise, corrosion, localized overheating and mechanical damage.

Typical Specification

Furnish and install on the plans and described herein, a Caleffi DISCAL Air Separator as manufactured by Caleffi. Each separator must be designed with a brass valve body, seals in EPDM, and removable internal glass-reinforced nylon fiber mesh - PA66G30, coalescing medium (stainless steel for compact version). (See product instructions for specific installation information.)

Technical specifications

Materials:

- Body: brass
- Coalescing Medium (compact version): stainless steel
- Coalescing Medium: PA66GF30
- Seal: EPDM

Suitable fluids: water, with up to a 50% glycol solution

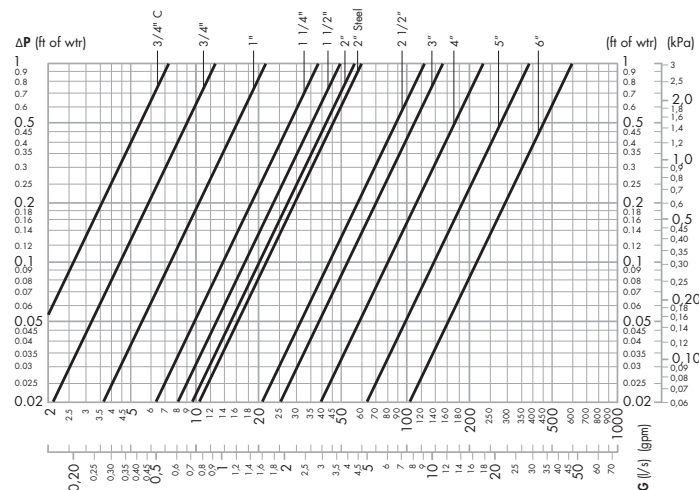
Max working pressure: 150 psi (10 bar)

Temperature range: 32–250°F (0 –120°C)

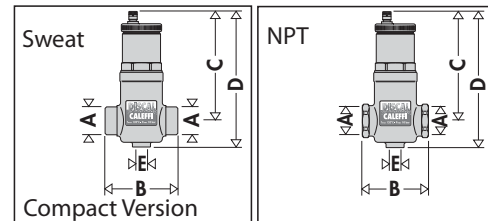
Connections:

- Main (compact version): 3/4" sweat; 3/4" NPT
- Main: 3/4" - 1" - 1 1/4" - 1 1/2" - 2" NPT female
1" - 1 1/4" - 1 1/2" - 2" sweat
- Blowdown: 1/2" NPT male

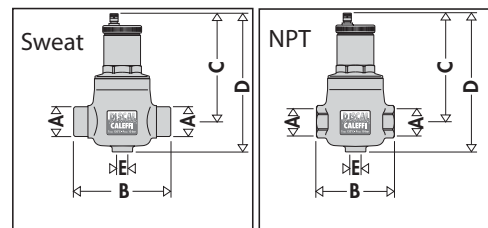
Hydraulic characteristics



Dimensions



Code	A	B	C	D	E	Weight (lb)	(kg)
551022A	3/4"	3-1/16"	5-5/8"	6-7/8"	1/2"	2.0	0.9
551003A	3/4" SWT	3-1/16"	5-5/8"	6-7/8"	1/2"	2.0	0.9



Code	A	B	C	D	E	Weight (lb)	(kg)
551005A	3/4"	4-5/16"	5-3/4"	7-1/2"	1/2"	3.7	1.7
551006A	1"	4-5/16"	5-3/4"	7-1/2"	1/2"	3.7	1.7
551007A	1-1/4"	4-7/8"	6-9/16"	8-1/4"	1/2"	4.9	2.2
551008A	1-1/2"	4-7/8"	6-9/16"	8-1/4"	1/2"	4.9	2.2
551009A	2"	5-1/8"	6-9/16"	8-1/4"	1/2"	4.9	2.2
551028A	1" SWT	5-1/16"	5-3/4"	7-1/2"	1/2"	3.7	1.7
551035A	1-1/4" SWT	5-3/16"	6-5/16"	8-1/4"	1/2"	3.7	1.7
551041A	1-1/2" SWT	5-3/4"	6-9/16"	8-1/4"	1/2"	4.9	2.2
551054A	2" SWT	6-1/8"	6-9/16"	8-1/4"	1/2"	5.5	2.5

Flow capacity

The fluid velocity at connections for DISCALDIRT 546 series air and dirt separators is recommended to not exceed 10.0 f/s. Above this speed, heavy internal turbulence and noise can occur and air and dirt elimination efficiency begins to fall measurably. Optimal air and dirt elimination performance occurs at fluid velocities of 4.0 f/s or less. See the flow capacity chart.

		FLOW CAPACITY					
	Size	3/4" C	3/4"	1"	1 1/4"	1 1/2"	2"
	GPM	6.0	8.0	9.3	15.3	23.9	36.1
Optimal (4.0 f/s)	l/s	0.4	0.5	0.6	1.0	1.5	2.3
	GPM	14.3	19.0	22.1	36.4	56.8	86.0
Max. (10.0 f/s)	l/s	0.9	1.2	1.4	2.3	3.6	5.4
	Cv	11.6	19.1	32.5	56.4	73.1	81

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice. Contractors should request production drawings if prefabricating the system.

Job name Parkhill Graden Elementary
 Job location _____
 Engineer _____
 Mechanical contractor _____
 Contractor's P.O. No. _____
 Representative AES

Size _____
 Quantity _____
 Approval _____
 Service _____
 Tag No. _____
 Notes _____

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WELL-X-TROL®

Diaphragm Well Tanks: Underground, Wall Hung and Pump Stand Series

150 PSIG Working Pressure

Construction

Shell	High Strength Steel
Diaphragm	Heavy Duty Butyl
Liner	Antimicrobial
System Connection	Stainless Steel
Finish	Tuf-Kote™ HG Blue
Water Circulator	Turbulator™
Air Valve	Projection Welded
Factory Precharge	38 PSIG (2.6 bar)

Performance

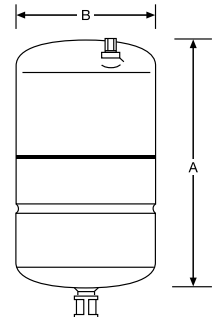
Maximum Operating Temperature	200°F (93°C)
Maximum Working Pressure	150 PSIG (10.3 bar)
Maximum Relief Valve Setting	125 PSIG (8.6 bar)
Warranty	7 Year

Application

- Controls pump cycling in residential well water systems.

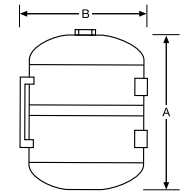
Underground Models (BLACK)

Model Number	Tank Volume		Max. Acceptance Factor	A Tank Height		B Tank Diameter		System Connection (NPTM)	Shipping Weight	
	Gal	Lit		In	mm	In	mm		Lbs	Kg
WX-200UG	14	53	0.81	23	584	15	381	1	22	10
WX-202UG	20	76	0.57	30	762	15	381	1	30	14
WX-250UG	44	167	0.77	33	838	22	559	1¼	60	27
WX-251UG	62	235	0.55	44	1118	22	559	1¼	83	38



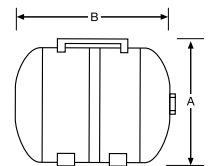
Wall Hung Model for VFD Systems

Model Number	Tank Volume		Max. Acceptance Factor	A Tank Height		B Tank Diameter		System Connection (NPTM)	Shipping Weight	
	Gal	Lit		In	mm	In	mm		Lbs	Kg
WX-102VFD	4.4	17	0.55	15	381	12	305	¾	13	6



Pump Stand Models

Model Number	Tank Volume		Max. Acceptance Factor	A Tank Height		B Tank Width		System Connection (NPTM)	Shipping Weight	
	Gal	Lit		In	mm	In	mm		Lbs	Kg
WX-102PS	4.4	17	0.55	12	305	15	381	¾	13	6
WX-105PS	5.3	20	0.80	12	305	18	457	¾	15	7
WX-110PS	7.4	28	0.56	12	305	23	584	¾	18	8
WX-200PS	14.0	53	0.81	16	406	22	559	1	29	13
WX-202PS	20.0	76	0.57	16	406	30	762	1	35	16
WX-202H	20.0	76	0.57	16	406	30	762	1	33	15



All dimensions and weights are approximate.

Job Name _____	Notes _____
Engineer _____	_____
Contractor _____	_____
P.O. No. _____	_____
Sales Rep. _____	_____
Model No. _____	_____

