Park Hill School District

Building Successful Futures • Each Student • Every Day

ADDENDUM No. 1

Park Hill School District
2025 Boiler Replacement
March 6, 2025

You are instructed to read and note the following described changes, corrections, clarifications, omissions, additions, deletions, approvals, and statements pertinent to the Construction Documents, Submittals, Drawings, and Diagrams.

Addendum No. 1 is part of the General Notes and shall govern the performance of the Work.

<u>Package 1:</u>
Graden Elementary
New submittals and drawings. Demo (2) tank-type water heaters and exhaust system controls – electrical (back to closest j box), gas (back to closest common shut off valve), flue (back to closest exposed connection before wall penetration and cap). Boilers 1 & 2 exhaust: core drill exterior block wall and terminated with manufacturer-approved method.

<u>Package 2:</u>
Park Hill High School
New submittals and diagrams attached. Contractor will be responsible for installing differential pressure sensor (provided by AES) in 300s hall air handler room

ACKNOWLEDGEMENT: Each Bidder shall acknowledge receipt of Addendum No. 1 on the Acknowledgement Form.

Acknowledgement Form

ACKNOWLEDGEMENT OF ADDENDA

The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

Addendum No. 1, dated March 6, 2025.

COMPANY _____

ADDRESS _____

_____

PHONE _____ FAX _____

EMAIL _____

PRINT NAME _____

SIGNATURE _____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.

Unit(s)	**Bid**
Demo Old Plant and (2) Water Heaters	_____
Boilers 1 & 2	_____
	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

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.

Unit(s)	**Bid**
Park Hill High School	
Boilers 1-4	_____
Graden:	
Demo Old Plant and (2) Water Heaters	_____
Boilers 1 & 2	_____
	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: _____

ASSOCIATED EQUIPMENT SALES

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**

ASSOCIATED EQUIPMENT SALES

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 4CRE32-2-1:

- Skid Performance: 800 gpm @ 80' tdh (scheduled specifications)
- Qty (4) 7.5hp TEFC 208/3/60 CRE-32-2-1 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
  - 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

AHRI CERTIFIED™ www.ahridirectory.org

FCB-Sub-02

Job Name: Parkhill High School

Location:

Contractor:

Type Gas: Natural Gas

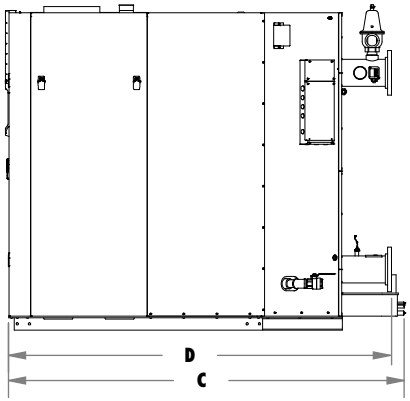
Engineer:

Model #: FCB2000

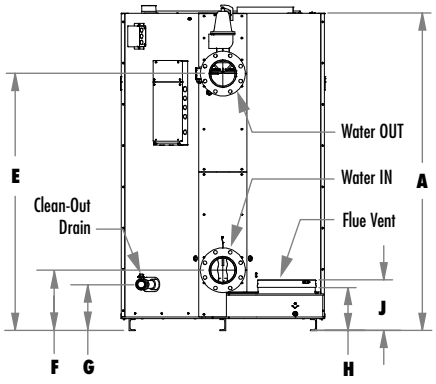
Agent/Wholesaler: AES

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

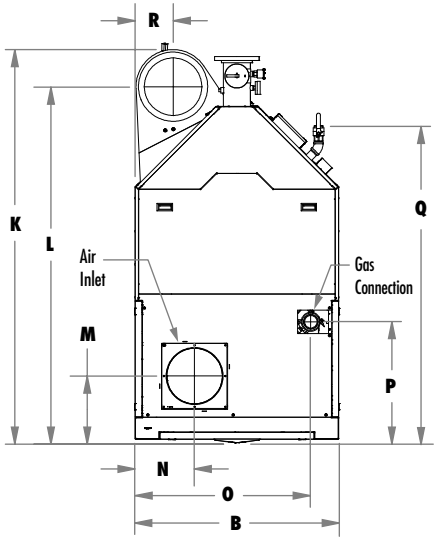
SIDE



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 Min	Input MBH Max	Gross Output MBH	Net Rating MBH	Combustion Eff. %	Thermal Eff. %	Turn down	Flow Rate GPM Min	Flow Rate GPM Max	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.)
○	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″	8″	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™ COMBUSTION TECHNOLOGY CONDENSING BOILER



ENERGY STAR FCB1000-2000

AHRI CERTIFIED

ASME H

CSD-1 CERTIFIED

DESIGN CERTIFIED

DESIGNED ★ ENGINEERED ★ ASSEMBLED USA

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

Standard Features

- **Hellcat Combustion Technology featuring RealTime O_2 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

Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

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

Lochinvar.com

09/24—Printed in U.S.A.

Lochinvar
HIGH EFFICIENCY BOILERS & WATER HEATERS

CREST BOILER with HELLCAT COMBUSTION TECHNOLOGY PRODUCT SUMMARY
(FCB) 1,000,000 - 6,000,000 BTU/HR

	FCB1000	FCB1500	FCB2000	FCB2500	FCB3000	FCB4000	FCB5000	FCB6000
WATER								
GALLON CAPACITY	77	94	111	157	156	201	254	304
HEATING SURFACE (SQ. FT.)	115	162	198	241	265	352	452	563
INLET WATER CONNECTION	3" Flanged	4" Flanged	4" Flanged	4" Flanged	4" Flanged	4" Flanged	6" Flanged	6" Flanged
OUTLET WATER CONNECTION	3" Flanged	4" Flanged	4" Flanged	4" Flanged	4" Flanged	4" Flanged	6" Flanged	6" Flanged
DRAIN	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
MAXIMUM FLOW RATE (GPM)	350	350	350	350	350	350	600	600
ABSOLUTE MINIMUM FLOW RATE (GPM)	18	25	25	25	25	45	50	60
20°F ΔT WATER FLOW (GPM)	96	144	192	240	288	350†	480	576
HEAD LOSS (FT. OF HD.)	8.3	12.3	14.5	8.4	8.0	10.9	13.9	17.2
40°F ΔT WATER FLOW (GPM)	48	72	96	120	144	192	240	288
HEAD LOSS (FT. OF HD.)	6.0	7.3	8.1	5.3	4.0	5.9	7.6	9.4
MAX. WORKING PRESSURE (PSI)	160	160	160	160	160	160	160	160
# OF RELIEF VALVES	1	1	1	1	1	1	1	1
RELIEF VALVE SIZE	1 1/4	1	1 1/2	1 1/2	1 1/2	2	2	2 1/2
RELIEF VALVE RATING (MBH)	1,954	1,954	1,954	3,075	3,075	4,237	5,575	7,672
RELIEF VALVE PRESSURE RATING (PSI)	50	50	50	50	50	50	50	50
GAS								
BTU/HR INPUT	999,000	1,500,000	1,999,000	2,500,000	3,000,000	3,999,000	4,999,000	6,000,000
BTU/HR OUTPUT (HIGH FIRE)	961,000	1,443,000	1,923,000	2,400,000	2,883,000	3,843,000	4,804,000	5,766,000
BTU/HR OUTPUT (LOW FIRE)	48,100	57,720	76,920	120,000	144,150	192,150	240,200	288,300
HORSE POWER (INPUT)	30	45	60	75	90	119	149	179
INLET CONNECTION	1 1/4	1 1/2	1 1/2	2	2	2 1/2	2 1/2	3
MAX. INLET PRESSURE, NAT	14" w.c	14" w.c	14" w.c	14" w.c.	14" w.c.	14" w.c.	14" w.c.	14" w.c.
MIN. INLET PRESSURE, NAT	4" w.c.	4" w.c.	4" w.c.	4" w.c.	4" w.c.	4" w.c.	4" w.c.	4" w.c.
MAX. INLET PRESSURE, LP	14" w.c	14" w.c	14" w.c	14" w.c.	14" w.c.	14" w.c.	14" w.c.	14" w.c.
MIN. INLET PRESSURE, LP	8" w.c.	8" w.c.	8" w.c.	8" w.c.	8" w.c.	8" w.c.	8" w.c.	8" w.c.
ELECTRICAL *								
VOLTAGE/HEATER (VAC)	120V/1PH/60Hz	120V/1PH/60Hz	120V/1PH/60Hz	208V/3PH/60Hz	208V/3PH/60Hz	480V/3PH/60Hz	480V/3PH/60Hz	480V/3PH/60Hz
VOLTAGE/CONTROL (VAC)	24	24	24	24	24	24	24	24
TOTAL AMPS (FLA)	6.0	10.0	13.0	4.5	6.5	6.0	5.0	7.0
MINIMUM CIRCUIT AMPS (MCA)	7.5	12.5	16.3	5.6	8.1	7.5	6.3	8.8
# OF ELECTRICAL CONNECTIONS	1	1	1	1	1	1	1	1
DIMENSIONS								
HEIGHT	78	78	78	77 3/4	77 3/4	78	78	78
WIDTH	30	30	30	35	35	43 1/4	46 1/2	50
DEPTH	57 1/2	64	64 1/4	79 1/4	79 1/4	95 1/4	96 1/2	102 3/4
SHIPPING WEIGHT (lbs.)	1,721	1,985	2,120	2,812	2,848	3,874	4,470	4,862
OPERATING WEIGHT (lbs.)	1,939	2,345	2,622	3,555	3,582	4,882	5,920	6,755
SERVICE CLEARANCES (RECOMMENDED)								
FRONT	30	30	30	30	30	30	30	30
REAR	24	24	24	24	24	24	24	24
RIGHT SIDE	24	24	24	24	24	24	24	24
LEFT SIDE	24	24	24	24	24	24	24	24
TOP	24	24	24	24	24	24	24	24
DIRECT VENTING								
VENT SIZE	6	8	8	9	10	12	14	14
AIR INLET SIZE	6	8	8	8	10	12	14	14
VENT CATEGORY	II or IV	II or IV	II or IV	II or IV	II or IV	II or IV	II or IV	II or IV
VENT MATERIAL	SS, CPVC, PVC, Polypro	SS, CPVC, PVC, Polypro	SS, CPVC, PVC, Polypro	SS, CPVC, PVC, Polypro	SS, CPVC, PVC, Polypro	SS, CPVC, PVC, Polypro	Stainless Steel	Stainless Steel

* Electrical - For alternate voltages and amp draws, please consult the factory or the installation and operation manual.

† Data based on 22°F delta T

Unless otherwise specified dimensions are in inches.

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FCB-PS-01 (Initial Release)

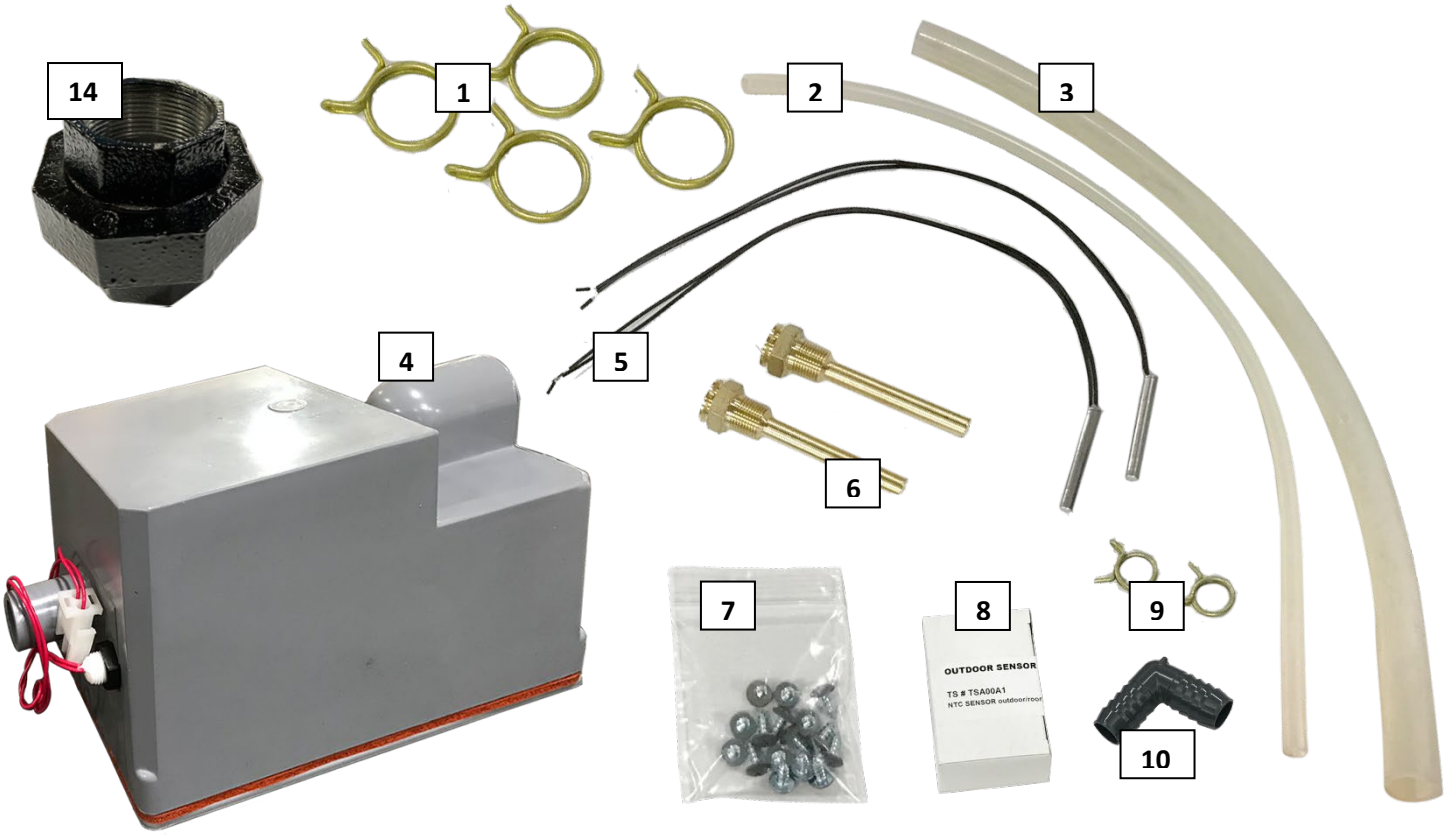
06/21-Printed in U.S.A.

IN THE BOX

Models FCB 1000-6000

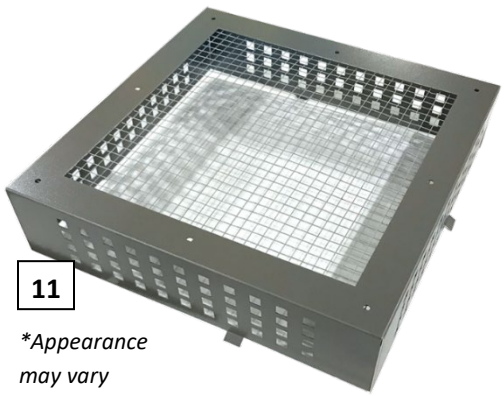
CREST® CONDENSING BOILER

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^{O} ELBOW
11	AIR INTAKE COVER*
12	6" SS to PVC ADAPTER ◆
13	AIR INLET COLLAR & GASKET ❖
14	GAS UNION*



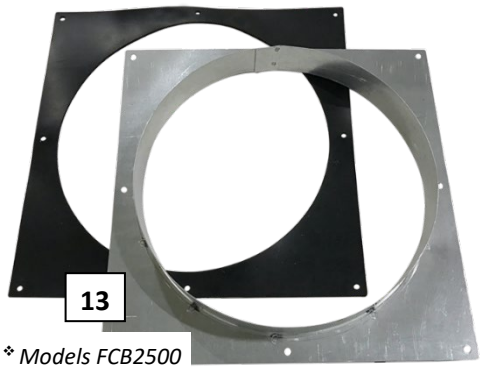
11

**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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CONDENSATE NEUTRALIZATION KIT

Submittal Sheet **CON-Sub-05**

CONDENSATE NEUTRALIZATION KITS FOR BOILERS UP TO 6.0 MBTU

Job Name: Parkhill High School Renova

Location: _____

Engineer: _____

Agent/Whls: AES

Contractor: _____

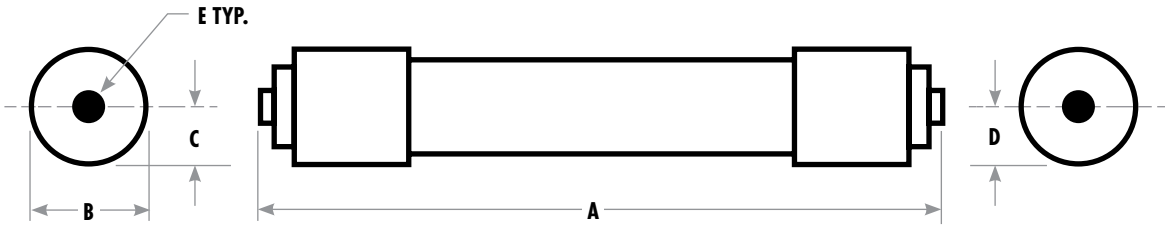
Model No. _____

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

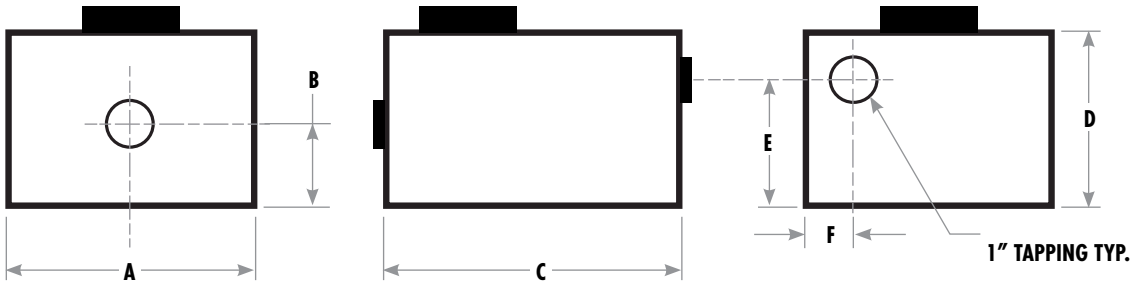
MODEL
CN2-300
CN4-850
CN4-2000



	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

Location: _____

Engineer: _____

Wholesaler: AES

Contractor: _____

Model No. _____

NOTES:

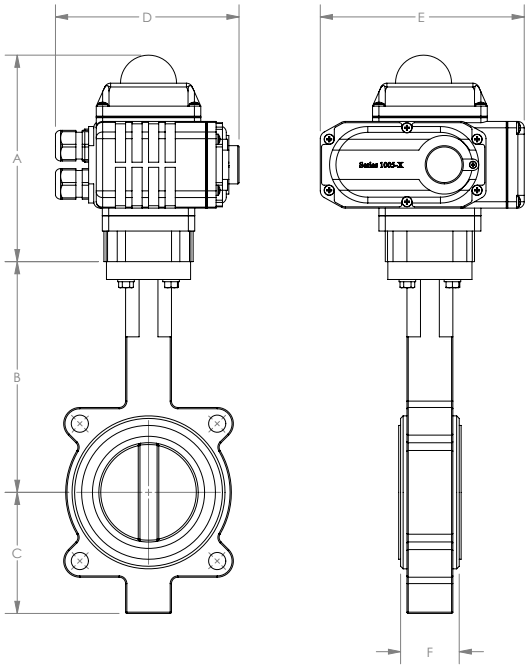
DIMENSIONS AND SPECIFICATIONS

	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 on 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

Location: _____

Engineer: _____

Agent/Wholesaler: AES

Contractor: _____

Model No. _____

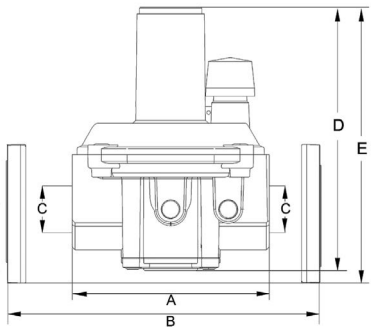
Equipment Tag(s):

_____

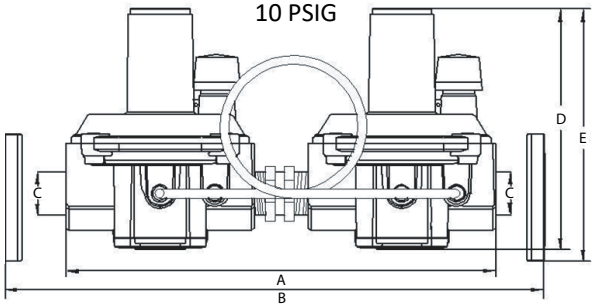
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NOTES:

2 PSIG



10 PSIG



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.

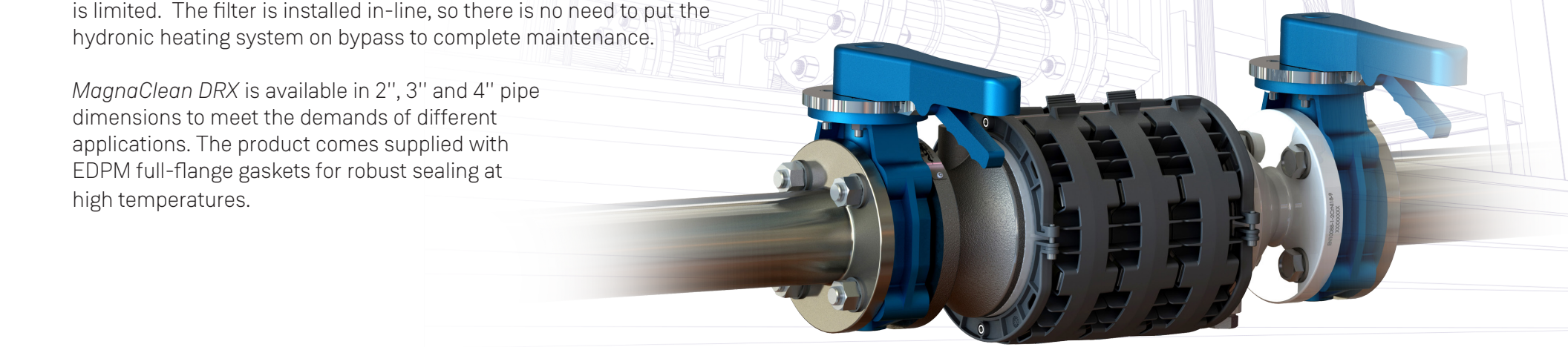
MagnaClean DRX introduces a new and compact design for protecting hydronic heating systems, based on industry-proven magnetic filtration technologies and components. The filter consists of an innovative magnetic belt, containing multiple high-performing neodymium magnets, wrapped around a precision-engineered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

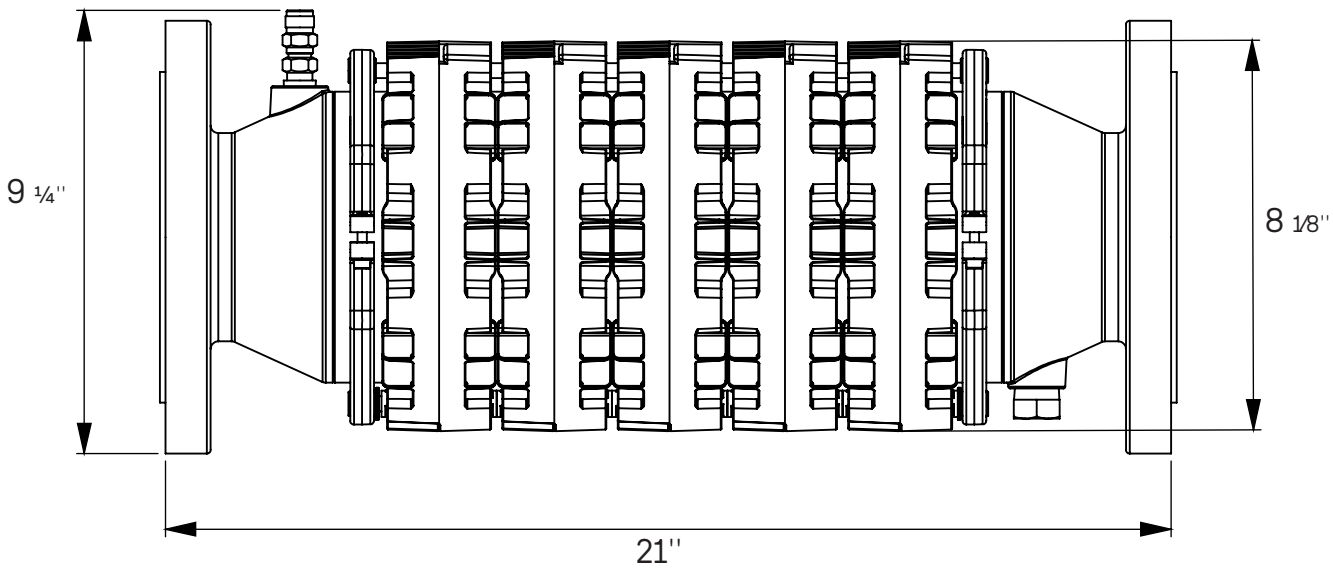


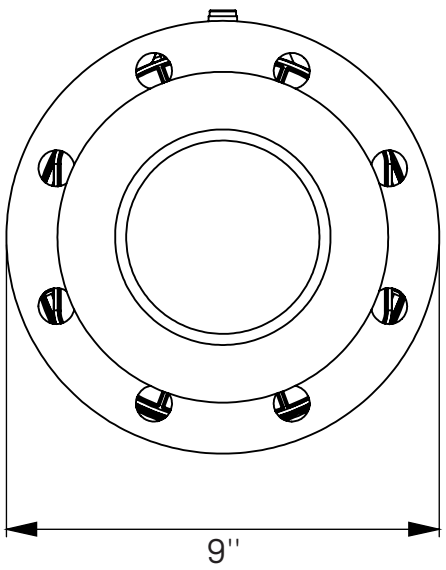
MagnaClean DRX Technical Specification

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	(⅝'')		
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





Pump Performance Datasheet

Customer	: ASSOCIATED EQUIPMENT SALES	Quote Number / ID	: 2383667
Customer ref. / PO	:	Model	: Hydro MPC-E 4CRE 32-2-1 3x208V 60Hz
Tag Number	: 011		
Service	:	Part Number	: 99689508
Quantity	: 1	Stages	: 2
Quantity of pumps	: 4 active + 0 standby	Based on curve number	: RC10455
		Date last saved	: 03/04/2025 1:41 PM

Operating Conditions

System flowrate	: 800.0 USgpm
Flowrate per pump	: 200.0 USgpm
Differential head / pressure, rated (requested)	: 80.14 ft
Differential head / pressure, rated (actual)	: 78.50 ft
Suction pressure, min / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz
Power Supply	: 3ph 208V

Performance

Speed, rated	: 3599 rpm
Speed, maximum	: 3599 rpm
Speed, minimum	: 899 rpm
Pump efficiency	: 54.09 %
NPSH required / margin required	: 24.56 / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,805 / 9,516 US Units
Head maximum, rated speed	: 165.6 ft
Head rise to shutoff	: 111.02 %
Flow, best eff. point	: 134.9 USgpm
Flow ratio, rated / BEP	: 148.30 %
Speed ratio (rated / max)	: 100.00 %
Head ratio (rated speed / max speed)	: 100.00 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Near miss

Energy Indexes

PEI (VL)	: 0.41
ER (VL)	: 59

Liquid

Liquid type	: Cold Water
Additional liquid description	:
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

Material selected	: Standard - Cast Iron / 304 Stainless Steel

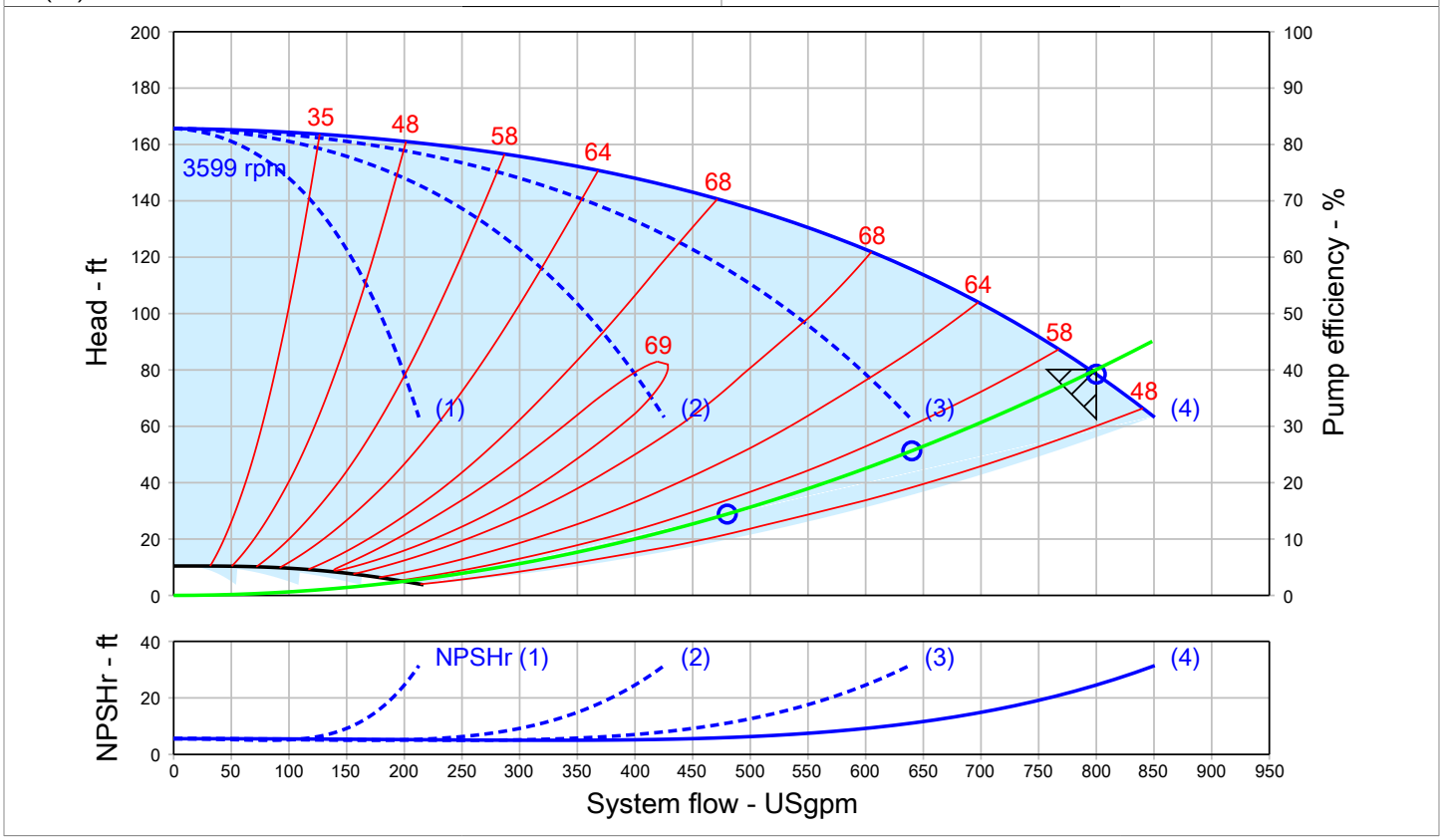
Pressure Data

Pump shut off pressure	: 71.68 psi.g
Maximum allowable suction pressure	: 58.00 psi.g

Driver & Power Data (@Max density) (Per Pump)

Motor sizing specification	: Max power (non-overloading)
Margin over specification	: 0.00 %
Service factor	: 1.00
Rated power (based on duty point)	: 7.33 hp
Max power (non-overloading)	: 7.34 hp
Motor rating	: 7.50 hp / 5.59 kW (Fixed)
Panel Max FLA	: 81 A
MCA	: 102.9 A
MOCP	: 125 A

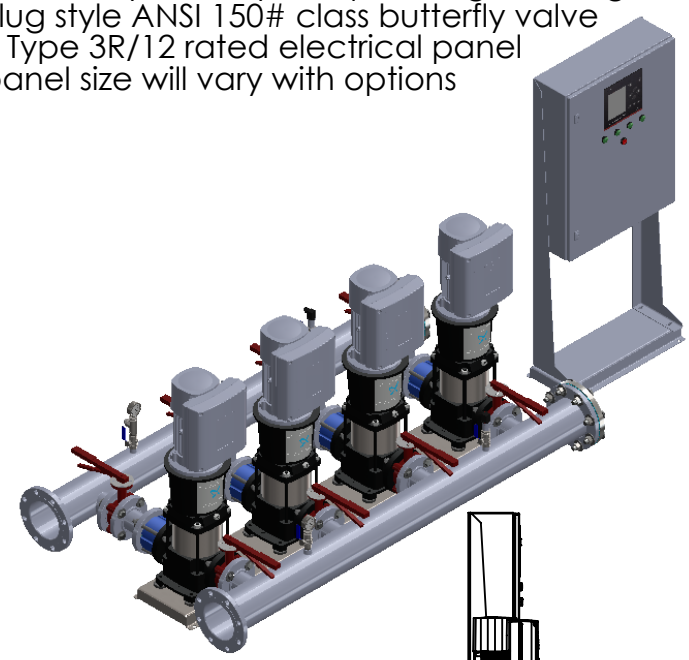
*Addition of pilot pump or up-sizing HP will affect system FLA, MCA, and MOCP.

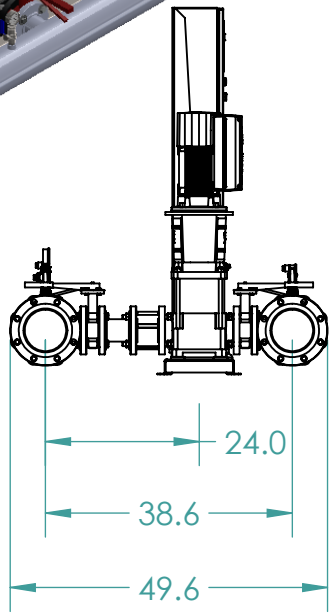


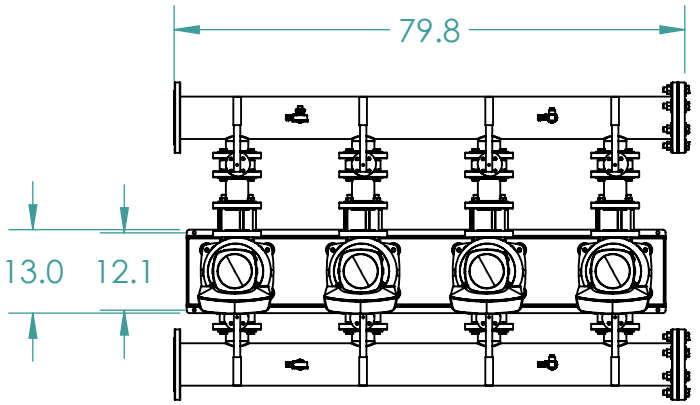
Associated Equipment Sales (AES) · 14535 West 96th Terrace · Lenexa, KS 66215
phone: 913-894-4455 · fax: 913-894-4459 ·

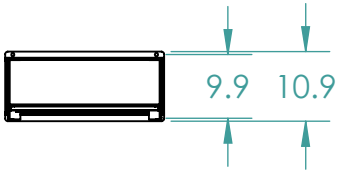
1. Manifolds 6" ANSI Class 150 AISI 316SS Schedule 10s ASTM A312 or ∅168.3mm x2mm
2. Base/Frame AISI 304SS
3. Standard system layout : panel right facing suction
4. 3" lug style ANSI 150# class butterfly valve
5. UL Type 3R/12 rated electrical panel

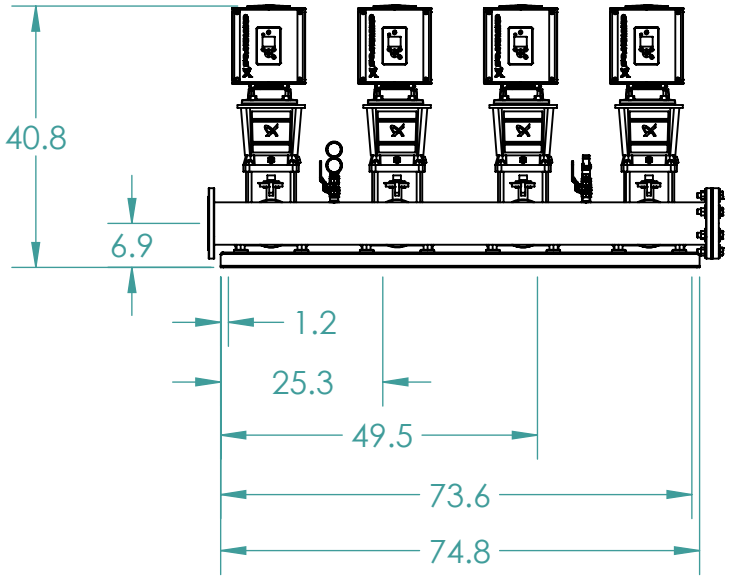
Note: panel size will vary with options

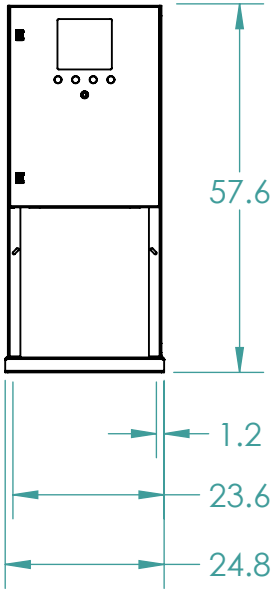












GRUNDFOS

FRESNO, CALIFORNIA 93727 USA

Note:
All dimensions are ±0.5"
Not for Construction
All dimensions subject to changewithout notice.

BoosterpaQ Model:	HYDRO MPC E 4CRE32-2-1				
Power:	3x208-230	60HZ	4x7.5HP		
Job:				Scale:	1:30
Dwg No:	Rev: 0	Date: 7/20/2018	Drawer 71999	Page:	1 of 1

GRUNDFOS

Panel Part Number:
99554605

Description

Control MPC E

4 X 7.5HP
3 X 208/240V

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

Rev	B	Control MPC E 4 X 7.5HP 3 X 208/240V	This drawing and its content is the property of GRUNDFOS. It may not be copied for third parties or competitors. Changes are only to be made by GRUNDFOS.	Document ID	GRUNDFOS
Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 1/11

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, 240V

UL Type Rating: 3R

Largest Motor FLA and Panel Maximum FLA:

Motor Horsepower	7.5HP
Motor FLA	20FLA
Panel Max. FLA	81FLA

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

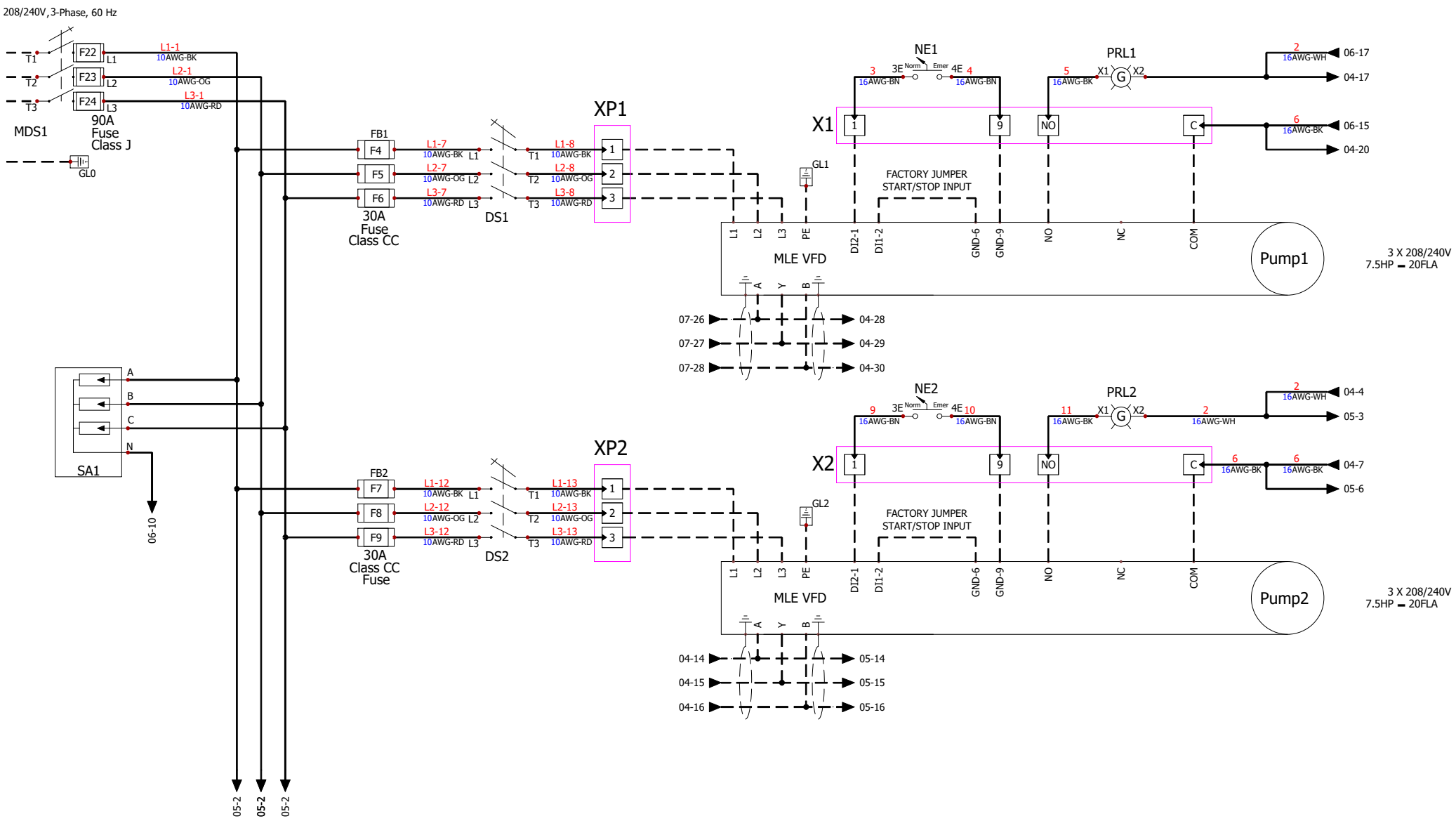
Internal Panel Wire
External Wire

Rev	B	Control MPC E 4 X 7.5HP 3 X 208/240V	This drawing and its content is the property of GRUNDFOS. It may not be copied for third parties or competitors. Changes are only to be made by GRUNDFOS.	Document ID	GRUNDFOS
Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 2/11

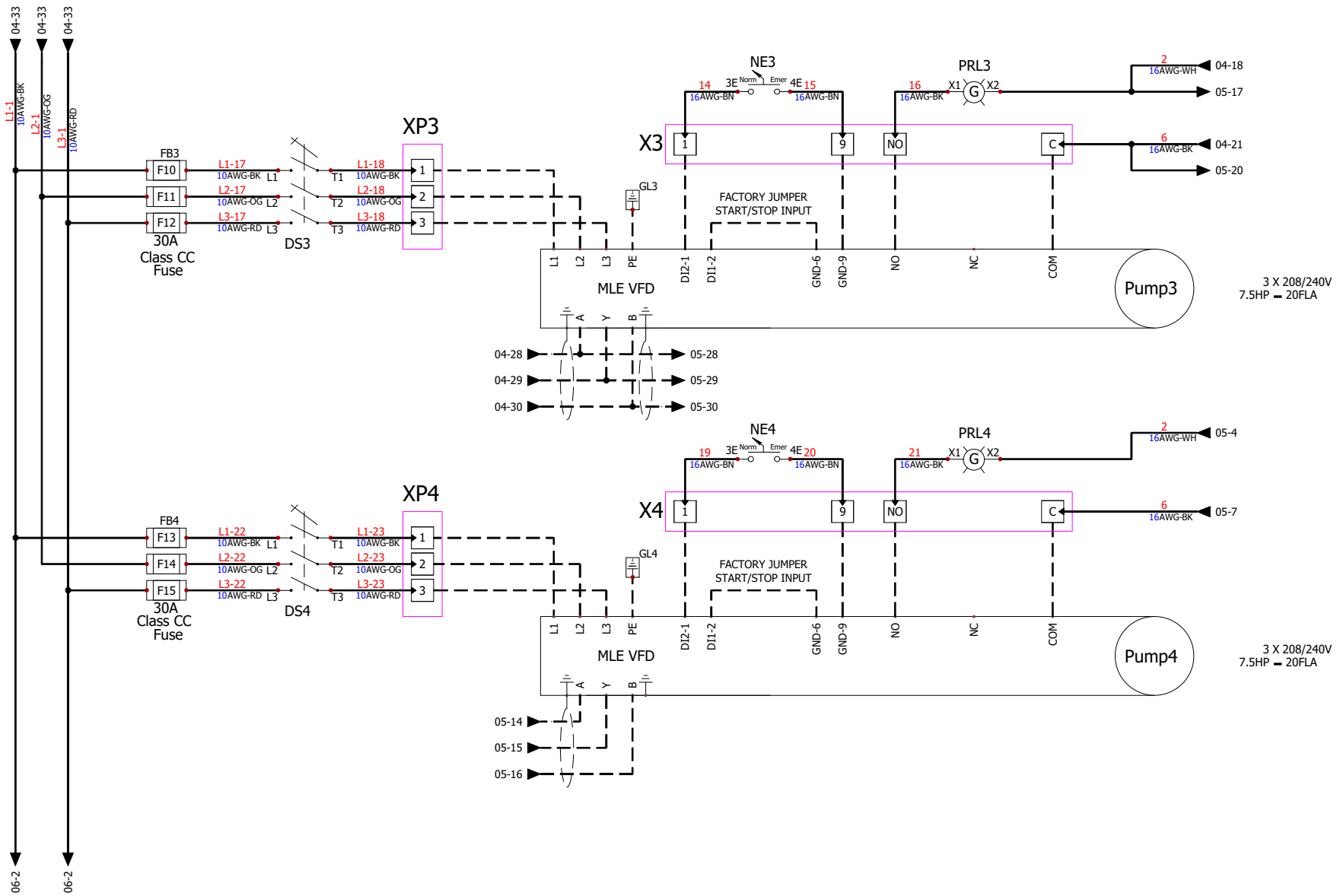
1-Table of Contents

Drawing	Revision	Date	Created by	Description
01	1	9/10/2019	kharen	Cover Page 01
02	1	9/10/2019	kharen	Cover Page 02
03	1	9/10/2019	kharen	Drawings list
04	1	9/10/2019	kharen	Power 01
05	1	9/10/2019	kharen	Power 02
06	1	9/10/2019	kharen	Control 01
07	1	9/10/2019	kharen	Control 02
08	1	9/10/2019	kharen	Panel Layout
09	1	9/10/2019	kharen	Panel Views
10	1	9/10/2019	kharen	Bill Of Materials grouped by manufacturer Rev1.0 (Components)
11	1	9/10/2019	kharen	Bill Of Materials grouped by manufacturer Rev1.0 (Components)
12	1	9/10/2019	kharen	Main electrical closet

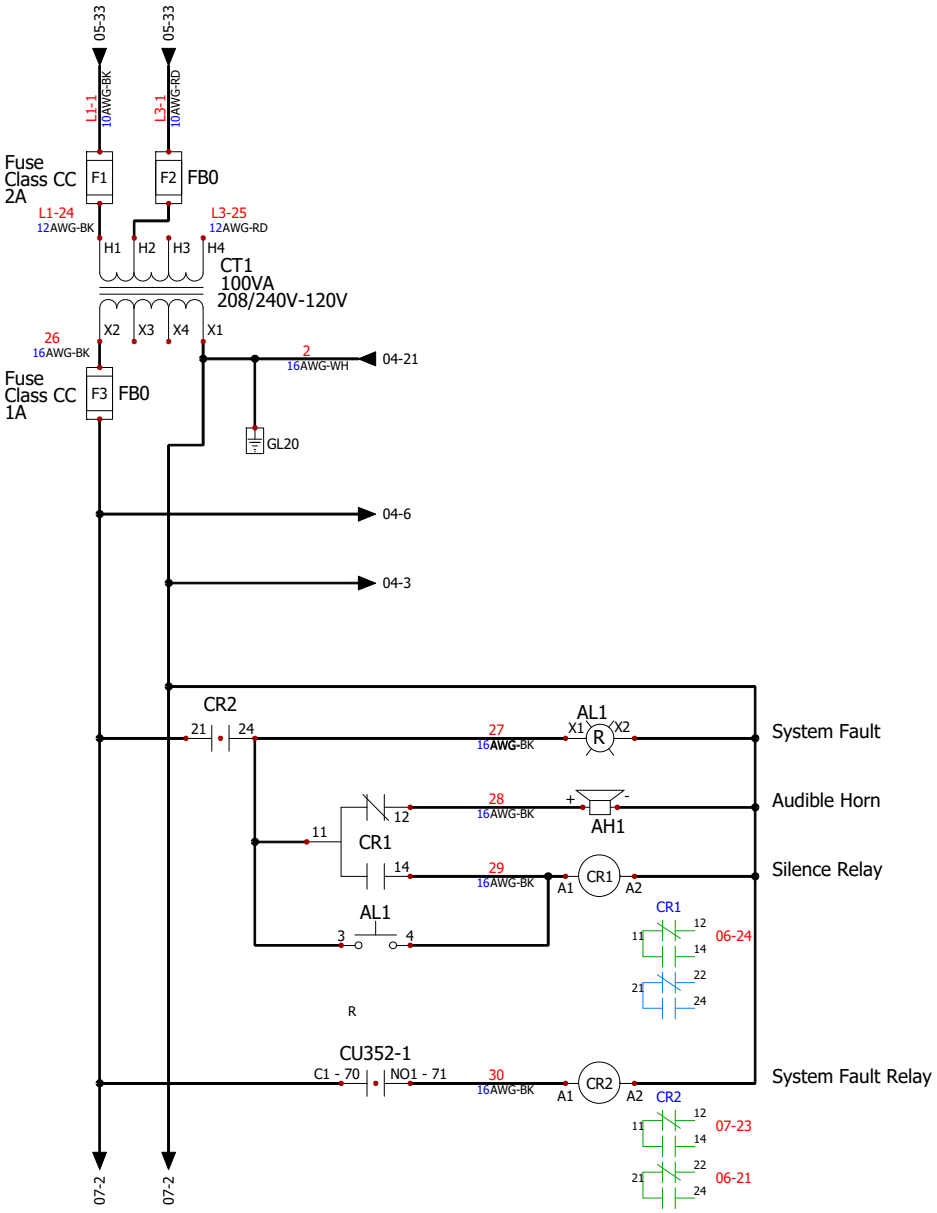
Rev	B	Control MPC E 4 X 7.5HP 3 X 208/240V	This drawing and its content is the property of GRUNDFOS. It may not be copied for third parties or competitors. Changes are only to be made by GRUNDFOS.	Document ID	GRUNDFOS
Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 3/11



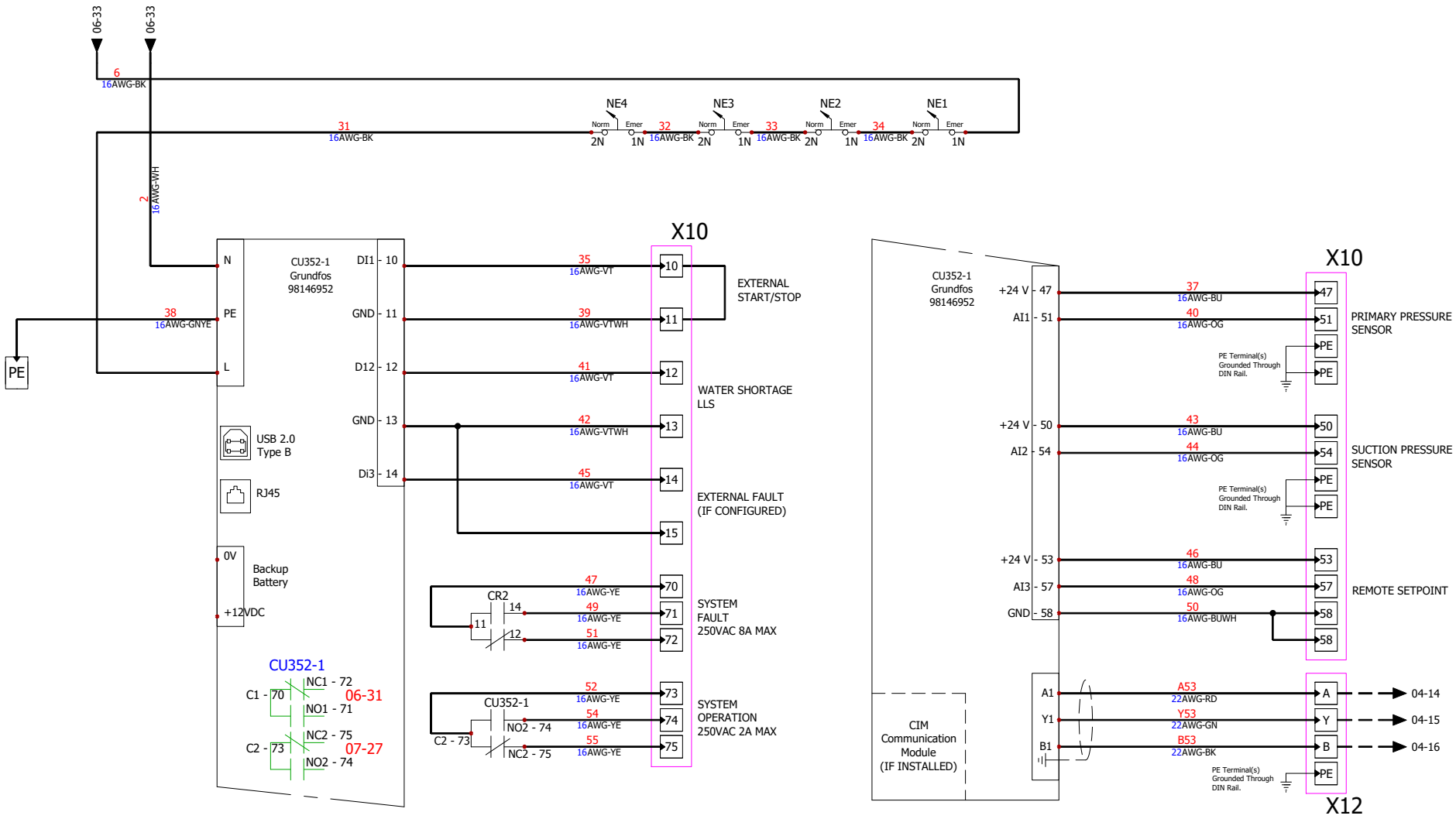
Rev	B	Control MPC E 4 X 7.5HP 3 X 208/240V	This drawing and its content is the property of GRUNDFOS. It may not be copied for third parties or competitors. Changes are only to be made by GRUNDFOS.	Document ID	GRUNDFOS
Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 4/11



Rev	B	Control MPC E 4 X 7.5HP 3 X 208/240V	This drawing and its content is the property of GRUNDFOS. It may not be copied for third parties or competitors. Changes are only to be made by GRUNDFOS.	Document ID	GRUNDFOS
Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 5/11



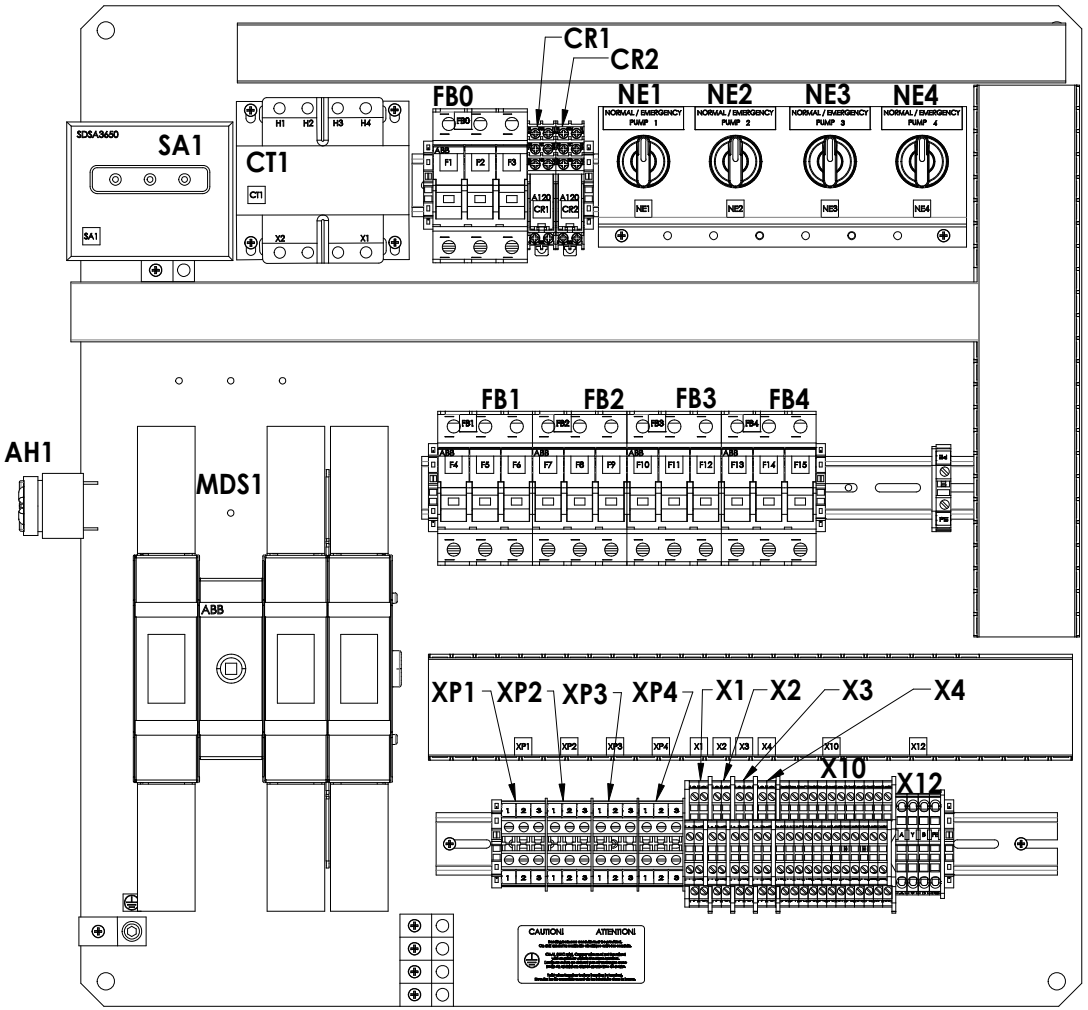
Rev	B	Control MPC E 4 X 7.5HP 3 X 208/240V	This drawing and its content is the property of GRUNDFOS. It may not be copied for third parties or competitors. Changes are only to be made by GRUNDFOS.	Document ID	GRUNDFOS
Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 6/11



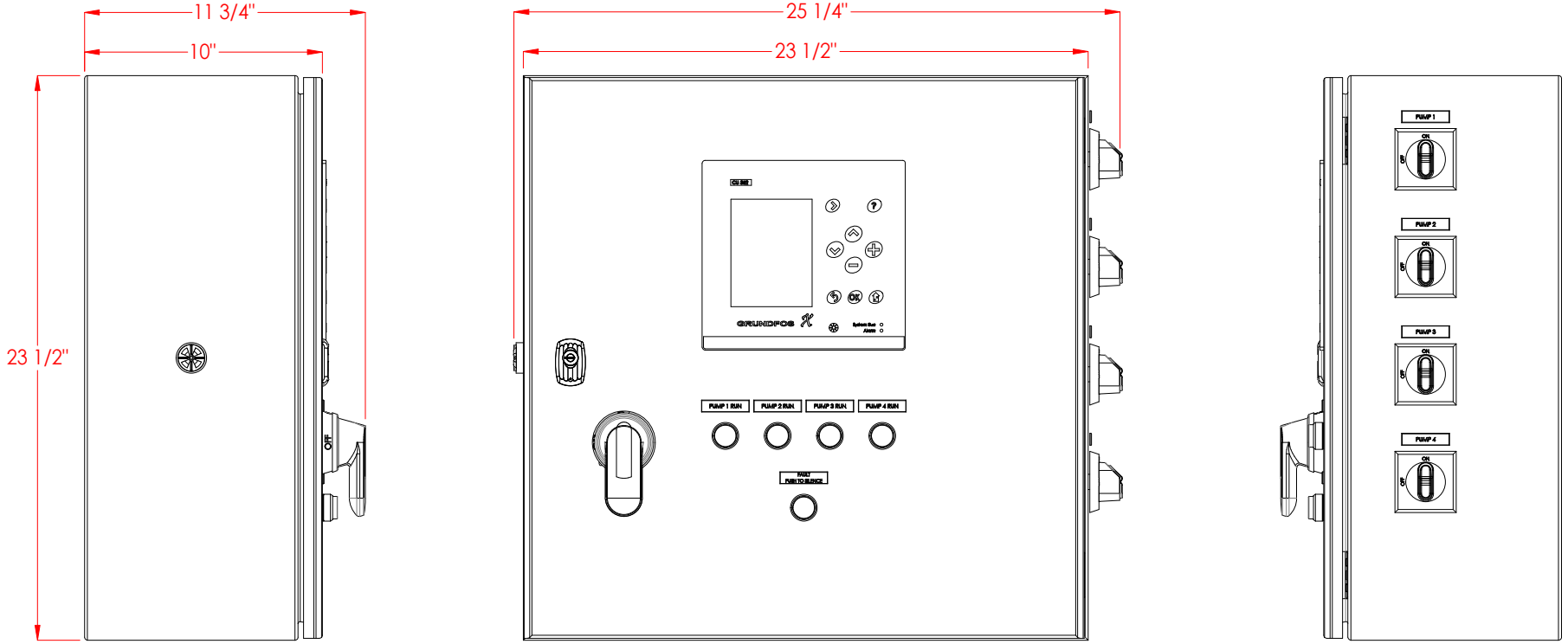
CIM COMMUNICATION MODULE TERMINATIONS

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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Status	Approved				SHEET: 7/11



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Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 8/11



CLEARANCE FROM FRONT OF ENCLOSURE MUST BE 36"
CLEARANCE FROM DISCONNECT HANDLES MUST BE 6"

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Date	12/13/2021			EDW-WD-GPC-1094	Panel Part Number: 99554605
Status	Approved				SHEET: 9/11

Article Number	Mark	Manufacturer	Reference	Description	Quantity	Component Type
13-16-26-1241	FB0, FB1, FB2, FB3, FB4	ABB	E9330CCS	Fuse Block; 3P, 30 A, Class CC, Indicator, Padlockable	5	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, DS4	ABB	OHYS2RJ	Disconnect Handle; Red/Yellow, for Side Mount, Type 3R, 12	4	Service Disconnect
13-16-66-1506	MDS1	ABB	OHZX10	Alignment Ring; Use on all Pistol Grip Handles	1	Main Disconnect
13-16-66-1433	MDS1	ABB	OS100GJ12	Disconnect Switch; 100A, Fuseable, 600V, 3-Pole, Class J, Center Shaft	1	Main Disconnect
13-16-66-1437	MDS1	ABB	OSS160G1L3	Touch Safe Cover for Disconnect switch; 100A, 600V, 3-Pole, UL98	2	Main Disconnect
13-16-66-1383	DS1, DS2, DS3, DS4	ABB	OT63FT3	Disconnect Switch; 60A, 600V, 3-Pole, Front Mount	4	Service Disconnect
13-16-66-1610	MDS1	ABB	OXP6X500	Disconnect Shaft; 19.7", 6x500	1	Main Disconnect
13-16-86-1024	MDS1	ABB	OZXA-24	Terminal Lug Kit; Line Side, 100/200A Disconnects, 14-2/0AWG wire, 6 Pack	1	Main Disconnect
13-16-86-1021	MDS1	ABB	OZXA-175	Terminal Lug Kit; Load Side, 100/200A Disconnects, (6) 6-14AWG, 3 Pack	1	Main Disconnect
13-16-26-1291	F22, F23, F24	F.Shaw	A4J90	Fuse; 90A, 600V, Class J	3	Fuse
13-16-26-1060	F3	F.Shaw	ATQR1	Fuse; 1A, 600V, 13/32" x 1 1/2", Class CC	1	Fuse
13-16-26-1061	F1, F2	F.Shaw	ATQR2	Fuse; 2A, 600V, 13/32" x 1 1/2", Class CC	2	Fuse
13-16-26-1069	F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15	F.Shaw	ATQR30	Fuse; 30A, 600V, 13/32" x 1 1/2", Class CC	12	Fuse
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, PRL4	Idec	HW1P-2FQD-G-120V	Pilot Light; Green, Illuminated, 120V, Complete	4	Pump 1 Run Light, Pump 2 Run Light, Pump 3 Run Light, Pump 4 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

Article Number	Mark	Manufacturer	Reference	Description	Quantity	Component Type
65-BRKT-4HOA	SWB1	Orenco	65-BRKT-4HOA	Bracket; HOA or N/E Switch, x4	1	NE Bracket
65-ENCL-2424-4P-SD	L1	Orenco	65-ENCL-2424-4P-SD	Pre-Drill Enclosure; 24x24x10 4pump, w/Side Disconnects	1	Main electrical closet
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, NE4	OSI	65-SWITCH-2-12	Switch; Two Position, 1-NO, 1-NC	4	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
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, XP3 1, XP4 1, XP1 1	OSI	65-TB-PT-50A	Terminal Blocks; Single Pump Pass Through, 50A	4	Pump Power Terminal Blocks
65-TB-SINGLE-PUMP-DB	X4 1, X1 1, X3 1, X2 1	OSI	65-TB-SINGLE-PUMP-DB	Terminal Blocks; MLE Pump Control	4	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, GL4, GL20	Raco	TA2-Bulk	Ground Lug; 2AWG, Burndy	6	Ground Lug
13-16-81-1442	CT1	Schneider Electric	9070T100D20	Transformer; 100VA, P/208/230/460V, S/115V	1	
13-16-61-1010	SA1	Schneider Electric	SDSA 3650	Surge Arrestor; 3 Phase, 600V, WYE	1	Surge Arrestor

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Status	Approved				SHEET: 11/11

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:

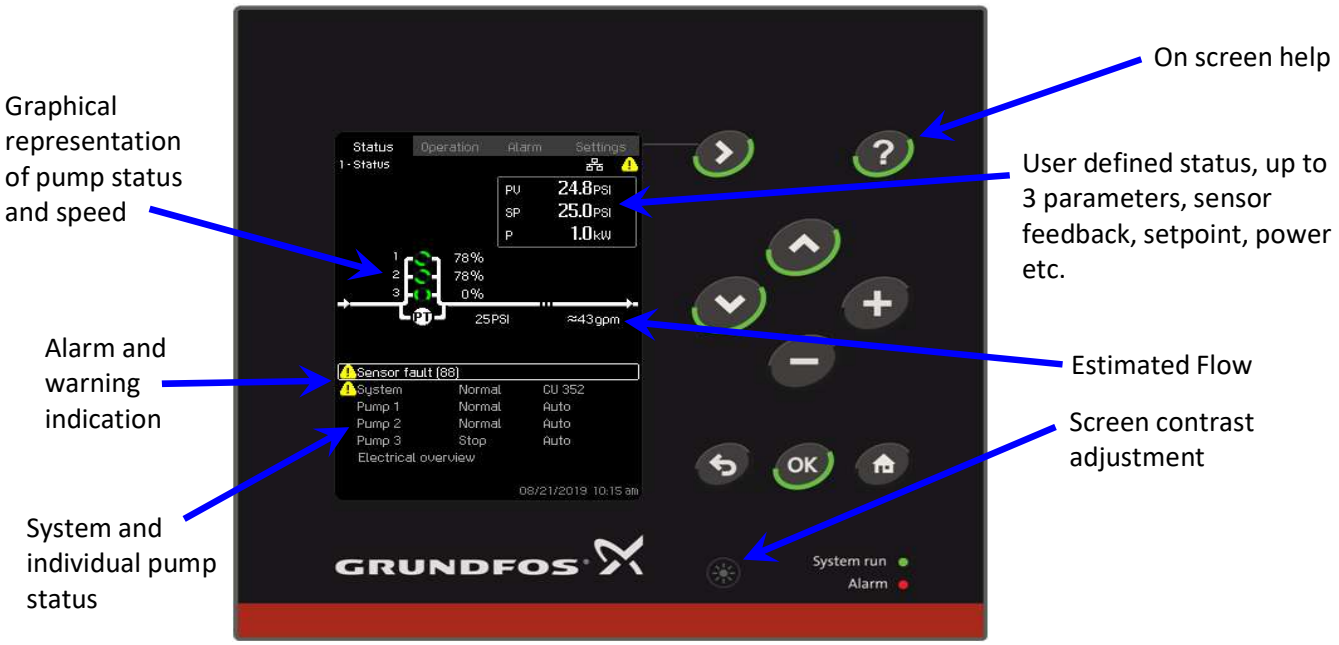
- o Secondary (Fallback) Sensor
- o Pump curve data (5th or 2nd order polynomial)
  * Pre-programmed from factory
- o Flow estimation via pump curve data and pressure measurement across pump(s)
- o Reduced operation (generator backup power) Max. kW limit or max. number of pumps
- o Specific energy calculation (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

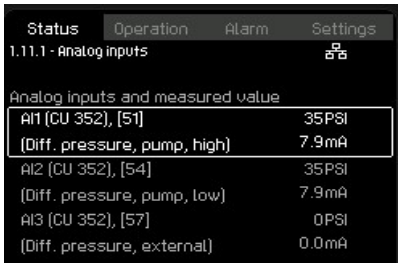
CU 352 Control user interface

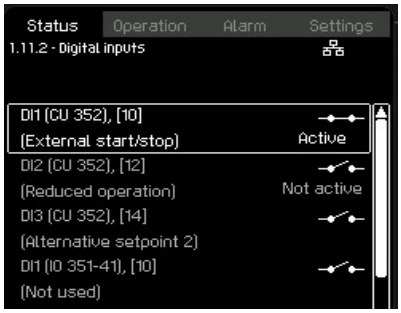


Status of inputs and outputs

Electrical overview

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

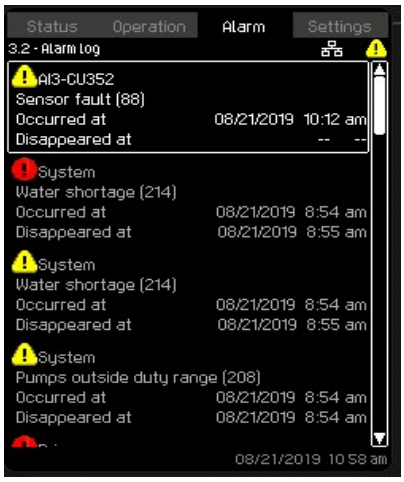




Alarms and warnings

Alarm log - Stores last 24 alarms and warnings.

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

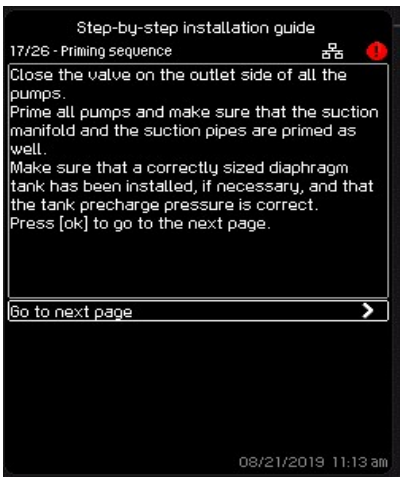


Startup Wizard

Startup Wizard

Step by Step installation guide

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



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)

Input current and voltage	0-20 mA 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%
Supply to sensor	24 V, 30 mA 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

Company name: Grundfos
Created by:
Phone:

Date: 12/02/2025

Qty.	Description
1	**DPI/--0-2.5b/2/ C/M2.00-X/EG6/-B/02B/SD-1**



Note! Product picture may differ from actual product

Product No.: 97747197

The transmitter is made of 1.4404 stainless steel.

Liquid:
Liquid temperature range: -22 .. 248 °F

Technical:
Approvals: CCSAUS
Approvals for drinking water: AS4020, WRAS, UBA, ACS
Pressure differential functionality (Yes/No): Y
Pressure relative functionality (Yes/No): N
Flow functionality (Yes/No): N
Temperature functionality (Yes/No): N
Minimum measuring pressure: 0 psi
Maximum measuring pressure: 36.26 psi

Installation:
Range of ambient temperature: -13 .. 140 °F

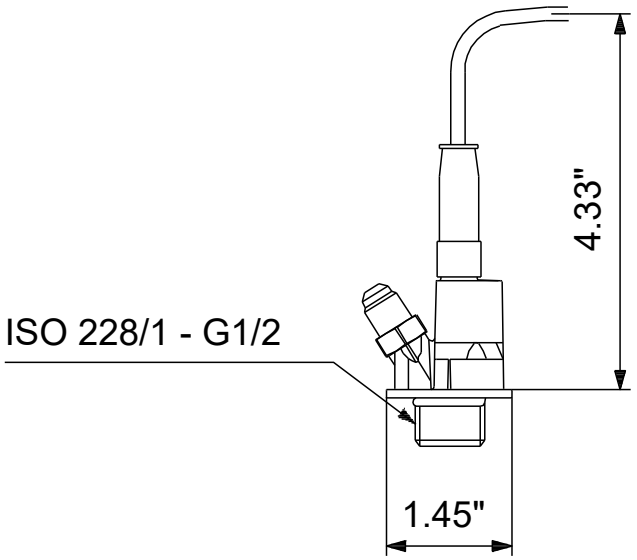
Electrical data:
Enclosure class (IEC 34-5): IP67
Length of cable: 6.56 ft
Minimum rated voltage DC: 12.50 V
Maximum rated voltage DC: 30.00 V

Others:
Net weight: 0.83 lb
Gross weight: 1.4 lb
Danish VVS No.: 475274025
Finnish LVI No.: 4534521
Country of origin: DK
Custom tariff no.: 9026.20.4000

Company name: Grundfos
Created by:
Phone:

Date: 12/02/2025

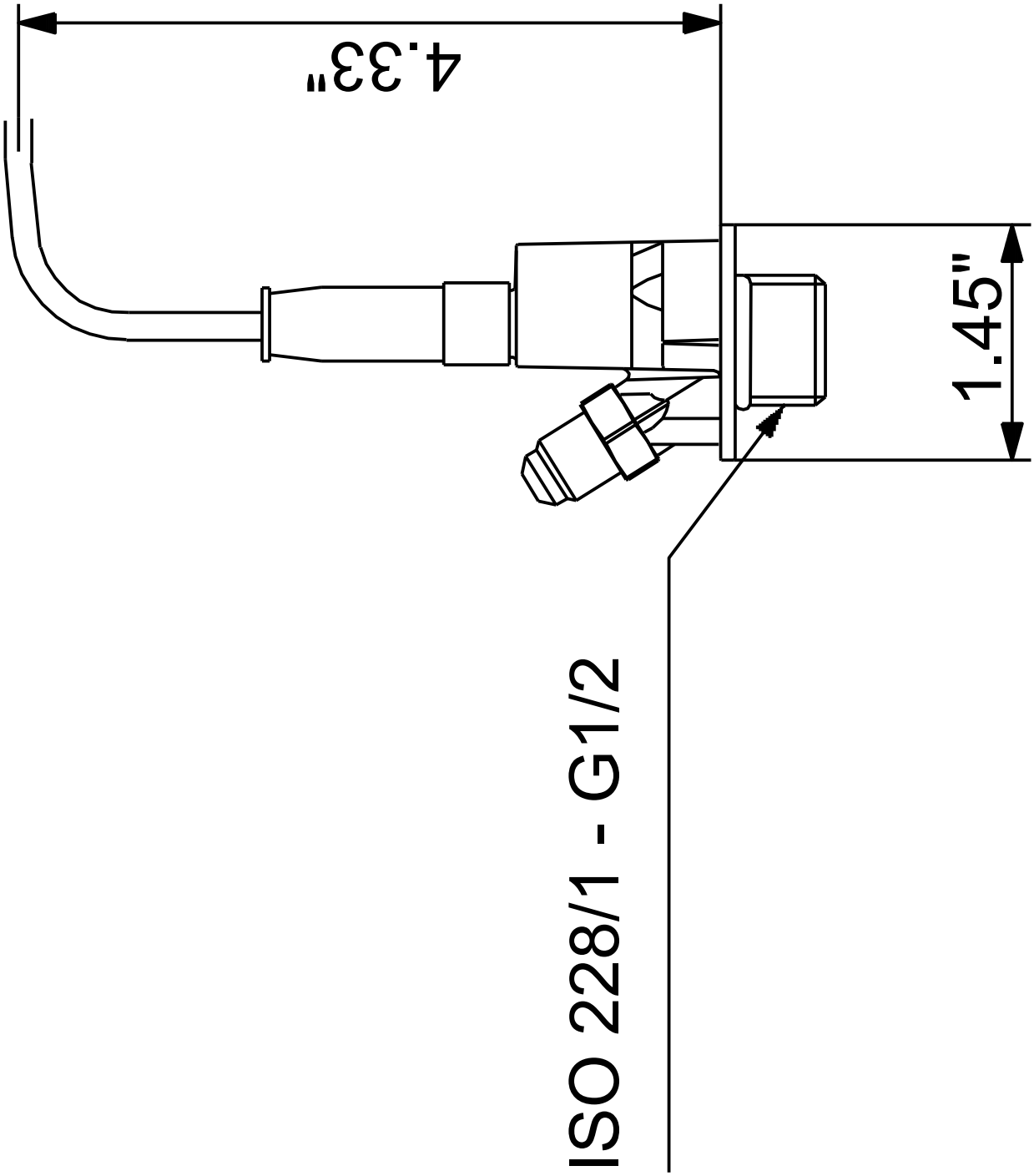
Description	Value
General information:	
Product name:	DPI/--0-2.5b/2/ C/M2.00-X/EG6/-B/02B/SD-1
Product No:	97747197
EAN number:	5710623682778
Price:	
Technical:	
Approvals:	CCSAUS
Approvals for drinking water:	AS4020, WRAS, UBA, ACS
Pressure differential functionality (Yes/No):	Y
Pressure relative functionality (Yes/No):	N
Flow functionality (Yes/No):	N
Temperature functionality (Yes/No):	N
Minimum measuring pressure:	0 psi
Maximum measuring pressure:	36.26 psi
Installation:	
Range of ambient temperature:	-13 .. 140 °F
Liquid:	
Liquid temperature range:	-22 .. 248 °F
Electrical data:	
Enclosure class (IEC 34-5):	IP67
Length of cable:	6.56 ft
Minimum rated voltage DC:	12.50 V
Maximum rated voltage DC:	30.00 V
Others:	
Net weight:	0.83 lb
Gross weight:	1.4 lb
Danish VVS No.:	475274025
Finnish LVI No.:	4534521
Country of origin:	DK
Custom tariff no.:	9026.20.4000



Company name: Grundfos
Created by:
Phone:

Date: 12/02/2025

97747197 DPI/--0-2.5b/2/ C/M2.00-X/EG6/-B/02B/SD-1



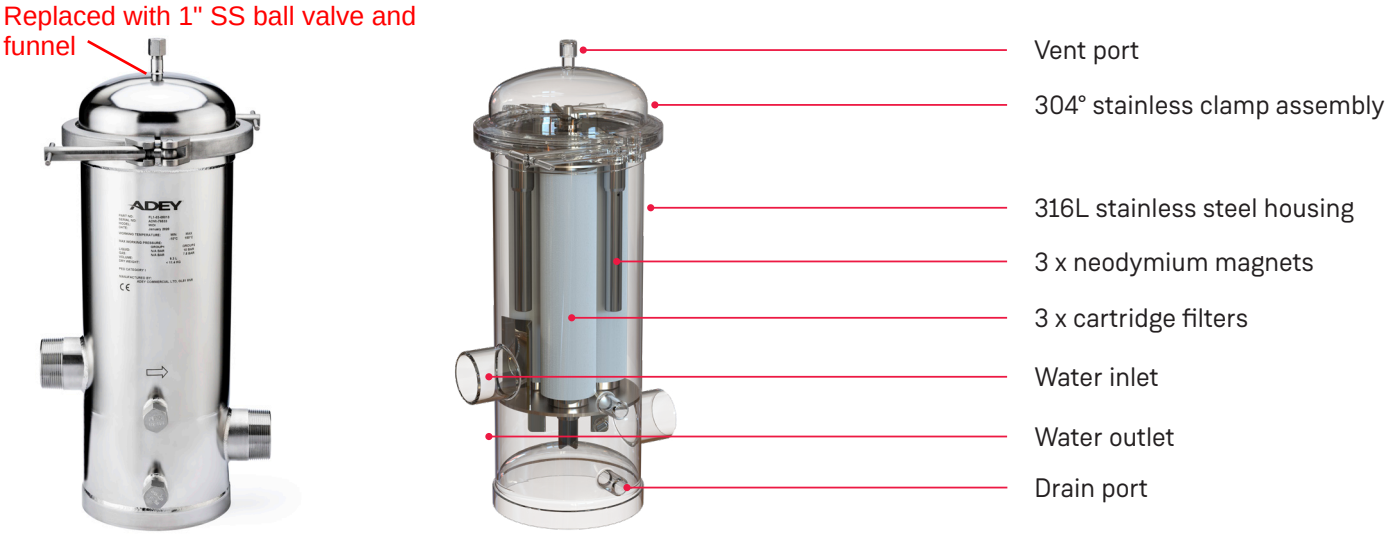
Note! All units are in [in] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

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.



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

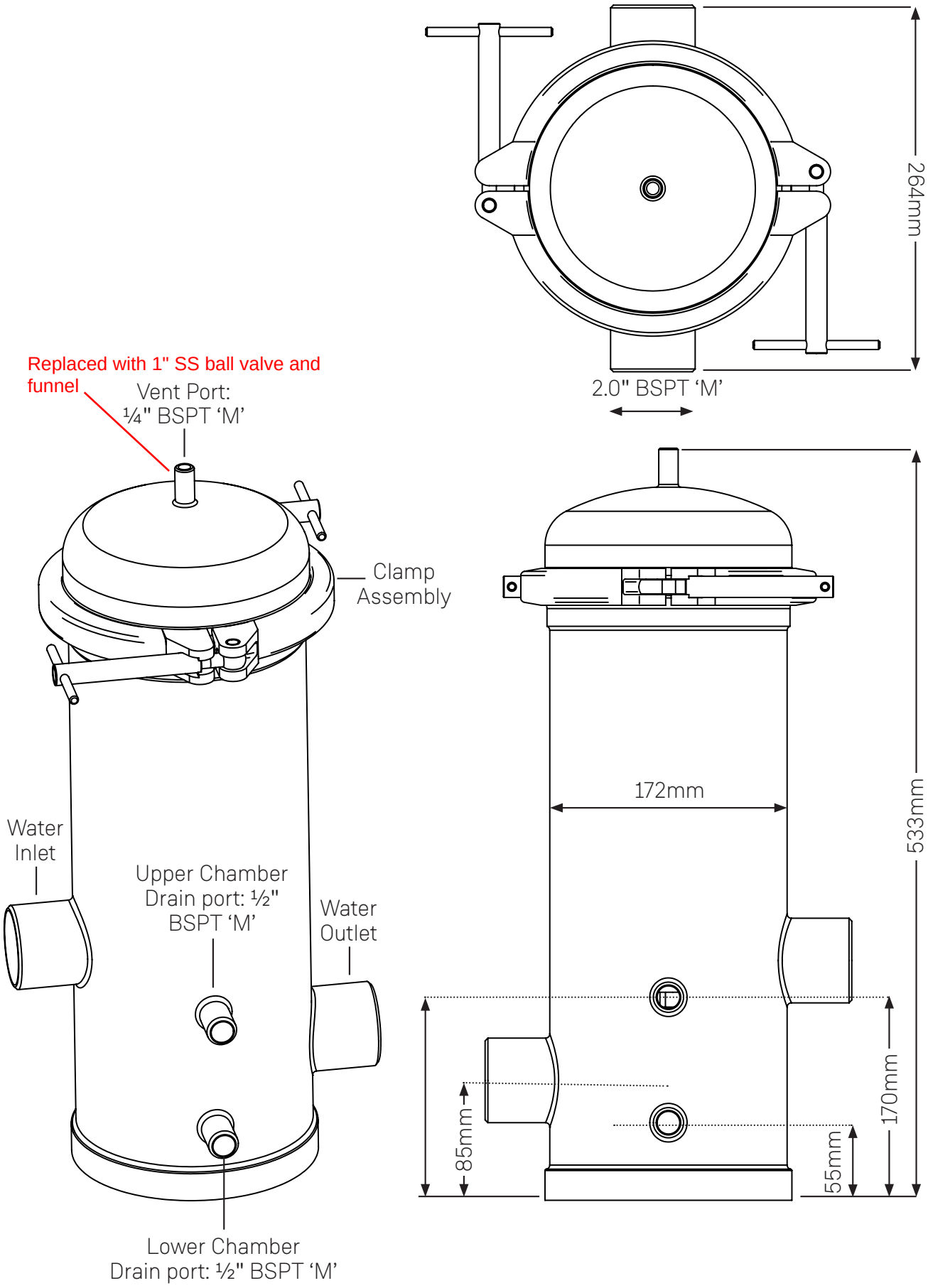
An ADEY system kit is available for the *MagnaClean CMX* Midi filter comprised of three 20-micron cartridge filters, an automatic air vent, magnetite scraper tool and five litres of ADEY's award winning *MC1+ Protector* which passivates and protects bare metal surfaces.



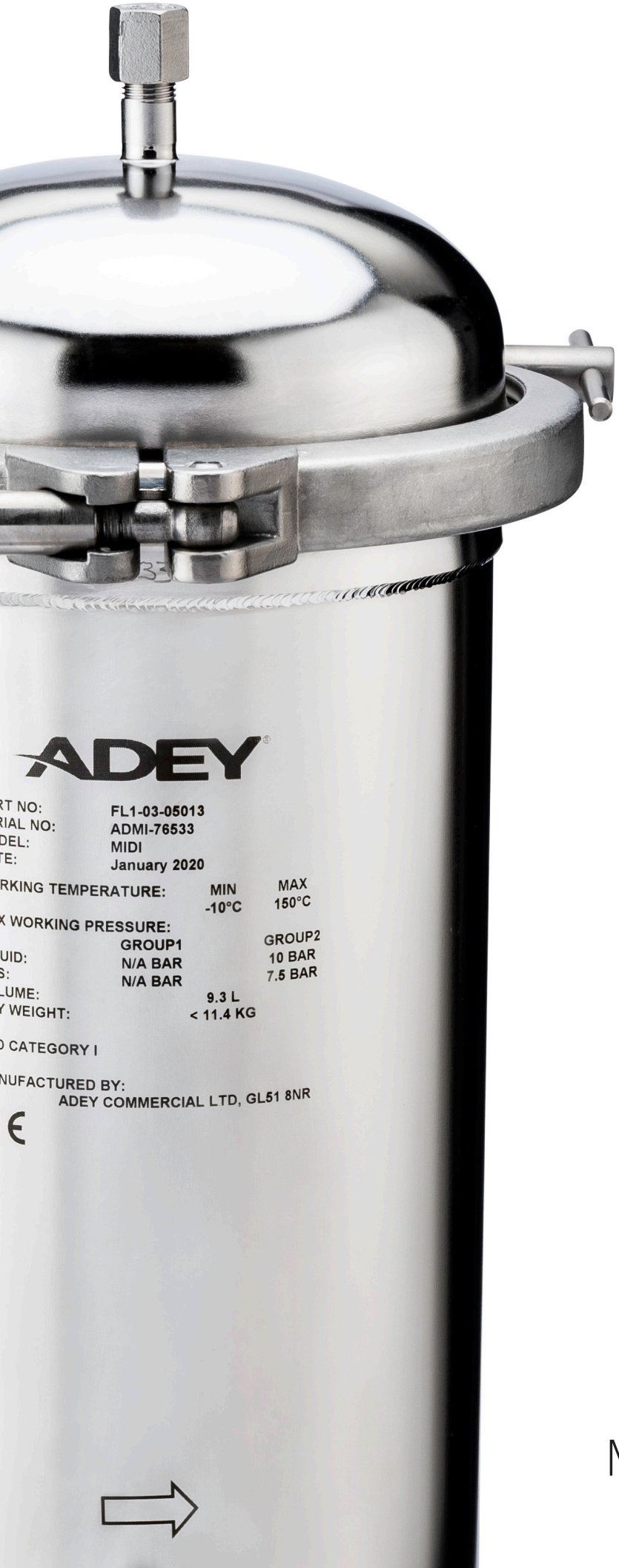




Technical Specification



MagnaClean™
CMX













Midi

Technical Specification

MagnaClean CMX			
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 By:	William Gustafson
Project City:	NA	Project Description:	(4) FCB-2000 Hellcats
Project State:	Kansas	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 Termintation:		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

CBX ___ ___ . ___

Metal:
3 = 430 SS
6 = 316L SS

Size:
25 - 75

Voltage:
2 = 208V/3ph
4 = 480V/3ph
5 = 575V/3ph

STANDARD EQUIPMENT

Three foot flexible conduit

Motor isolation plate

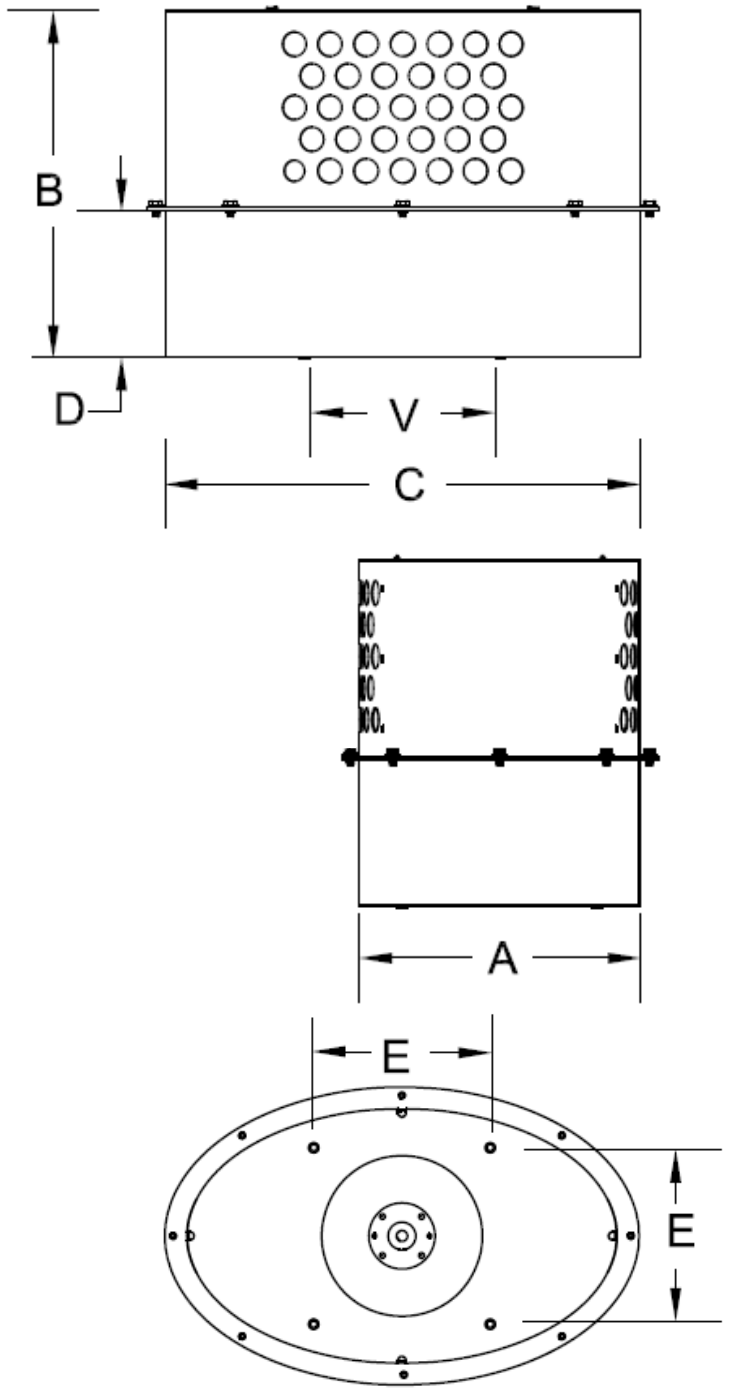
Fan guard

Integrated inlet ring

PROUDLY MADE IN USA

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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Intertek

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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

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

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

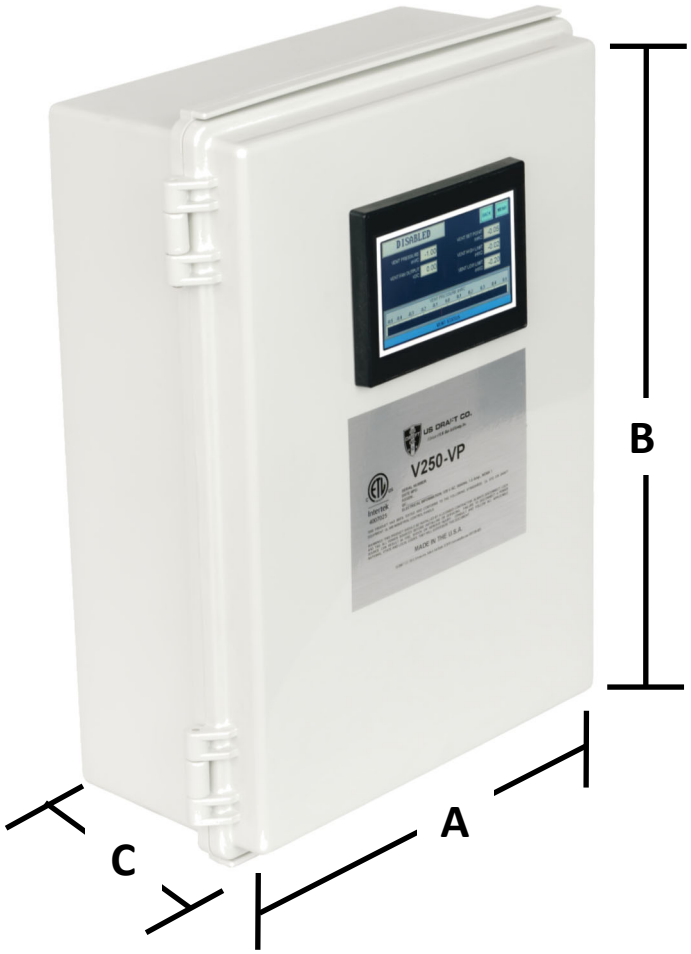
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Configuration		
Control System	**# of Appliances**	**Accessories**
V250-V	6	LP4, SLT, VP
V250-P	6	LP4, SLT, DP,
V250-O	6	LP4, GFS, SLT,
V250-VP	6	(2) LP4, (2) SLT, VP,
V250-OV	6	LP4, GFS, SLT,

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

CONNECTION DIAGRAM

System: V250 - OV

Job Name: General

Date:	Version:	DWG Rev:	Page #:
08/14/18	1.00	0	1 of 2

Factory Wired
Field Wired
Wire Connection
Terminal Block
Dry Contact
Wire Capped

Notes

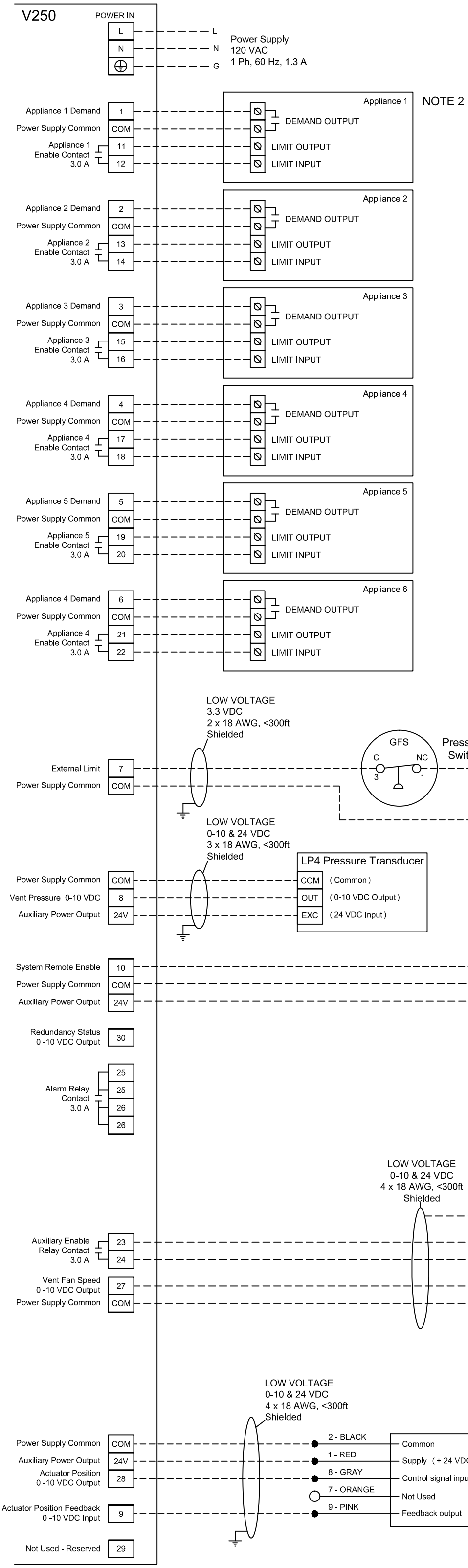
1. The wire sizes shown are typical and may not apply to all jobs. This system must be installed in compliance with NFPA 70, National Electric Code, and/or any local codes.
2. Appliance connections shown are for illustration purposes. Refer to appliance manufacturer for interlock method and connections.

Motor Connection Diagram 208-230 VAC

T4 (U2), T5 (V2), T6 (W2)
T1 (U1), T7 (U3) — U/T1 (L1)
T2 (V1), T8 (V3) — V/T2 (L2)
T3 (W1), T9 (W3) — W/T3 (L3)

Motor Connection Diagram 460 VAC

T1 (U1) — U/T1 (L1)
T2 (V1) — V/T2 (L2)
T3 (W1) — W/T3 (L3)
T4 (U2), T7 (U3)
T5 (V2), T8 (V3)
T6 (W2), T9 (W3)



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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

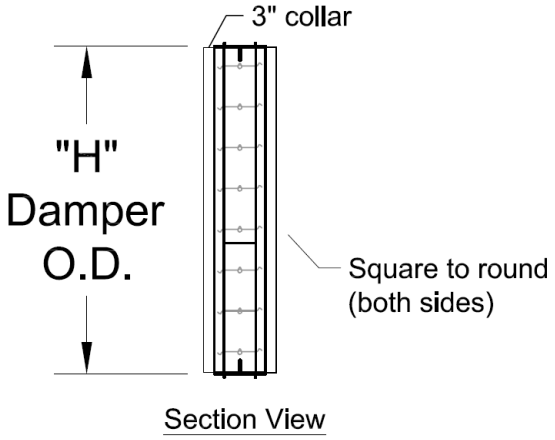
Available in sized from 8"ID to 36"ID
* Larger sizes available upon request

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^{o}-90^{o} span

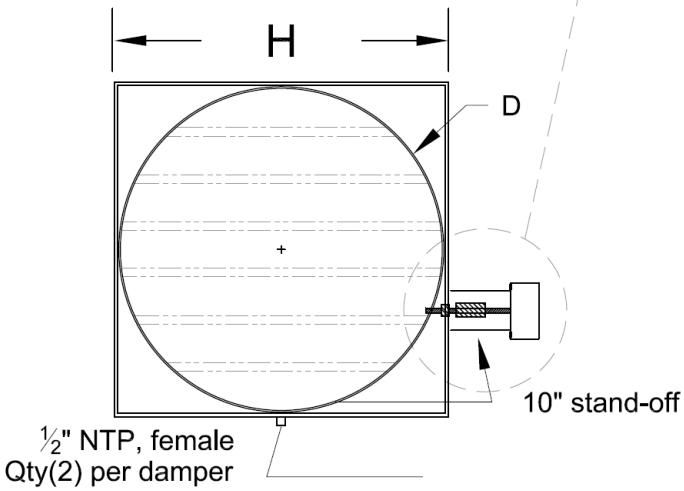
Ordering Matrix
OBDXX-AA
XX = Size - 8-36
AA = Material - S6 (316L stainless steel)

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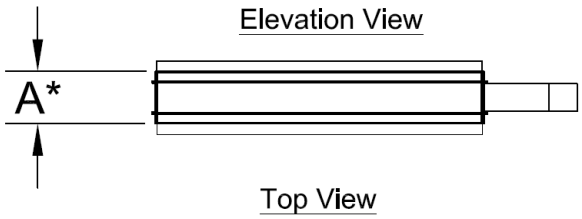
Dimensional Information			
Model	**A**	**D**	**H**
OBD8	7-1/2”	8”	13-1/8”
OBD9	7-1/2”	9”	13-1/8”
OBD10	7-1/2”	10”	13-1/8”
OBD12	7-1/2”	12”	13-1/8”
OBD14	7-1/2”	14”	15-1/8”
OBD16	7-1/2”	16”	17-1/8”
OBD18	7-1/2”	18”	19-1/8”
OBD20	7-1/2”	20”	21-1/8”
OBD22	7-1/2”	22”	23-1/8”
OBD24	7-1/2”	24”	25-1/8”
OBD26	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”



Section View



Elevation View



Top View

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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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

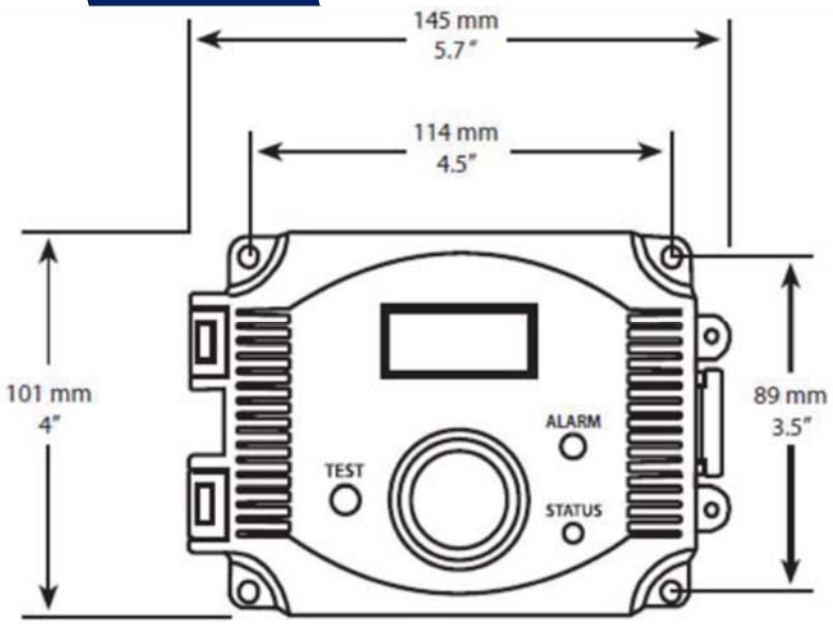
Optional Equipment
24VDC Power Supply
NIST calibration certificate
Replaceable electromechanical sensing element

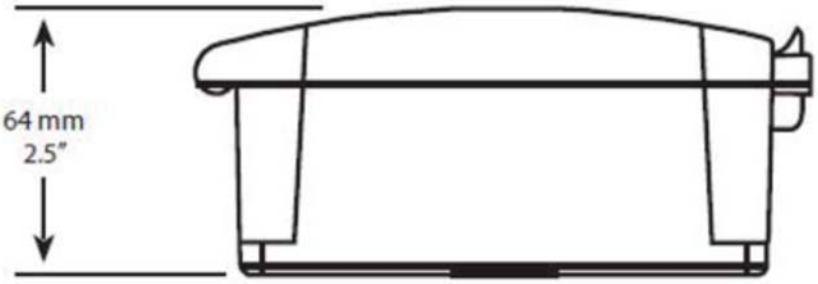
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Power Requirements			
Voltage	Amps	Frequency	Phase
24VAC/VDC	.15/.13	60/NA	1/NA
Relay		**Control Signal**	
Voltage	Amps	Voltage	Amps
250VAC	5	0-10VDC	0.1

Specifications	
Agency Approvals	ANSI/UL 2034 & 2075
Coverage	7,500 ft² 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

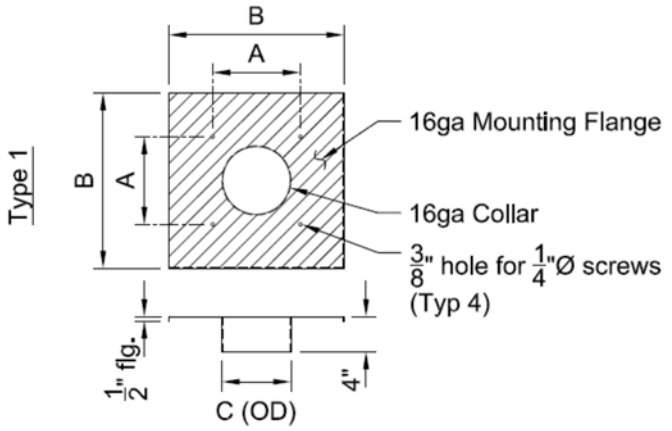
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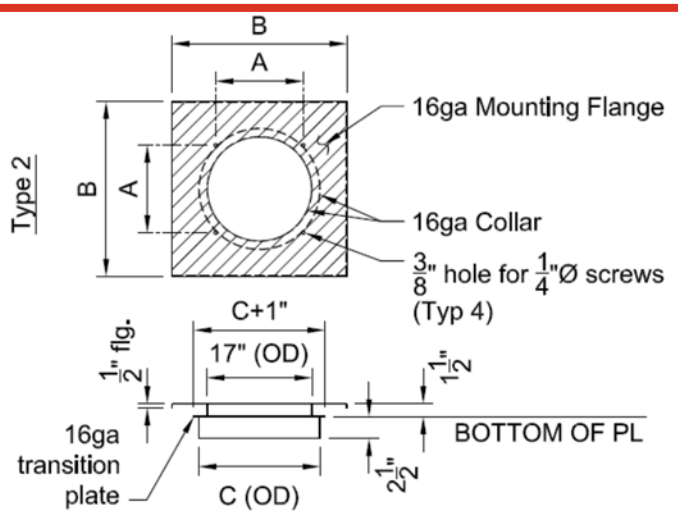
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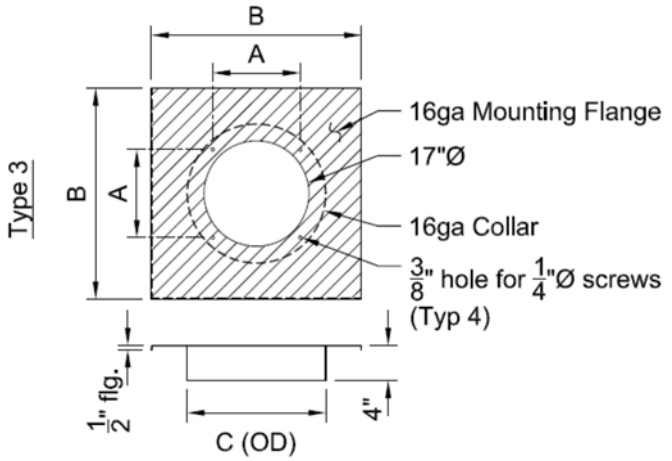
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FA

Fan Adapter







Model	Type	Dimensions		
		A	B	C
FA35-14	Type 1	16”	28”	13-7/8”
FA35-16	Type 1	16”	28”	15-7/8”
FA35-18	Type 1	16”	28”	17-7/8”
FA35-20	Type 1	16”	28”	19-7/8”
FA35-22	Type 1	16”	28”	21-7/8”
FA35-24	Type 1	16”	28”	23-7/8”
FA35-26	Type 1	16”	28”	25-7/8”
FA35-28	Type 2	16”	28”	27-7/8”

Material	304 Stainless Steel
	316L Stainless Steel
	Galvanized Steel

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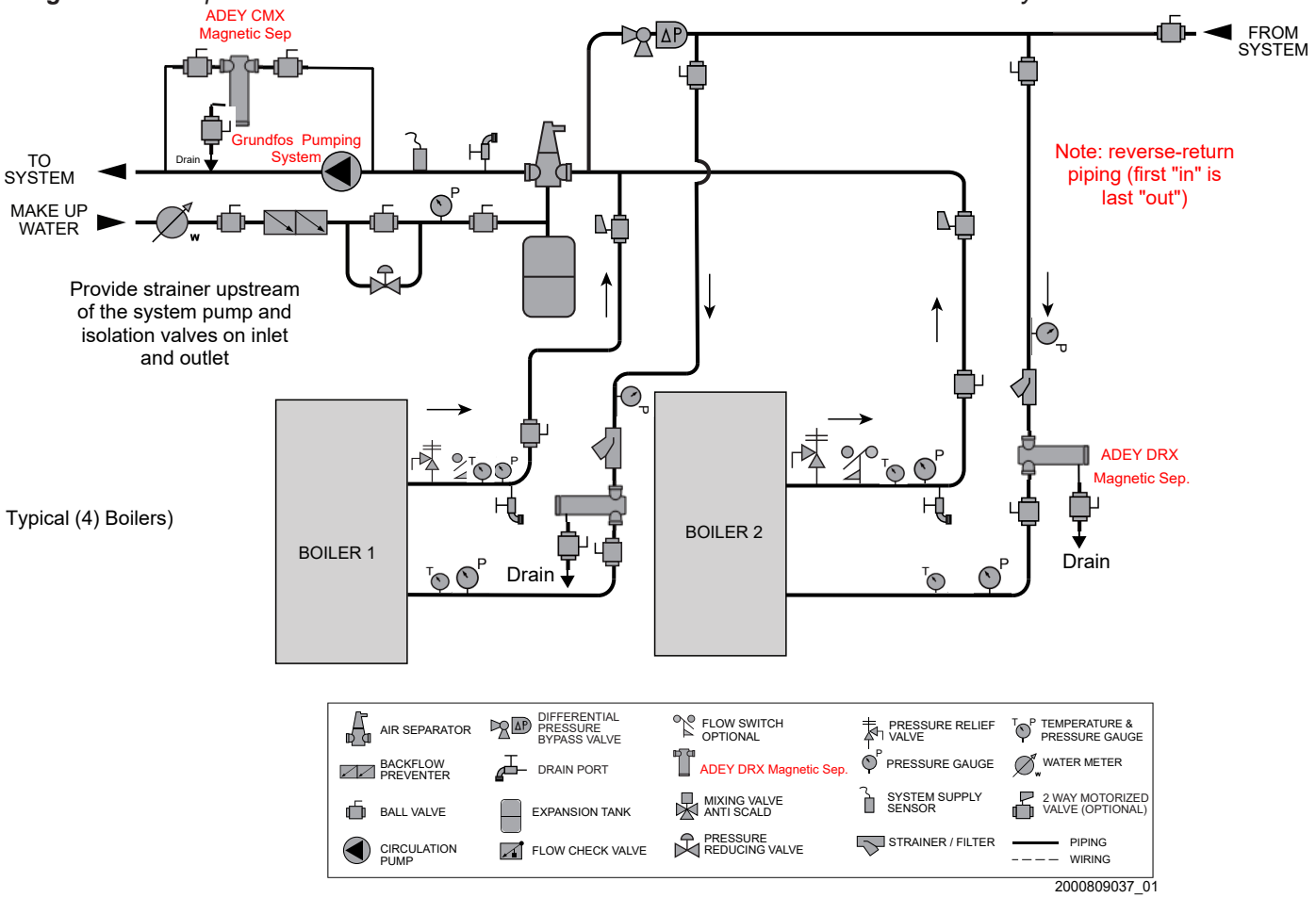
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5 Hydronic piping

For Park Hill High School

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.

4 CABINET UNIT HEATER SCHED.

UNIT NO.	TRANE MODEL NO.	MBH	GPM	P.D.	CFM
1	N48A018	108	8.00	5.11'	1610
2	N46A004	35.9	1.87	1.74	405
3	N46A004	39.4	2.65	2.16	405

NOTE: CAPACITIES BASED ON 200° ENT. AND 80° ENT. AIR TEMPERATURE.

3 PARTIAL FLOOR PLAN - BASE BID
SCALE: 1/8"=1'-0"

1 LOWER LEVEL FLOOR PLAN
SCALE: 1/8"=1'-0"

NORTH

2 CONDENSATE PUMP PIPING
NOT TO SCALE

NOTE: ALL PIPING PENETRATING SHAFT & HORIZ. WALL SHALL HAVE SUITABLE SEAL ON BOTH SIDES OF EACH SLEEVE.

NOTES FOR FLOOR PLAN

1. RE: SM2 FOR WORK UNDER BASE BID. UNDER ALTERNATE #10 CONNECT NEW EXHAUST DUCTWORK AS SHOWN.
2. RELOCATED CABINET UNIT HEATER. CONNECT ABOVE CEILING AS SHOWN. 3.0 GPM, 0.1' P.D. 28.8 MBH, 730 CFM. PROVIDE NEW ELECTRIC THERMOSTAT ON HEATING CABINET.
3. 1¼" H & CW & 1¼ TEMPERED WATER DOWN TO TEMPERING VALVE.
4. CONNECT NEW 3½ LPS TO EXISTING 3½" LPS. PITCH LINE AT 1" /20 FEET.

Drawings Shown - Field Changes

CONTRACTOR SHALL CHECK DIMENSIONS FROM ARCHITECTURAL DRAWINGS AND VERIFY THOSE DIMENSIONS AT SITE. THIS DRAWING IS NOT TO BE SCALED FOR EXACT MEASUREMENTS OR TO BE USED IN ANY MANNER AS A SHOP DRAWING.

S. H. EISMAN NUMBER E-6438 REGISTERED PROFESSIONAL ENGINEER — STATE OF MISSOURI

ASSOCIATED ENGINEERING CONSULTANTS INCORPORATED

ASC # 77162

Date: APR. 24, 1978
Project 76-04

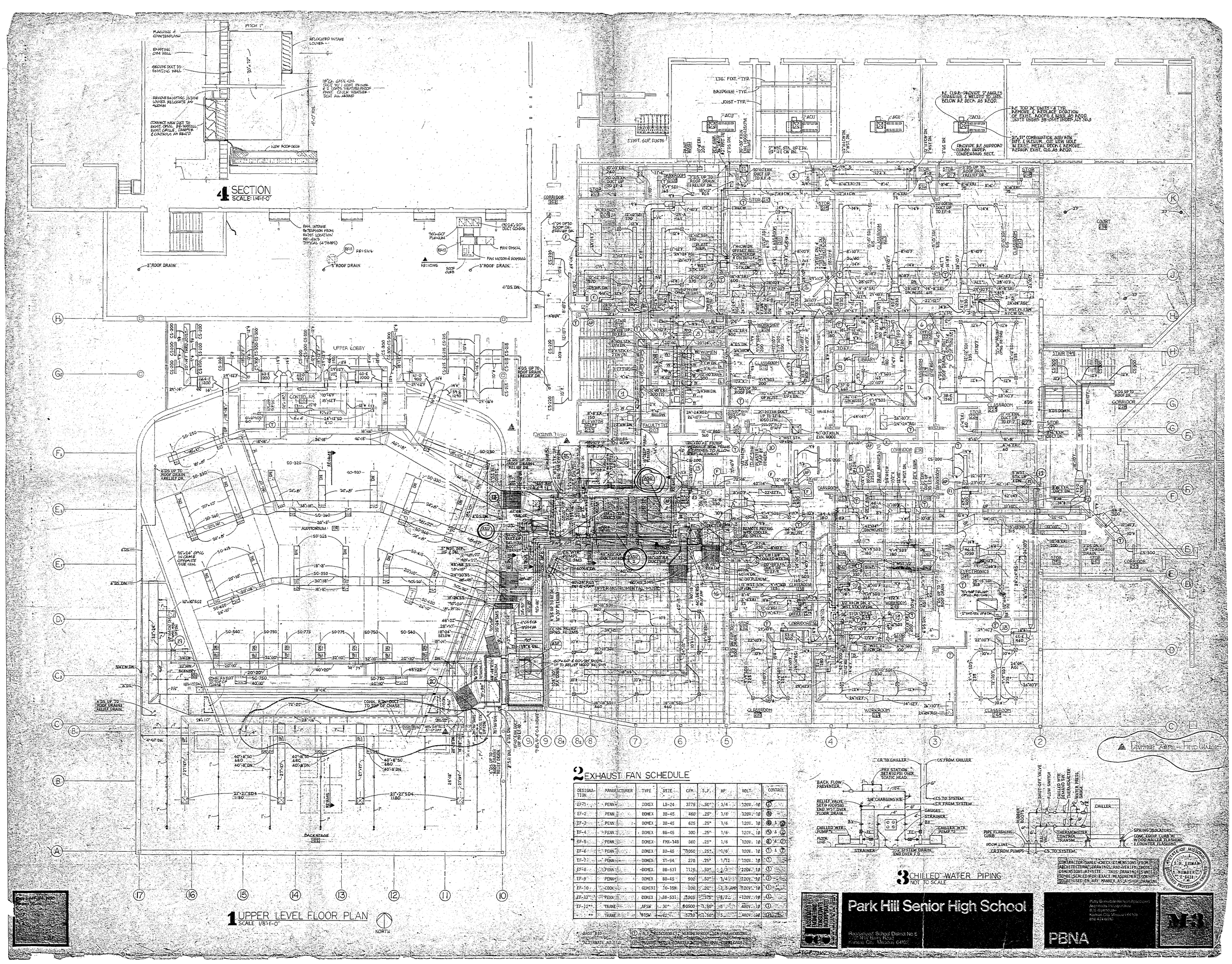
Park Hill Senior High School

Reorganized School District No. 5
7701 N.W. Barry Road
Kansas City, Missouri 64152

Patty Berkebile Nelson Associates Architects Incorporated
825 Wyandotte
Kansas City, Missouri 64105
816 474 6910

PBNA

M 2


4 SECTION
SCALE: 1/4"=1'-0"
1 UPPER LEVEL FLOOR PLAN
SCALE 1/8"=1'-0"
NORTH
UPPER LOBBY
AUDITORIUM
UPPER INSTRUMENTAL MUSIC
WORKSHOP
LIBRARY
CLASSROOM
CORRIDOR
COURT
STAIR
ELECTRONICS
BACK STAGE
CONTROL RM.
FACULTY TH.
ELEVATOR
FLASHING & COUNTERFLASHING
EXISTING CMU WALL
SECURE DUCT TO EXISTING WALL
REMOVE EXISTING INTAKE LOUVER RELOCATE AS SHOWN
CONNECT NEW DUCT TO EXIST. OPNG. RE-INSTALL EXIST. GRILLE, DAMPER & CONTROLS AS REQ'D
NEW ROOF DECK
RELOCATED INTAKE LOUVER
18"GA. GALV. SH. DUCT W/ 1 COAT PRIMER & 2 COATS WEATHERPROOF PAINT. CAULK WEATHER-TIGHT ALL AROUND
EXH. INTAKE EXTENSION FROM EXIST. LOCATION RE-USE TYPICAL (4 TIMES)
3" ROOF DRAIN
RF-1 OMS
RF-2 OMS
FAN DISCH.
FAN MOTOR & HOUSING
ROOF CURB
EXIST. SUP. DUCTS
LTG. FIXT. - TYP.
BRIDGING - TYP.
JOIST - TYP.
A.F. CURB - PROVIDE 2" ANGLES SPANNING 2 WELDED TO JSTS. BELOW A.F. DECK AS REQ'D.
A.F. TOP AC UNITS - A TYP. REMOVE & REPLACE PORTION OF EXIST. ROOFG & INSUL AS REQ'D. UNITS UNDER 3'0" CENTER UNDER ACT 16'-5
PROVIDE A.F. SUPPORT CURBS UNDER CONDENSING SECT.
21"x21" COMBINATION SUP/RTN DUFF. & PLENUM. CUT NEW HOLE IN EXIST. METAL DECK & REMOVE & REPAIR EXIST. CLG. AS REQ'D.
EXHAUST FAN SCHEDULE
DESIGNATION | MANUFACTURER | TYPE | SIZE | CFM | S.P. | HP | VOLT. | CONTROL
EF-1 | PENN | DOMEX | LB-24 | 3775 | .50" | 3/4 | 120V. 1Ø | ①
EF-2 | PENN | DOMEX | BB-45 | 460 | .25" | 1/6 | 120V. 1Ø | ①
EF-3 | PENN | DOMEX | BB-45 | 625 | .25" | 1/6 | 120V. 1Ø | ① & ③
EF-4 | PENN | DOMEX | BB-45 | 300 | .25" | 1/6 | 120V. 1Ø | ① & ③
EF-5 | PENN | DOMEX | FMX-148 | 360 | .25" | 1/6 | 120V. 1Ø | ① & ②
EF-6 | PENN | DOMEX | BB-45 | 1050 | .25" | 1/6 | 120V. 1Ø | ① & ③
EF-7 | PENN | DOMEX | XT-94 | 270 | .25" | 1/12 | 120V. 1Ø | ①
EF-8 | PENN | DOMEX | BB-531 | 1175 | .50" | 1/3 | 120V. 1Ø | ①
EF-9 | PENN | DOMEX | BB-45 | 900 | .50" | 1/4 | 120V. 1Ø | ①
EF-10 | COOK | GEMINI | 70-15N | 200 | .20" | 1.5 AMP | 120V. 1Ø | ①
EF-11* | PENN | DOMEX | BB-531 | 1905 | .375" | 3/12 | 120V. 1Ø | ①
EF-12** | TRANE | AFSW | 30" | 10500 | 1.50" | 5 | 480V. 3Ø | ①
** | TRANE | B1SW | 22" | 5710 | 1.50" | 5 | 480V. 3Ø | ①
* BASE BID
** ALTERNATE NO. 3
① A.T. DISCONNECT - WEATHERPROOF - IN FAN HOUSING
② MAGNETIC MOTOR STARTER WITH THERMAL OVERLOADS
CR TO CHILLER
CS FROM CHILLER
PRV STATION SET @ 10 PSI OVER STATIC HEAD
BACK FLOW PREVENTER
3/4" CHARGING HR.
CS TO SYSTEM
CR FROM SYSTEM
RELIEF VALVE SET @ 100 PSI END WST. OVER FLOOR DRAIN
GAUGES
STRAINER
CHILLED WTR. PUMP #1
CHILLER W/TK PUMP #2
FLOOR LINE
1/2" SYSTEM DRAIN END OVER F.D.
STRAINER
SHUT-OFF VALVE
FLOW SWITCH
CHILLED WTR. SUPPLY
THERMOMETER
WATER PRESS. GAUGE
CHILLER
RUBBER PAD
BALL VALVE
THERMOMETER CONTROL TRANSM.
SPRING ISOLATORS
CONC. CURB W/ WOOD NAILER FLASHING & COUNTER FLASHING
PIPE FLASHING CURB
ROOF LINE
CR FROM PUMPS
CS TO SYSTEM
2 EXISTING EQUIPMENT TO BE REMOVED
3 CHILLED WATER PIPING
NOT TO SCALE
CONTRACTOR SHALL CHECK DIMENSIONS FROM ARCHITECTURAL DRAWINGS AND VERIFY ALL MISC. DIMENSIONS AT SITE. THIS DRAWING IS NOT TO BE SCALED FOR EXACT MEASUREMENTS OR TO BE REUSED IN ANY MANNER AS A SHOP DRAWING
S. H. EISMAN NUMBER E-6428 REGISTERED PROFESSIONAL ENGINEER
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7701 N.W. Barry Road
Kansas City, Missouri 64153
Patty Berkebile Nelson Architects
Architects Incorporated
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Kansas City, Missouri 64105
816 474 6810
PBNA
MB

ASSOCIATED EQUIPMENT SALES

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**

ASSOCIATED EQUIPMENT SALES

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 1)

- 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

Location:

Engineer: NA

Agent/Wholesaler: AES

Contractor:

Type Gas: Natrual Gas

Model #: KHB285N

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 E˜ciency Optimizers
SH Night Setback
DHW Night Setback
Anti-Cycling
Outdoor Air Reset Curve
Ramp Delay
Modulation Factor Control
Boost Temperature & Time

> Four Pump Control
System Pump with Parameter for Continuous Operation
Boiler Pump with Variable Speed Control
Domestic Hot Water Pump
Domestic Hot Water Recirculation

> 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 SYSTEM
DHW Modulation Limiting
Separately Adjustable Space Heat/DHW Switching Times

> Building Management System Integration
0-10 VDC Input to Control Modulation or Setpoint
0-10 VDC Modulation Rate Output
0-10 VDC Input to Enable/Disable Call for Heat

> Access to BMS Settings through Graphic LCD Display

> High-Voltage Terminal Strip
120 VAC / 60 Hertz / 1 Phase Power Supply
Three Sets of Pump Contacts

> Low-Voltage Terminal Strip
DHW Recirculation Pump Start/Stop
24 VAC Device Relay
Configurable Proving Contacts
Flow Switch Contacts
Alarm on Any Failure Contacts
Runtime Contacts
DHW Thermostat Contacts
3 Space Heat Thermostat Contacts
System Sensor Contacts
DHW Tank Sensor Contacts
Outdoor Air Sensor Contacts
Cascade Contacts
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

Standard Features

> 95% DOEAFUE E˜ciency (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 SYSTEMŽ Control

> Condensate Trap

> ECM Variable Speed Boiler Circulating Pump

> 110VConvenience Outlet

> High Altitude Models Available

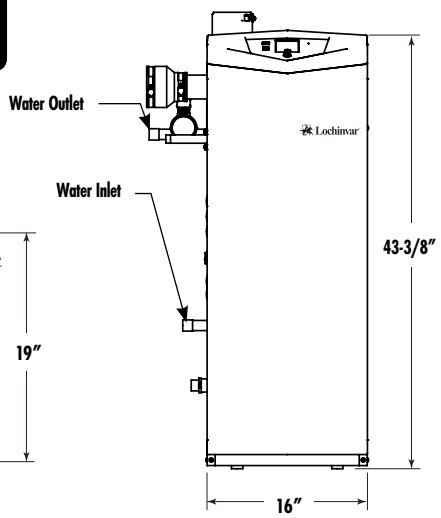
> Other Features
Automatic Reset High Limit
Adjustable High Limit w/Manual Reset
Zero Clearances to Combustible Materials
15-Year Limited Warranty (See Warranty for Details)
5-Year Limited Parts Warranty

Optional Equipment

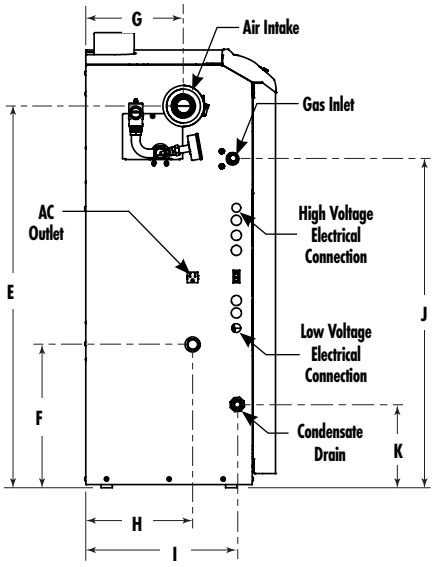
- ☐ CON·X·US Remote Connectivity
- ☐ Modbus Communication
- ☐ BACnet MSTP
- ☐ Flow Switch
- ☐ Low-Water Cutoff w/Manual Reset & Test
- ☐ Alarm Bell
- ☐ Concentric Vent Kit
- ☐ Condensate Neutralization Kit
- ☐ BMS Gateway to LON or BACnet IP
- ☐ Sidewall Vent Termination
- ☐ Wireless Outdoor Sensor
-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

KNIGHT®
FIRE TUBE BOILER

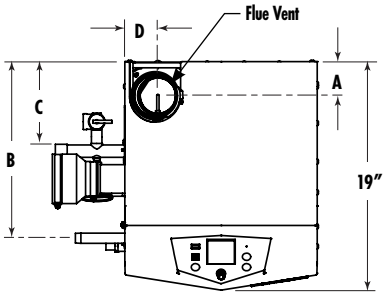
FRONT



LEFT SIDE



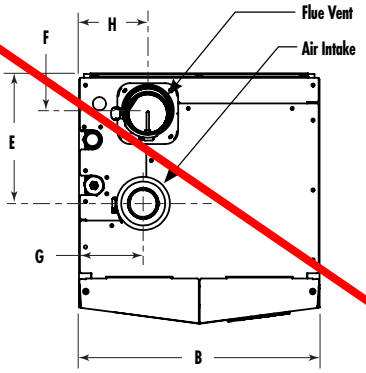
TOP



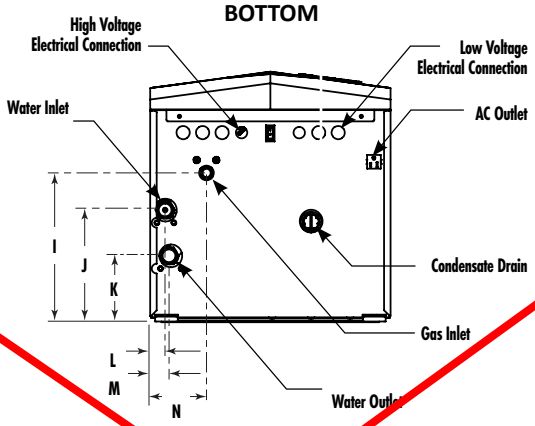
FLOOR MOUNT

	Model Number	Input MBH Min	Input MBH Max	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.)
○	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

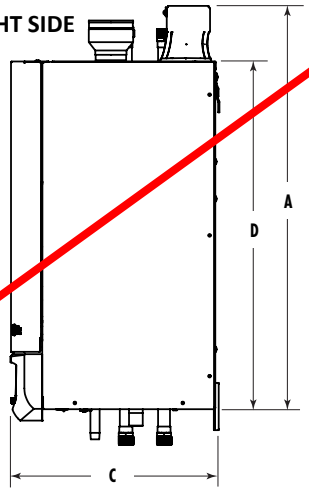
TOP



BOTTOM



RIGHT SIDE



WALL MOUNT

	Model Number	Input MBH Min	Input MBH Max	*Output 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.)
○	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"	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	94.4	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®
HIGH EFFICIENCY BOILERS & WATER HEATERS

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Lebanon, Tennessee 37090
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Lochinvar.com

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KNIGHT® FIRE TUBE BOILER PRODUCT SUMMARY
(KHB) 55,000 - 285,000 BTU/HR

	KHB-055	KHB-085	KHB-110	KHB-155	KHB-199	KHB- 285
WATER						
GALLON CAPACITY	2.3	2.2	3.2	3.2	5.0	4.9
HEATING SURFACE (SQ. FT.)	5.92	8.33	10.00	14.07	15.66	21.60
WATER CONNECTIONS	1"	1"	1"	1"	1-1/4"	1-1/4"
20°F ΔT WATER FLOW (GPM)	5	8	10	15	19	27
HEAD LOSS (FT. OF HD.)	0.27	0.94	1.53	3.50	1.13	2.42
35°F ΔT WATER FLOW (GPM)	3	5	6	9	11	16
HEAD LOSS (FT. OF HD.)	0.10	0.37	0.55	1.45	0.38	0.85
MAX. WORKING PRESSURE (PSI)	80	80	80	80	80	80
# OF RELIEF VALVES	1	1	1	1	1	1
RELIEF VALVE SIZE	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
RELIEF VALVE RATING (MBH)	535	535	535	535	535	535
RELIEF VALVE PRESSURE RATING (PSI)	30	30	30	30	30	30
GAS						
INLET CONNECTION	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
MAX. INLET PRESSURE, NAT	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, NAT	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.
MAX. INLET PRESSURE, LP	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, LP	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.
BTU/HR INPUT	55,000	85,000	110,000	155,000	199,999	285,000
BTU/HR OUTPUT (HIGH FIRE)	52,250	80,750	104,500	147,250	189,999	270,750
BTU/HR OUTPUT (LOW FIRE)	7,790	8,075	10,450	14,725	18,999	27,075
ELECTRICAL (Boiler and Pump Only)						
VOLTAGE/HEATER	120	120	120	120	120	120
VOLTAGE/CONTROL	24	24	24	24	24	24
FLA	1.8	2.1	2.1	2.2	3.3	3.6
MCA	2.3	2.7	2.7	2.8	4.2	4.5
DIMENSIONS						
HEIGHT	43-1/2"	43-1/2"	43-1/2"	43-1/2"	43-1/2"	43-1/2"
WIDTH	16"	16"	16"	16"	16"	16"
DEPTH	19"	19"	19"	19"	19"	19"
SERVICE CLEARANCES						
FRONT	24"	24"	24"	24"	24"	24"
REAR	0"	0"	0"	0"	0"	0"
RIGHT SIDE	0"	0"	0"	0"	0"	0"
LEFT SIDE	24"	24"	24"	24"	24"	24"
TOP	24"	24"	24"	24"	24"	24"
DIRECT VENTING						
SIZE	2"	2"	3"	3"	3"	3"
VENT CATEGORY	IV	IV	IV	IV	IV	IV
VENT MATERIAL	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C

Lochinvar, LLC • 300 Maddox Simpson Pkwy • Lebanon, TN 37090 • 615-889-8900 / Fax: 615-547-1000
www.Lochinvar.com

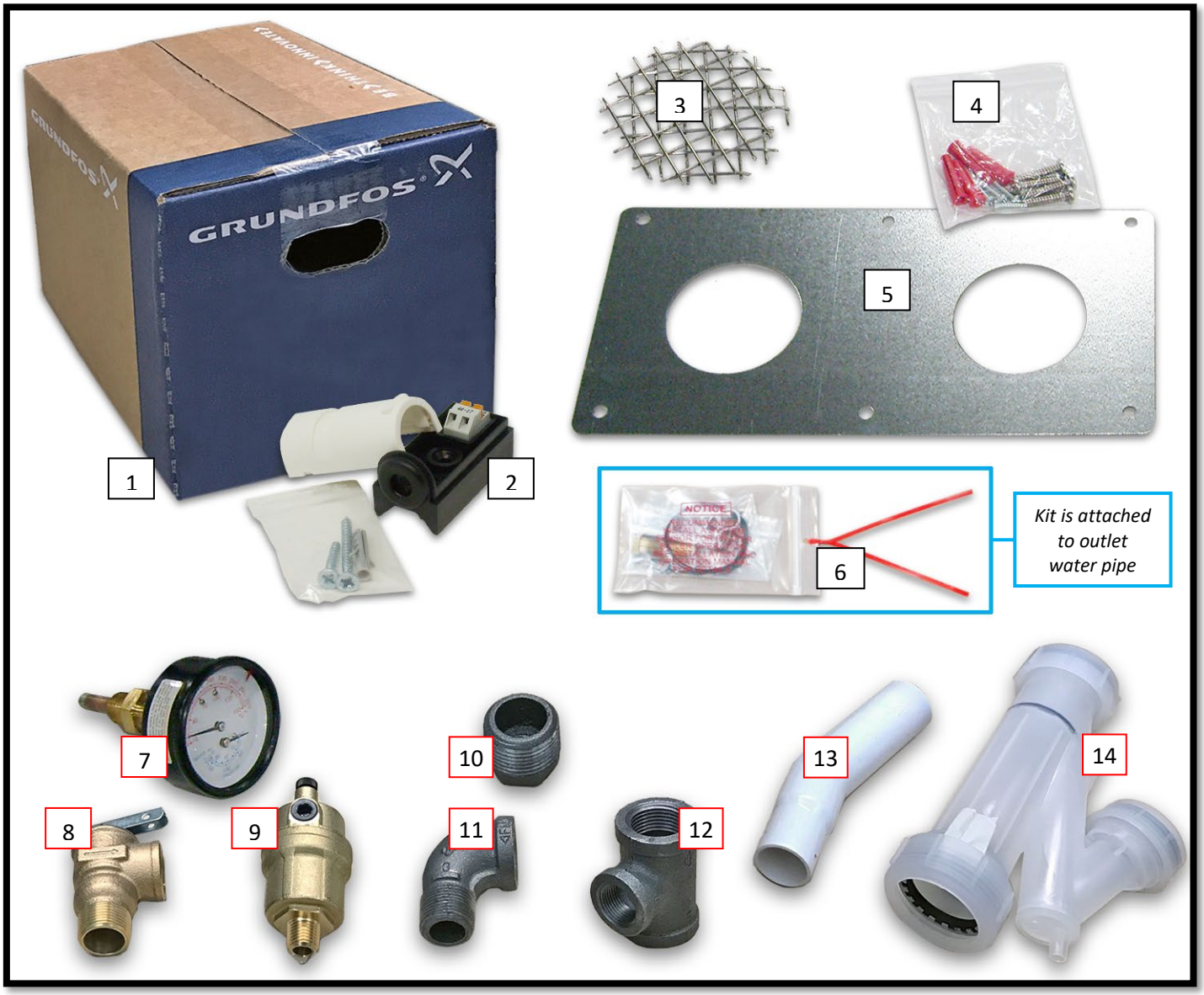
06/18-Printed in U.S.A.

"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

Location: _____

Engineer: _____

Agent/Whls: AES

Contractor: _____

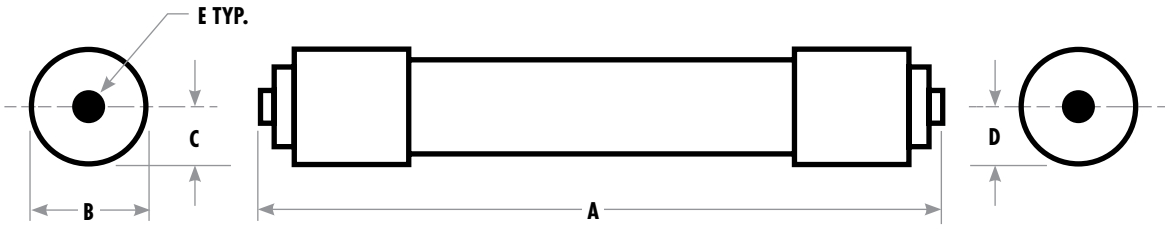
Model No. _____

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

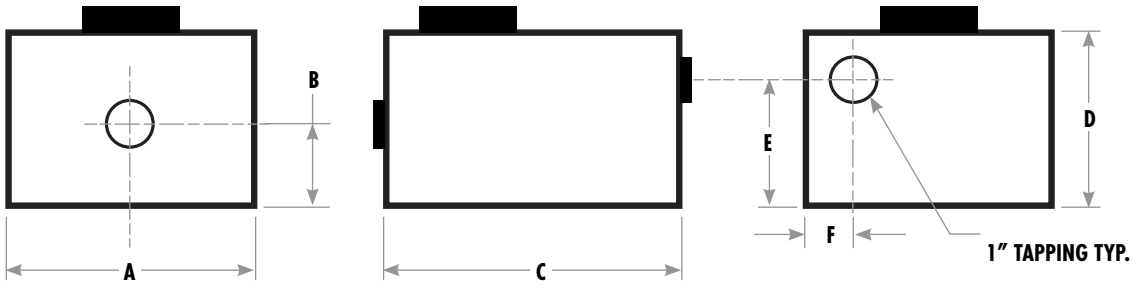
MODEL
CN2-300
CN4-850
CN4-2000



	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
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GRUNDFOS

SUBMITTAL

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

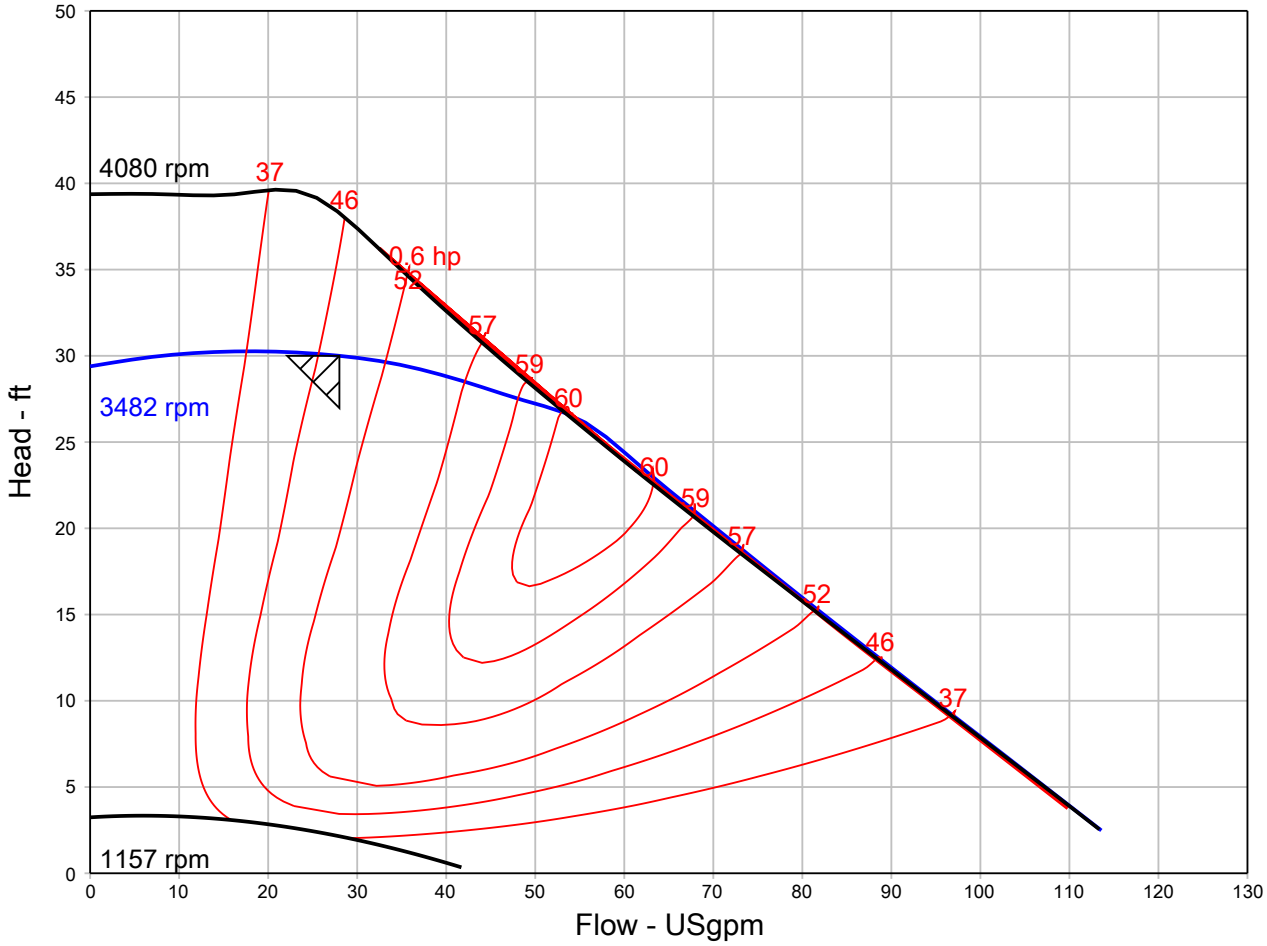
QUOTE NUMBER / ID 2383667	**UNIT TAG 008**	**QUANTITY 1**
	SERVICE	
REPRESENTATIVE	**SUBMITTED BY**	**DATE**
ENGINEER	**APPROVED BY**	**DATE**
CONTRACTOR	**ORDER #**	**DATE**



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				

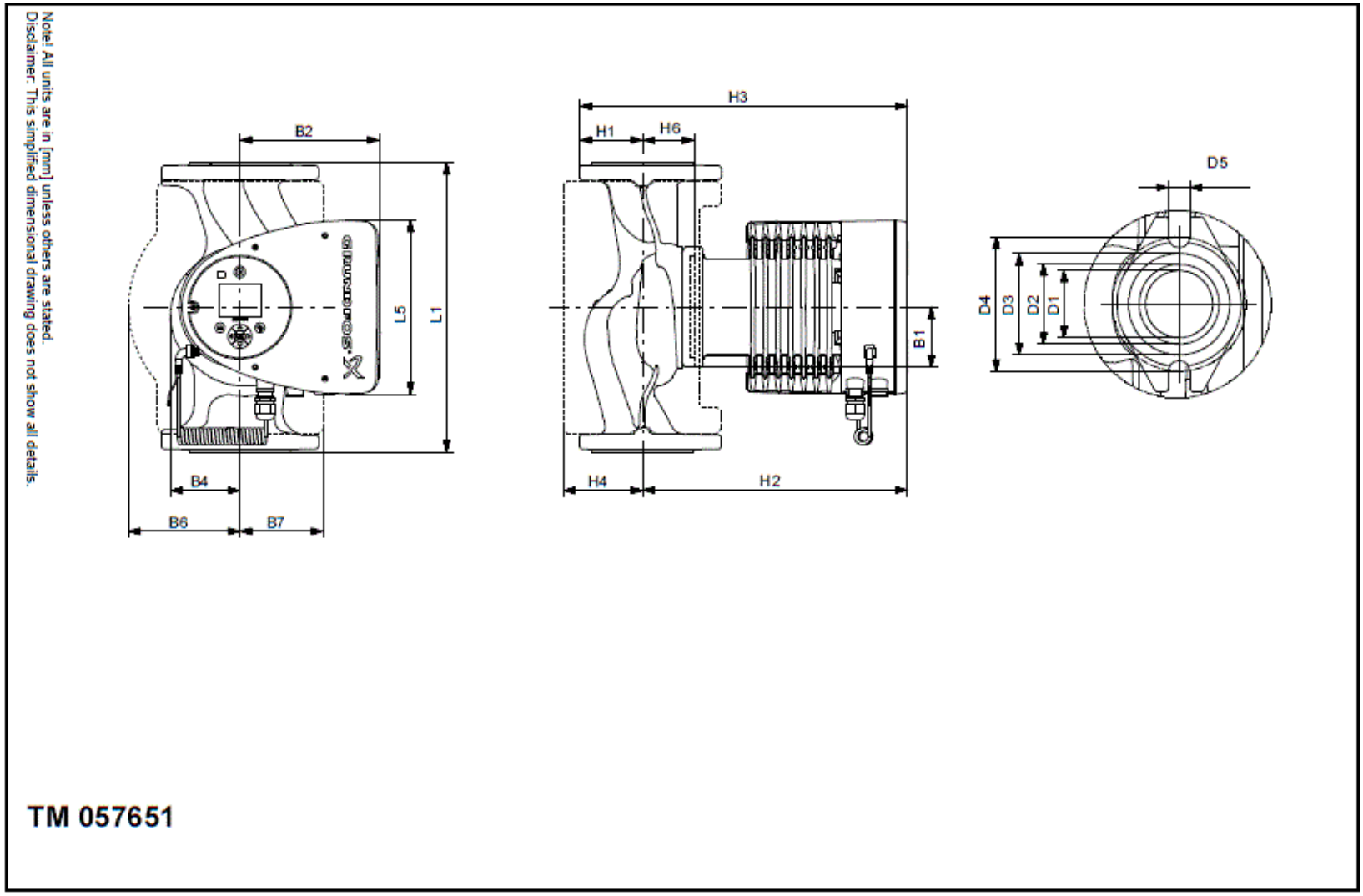


GRUNDFOS

SUBMITTAL

QUOTE NUMBER / ID 2383667 **UNIT TAG 008** **MAGNA3 40-120 GF 115V**

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



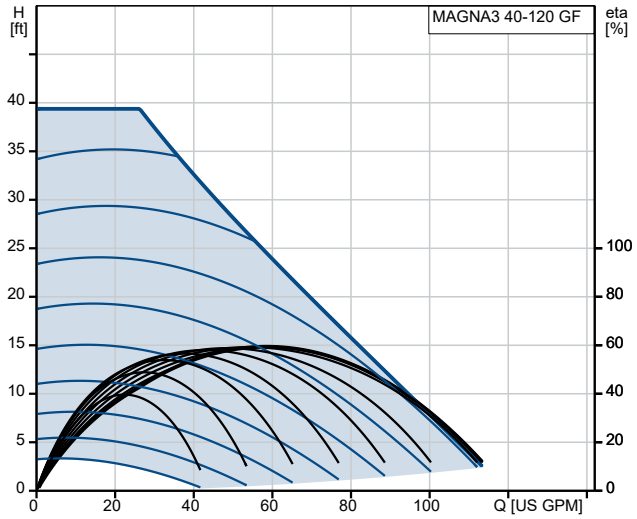
NOT FOR CONSTRUCTION, unless certified and referenced on order

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

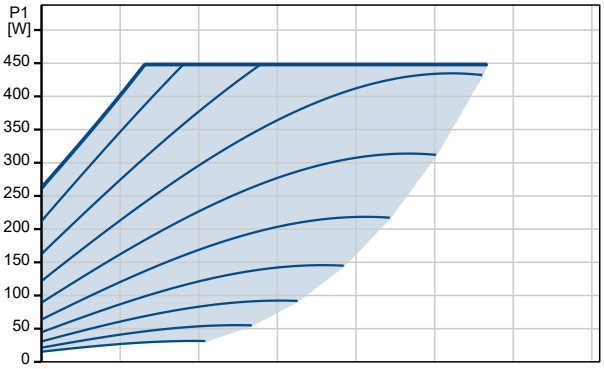
Company name:
Created by:
Phone:

Date: 04/03/2025

Description	Value
General information:	
Product name:	MAGNA3 40-120 GF
Product No:	98126804
EAN number:	5710629499660
Technical:	
Rated flow:	55.5 US GPM
Rated head:	25.59 ft
Maximum head:	39.37 ft
TF class:	110
Approvals:	cETLus, Proposition 65
Model:	E
Materials:	
Pump housing:	Cast iron
	EN 1561 EN-GJL-250
	ASTM A48-250B
Impeller:	Composite
Installation:	
Range of ambient temperature:	32 .. 104 °F
Maximum operating pressure:	174.05 psi
Flange standard:	GF
Pipe connection:	GF15/26/40/43
Pressure rating for connection:	PN 12
Port-to-port length:	8 9/16 in
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	14 .. 230 °F
Selected liquid temperature:	140 °F
Density:	61.35 lb/ft³
Electrical data:	
Maximum power input - P1:	448 W
P1 min.:	16 W
Mains frequency:	60 Hz
Rated voltage:	1 x 115 V
Minimum current consumption:	0.26 A
Maximum current consumption:	3.96 A
Maximum speed:	4080 rpm
Enclosure class (IEC 34-5):	X4D
Insulation class (IEC 85):	F
Others:	
Energy (EEI):	0.19
Net weight:	32.2 lb
Gross weight:	35.5 lb
Shipping volume:	1.06 ft³
Country of origin:	US
Custom tariff no.:	8413.70.2005



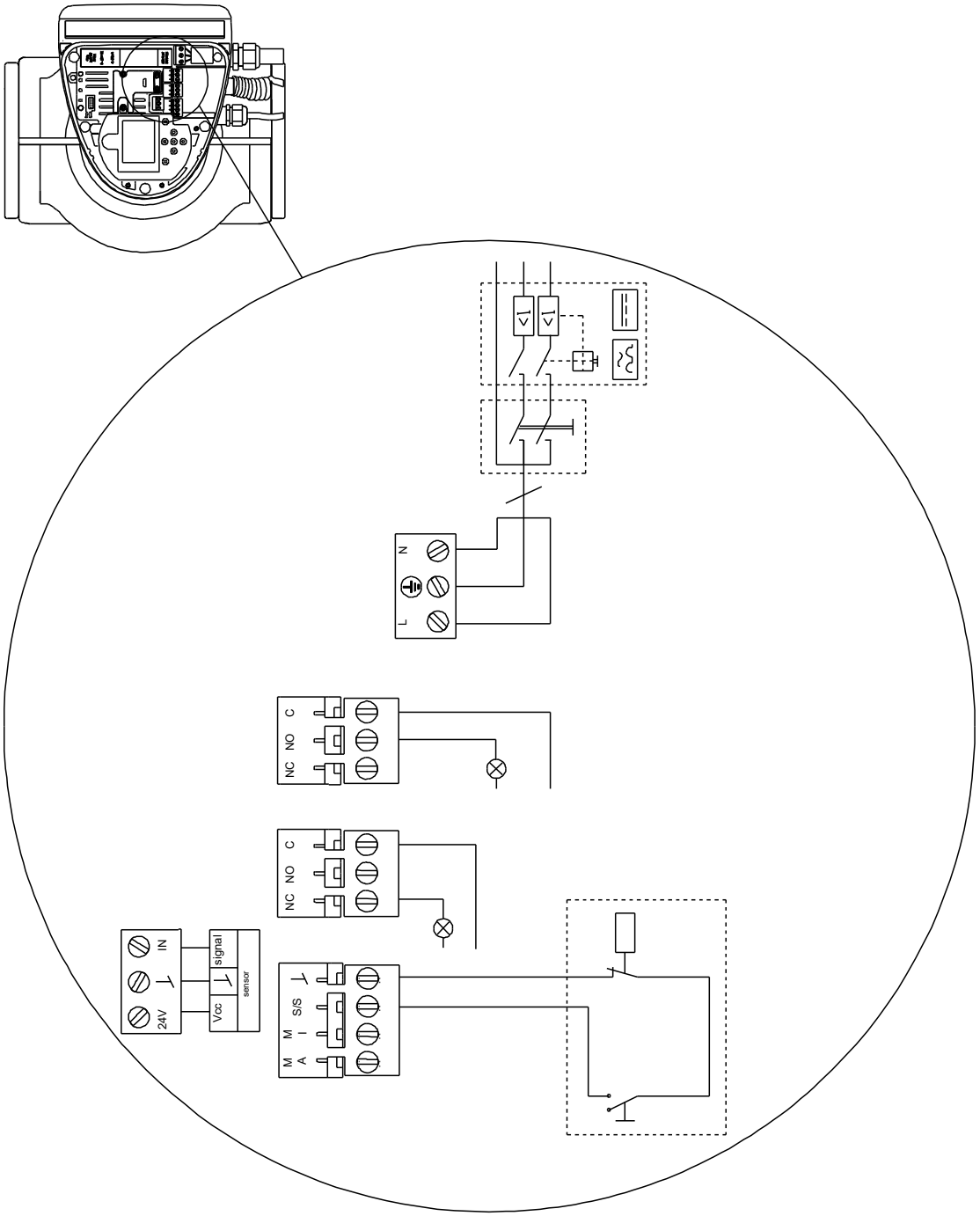
Pumped liquid = Water
Liquid temperature during operation = 140 °F
Density = 61.35 lb/ft³



Company name:
Created by:
Phone:

Date: 04/03/2025

98126804 MAGNA3 40-120 GF 60 Hz



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

Pietro Fiorentini

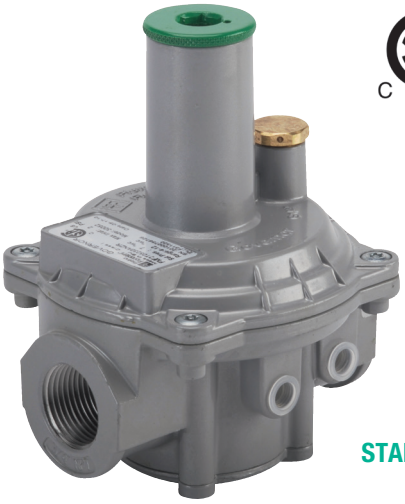


GOVERNOR & PF400

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: ½” - 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

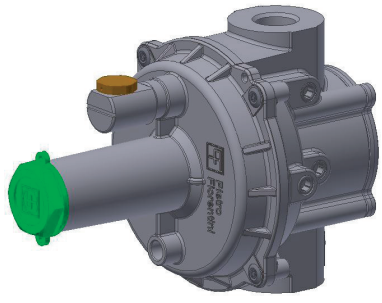
GOVERNOR STANDARD MODEL

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

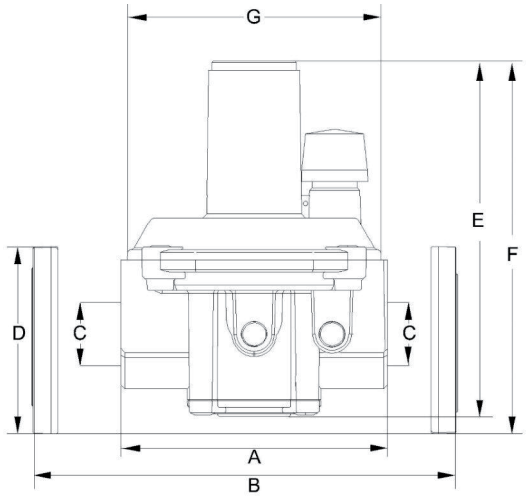
	Outlet Pressure Set Point	Operating Inlet Pressure		
		14" W.C.	1 PSIG	2 PSIG
31051 ½"	8" W.C.	306 (360)	552 (649)	785 (923)
	11" W.C.	218 (256)	511 (601)	788 (927)
31052 ¾"	8" W.C.	369 (450)	665 (812)	946 (1,154)
	11" W.C.	363 (321)	616 (751)	950 (1,158)
31053 1"	8" W.C.	495 (585)	893 (1,055)	1,270 (1,154)
	11" W.C.	353 (417)	826 (977)	1,274 (1,506)
31150 ½" 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 ¾" 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 1¼"	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 1½"	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 2½"	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

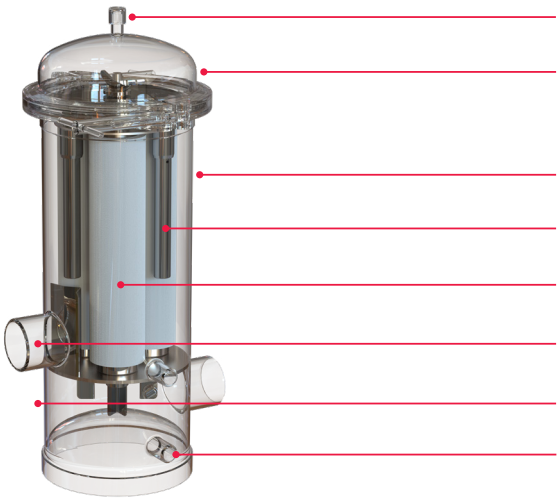
Innovative, adaptive sidestream & inline filtration

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





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

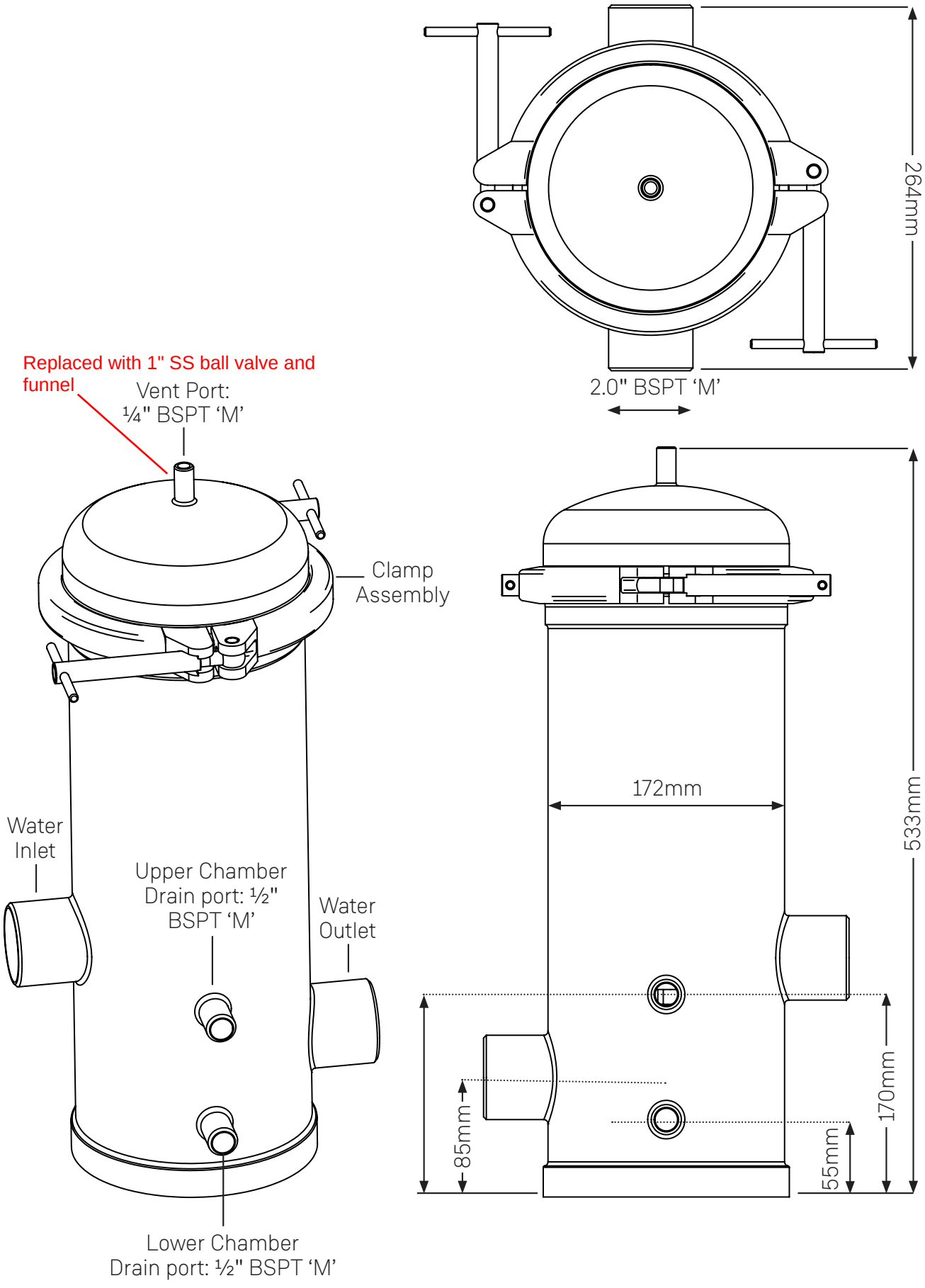
An ADEY system kit is available for the *MagnaClean CMX* Midi filter comprised of three 20-micron cartridge filters, an automatic air vent, magnetite scraper tool and five litres of ADEY's award winning *MC1+ Protector* which passivates and protects bare metal surfaces.



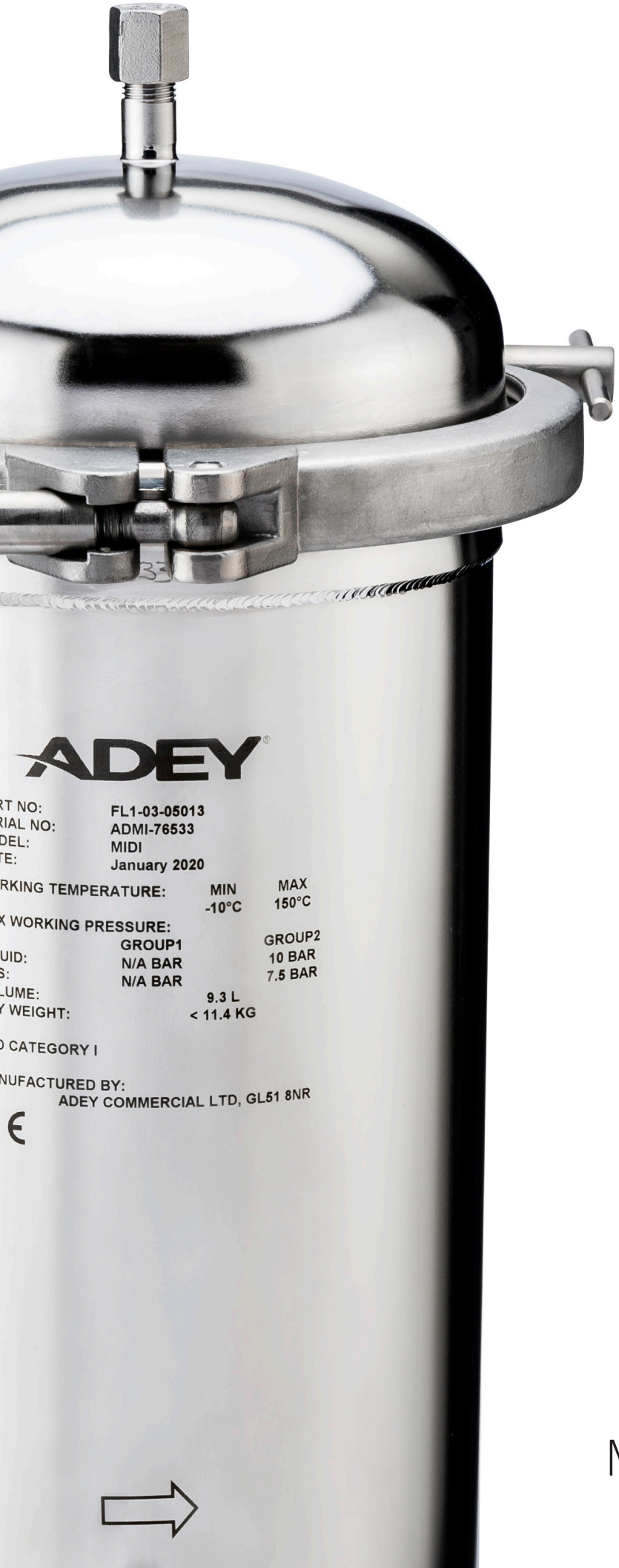




Technical Specification



MagnaClean™
CMX













Midi

Technical Specification

MagnaClean CMX			
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 mechancial 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

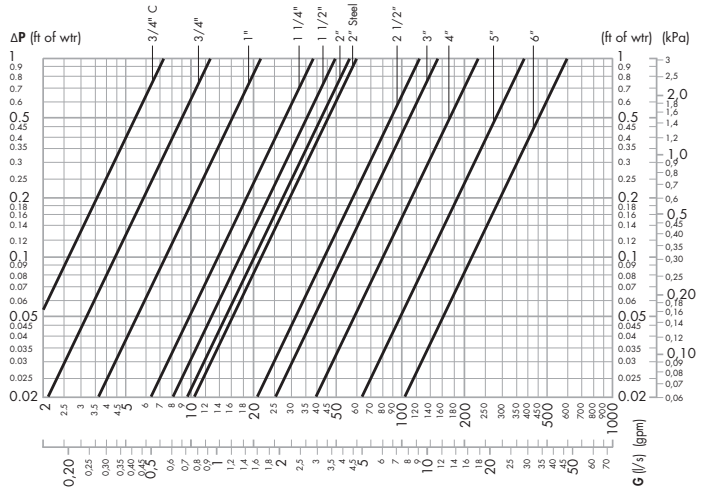
Materials:

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

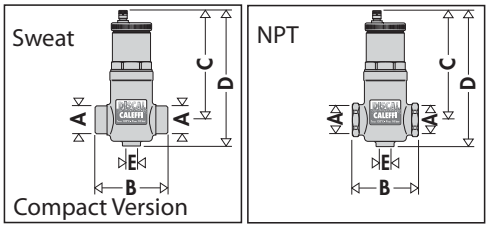
Suitable fluids: water, with up to a 50% glycol solution
Max working pressure: 150 psi (10 bar)
Temperature range: 32–250°F (0 –120°C)
Connections:

- 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

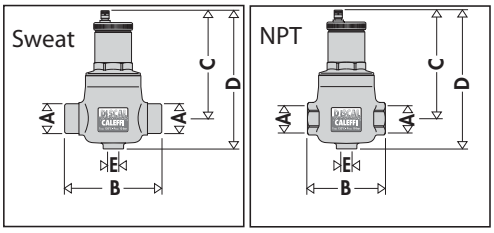
Hydraulic characteristics



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"
Optimal (4.0 f/s)	GPM	6.0	8.0	9.3	15.3	23.9	36.1
	l/s	0.4	0.5	0.6	1.0	1.5	2.3
Max. (10.0 f/s)	GPM	14.3	19.0	22.1	36.4	56.8	86.0
	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

Caleffi North America, Inc. 3883 West Milwaukee Road / Milwaukee, WI 53208
Tel: 414.238.2360 / Fax: 414.238.2366 / www.caleffi.us
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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

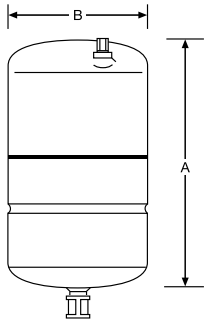
Maximum Operating Temperature	200°F (93°C)
Maximum Working Pressure	150 PSIG (10.3 bar)
Maximum Relief Valve Setting	125 PSIG (8.6 bar)
Warranty	7 Year

Application

• Controls pump cycling in residential well water systems.

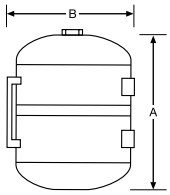
Undergound Models (BLACK)

Model Number	Tank Volume		Max. Acceptance Factor	A Tank Height		B Tank Diameter		System Connection (NPTM)	Shipping Weight	
	Gal	Lit		In	mm	In	mm	In	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



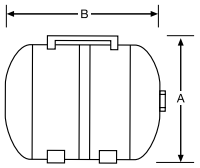
Wall Hung Model for VFD Systems

Model Number	Tank Volume		Max. Acceptance Factor	A Tank Height		B Tank Diameter		System Connection (NPTM)	Shipping Weight	
	Gal	Lit		In	mm	In	mm	In	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	In	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. _____ _____

CERTIFIED TO NSF/ANSI 61

ISO 9001:2008 REGISTERED

MADE IN USA

LOW-LEAD IAPMO R&T

ANTIMICROBIAL PROTECTION

TURBULATOR

Amtrol Inc., 1400 Division Road, West Warwick, RI 02893 USA T: 401.884.6300 **www.amtrol.com**

MC 4400 (01/15)

ASSOCIATED EQUIPMENT SALES

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**

ASSOCIATED EQUIPMENT SALES

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

Location:

Engineer: NA

Agent/Wholesaler: AES

Contractor:

Type Gas: Natrual Gas

Model #: KHB285N

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 E˜ciency Optimizers
SH Night Setback
DHW Night Setback
Anti-Cycling
Outdoor Air Reset Curve
Ramp Delay
Modulation Factor Control
Boost Temperature & Time

> Four Pump Control
System Pump with Parameter for Continuous Operation
Boiler Pump with Variable Speed Control
Domestic Hot Water Pump
Domestic Hot Water Recirculation

> 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 SYSTEM
DHW Modulation Limiting
Separately Adjustable Space Heat/DHW Switching Times

> Building Management System Integration
0-10 VDC Input to Control Modulation or Setpoint
0-10 VDC Modulation Rate Output
0-10 VDC Input to Enable/Disable Call for Heat

> Access to BMS Settings through Graphic LCD Display

> High-Voltage Terminal Strip
120 VAC / 60 Hertz / 1 Phase Power Supply
Three Sets of Pump Contacts

> Low-Voltage Terminal Strip
DHW Recirculation Pump Start/Stop
24 VAC Device Relay
Configurable Proving Contacts
Flow Switch Contacts
Alarm on Any Failure Contacts
Runtime Contacts
DHW Thermostat Contacts
3 Space Heat Thermostat Contacts
System Sensor Contacts
DHW Tank Sensor Contacts
Outdoor Air Sensor Contacts
Cascade Contacts
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

Standard Features

> 95% DOEAFUE E˜ciency (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 SYSTEMŽ Control

> Condensate Trap

> ECM Variable Speed Boiler Circulating Pump

> 110VConvenience Outlet

> High Altitude Models Available

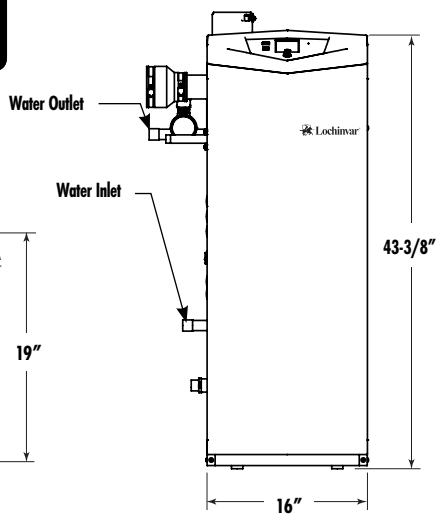
> Other Features
Automatic Reset High Limit
Adjustable High Limit w/Manual Reset
Zero Clearances to Combustible Materials
15-Year Limited Warranty (See Warranty for Details)
5-Year Limited Parts Warranty

Optional Equipment

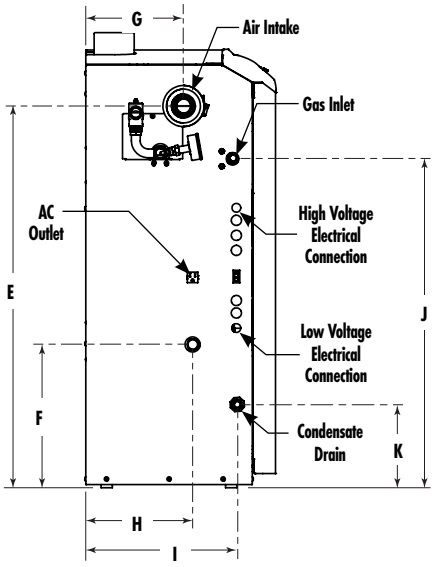
- ☐ CON·X·US Remote Connectivity
- ☐ Modbus Communication
- ☐ BACnet MSTP
- ☐ Flow Switch
- ☐ Low-Water Cutoff w/Manual Reset & Test
- ☐ Alarm Bell
- ☐ Concentric Vent Kit
- ☐ Condensate Neutralization Kit
- ☐ BMS Gateway to LON or BACnet IP
- ☐ Sidewall Vent Termination
- ☐ Wireless Outdoor Sensor
-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

KNIGHT®
FIRE TUBE BOILER

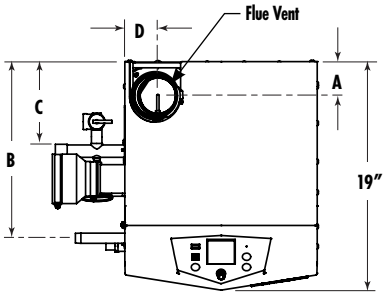
FRONT



LEFT SIDE



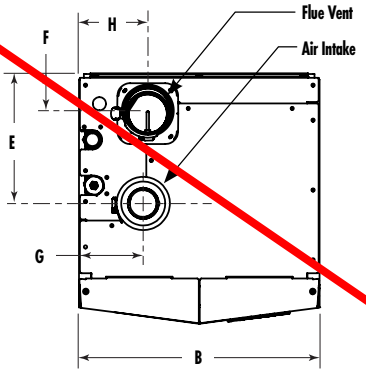
TOP



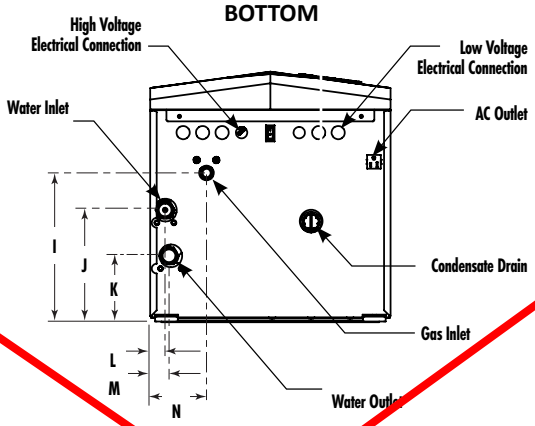
FLOOR MOUNT

	Model Number	Input MBH Min	Input MBH Max	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.)
○	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

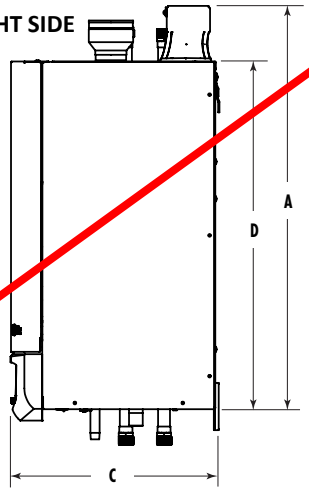
TOP



BOTTOM



RIGHT SIDE



WALL MOUNT

	Model Number	Input MBH Min	Input MBH Max	*Output 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.)
○	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"	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	94.4	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®
HIGH EFFICIENCY BOILERS & WATER HEATERS

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

2/22—Printed in U.S.A.

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HIGH EFFICIENCY BOILERS & WATER HEATERS

KNIGHT® FIRE TUBE BOILER PRODUCT SUMMARY
(KHB) 55,000 - 285,000 BTU/HR

	KHB-055	KHB-085	KHB-110	KHB-155	KHB-199	KHB- 285
WATER						
GALLON CAPACITY	2.3	2.2	3.2	3.2	5.0	4.9
HEATING SURFACE (SQ. FT.)	5.92	8.33	10.00	14.07	15.66	21.60
WATER CONNECTIONS	1"	1"	1"	1"	1-1/4"	1-1/4"
20°F ΔT WATER FLOW (GPM)	5	8	10	15	19	27
HEAD LOSS (FT. OF HD.)	0.27	0.94	1.53	3.50	1.13	2.42
35°F ΔT WATER FLOW (GPM)	3	5	6	9	11	16
HEAD LOSS (FT. OF HD.)	0.10	0.37	0.55	1.45	0.38	0.85
MAX. WORKING PRESSURE (PSI)	80	80	80	80	80	80
# OF RELIEF VALVES	1	1	1	1	1	1
RELIEF VALVE SIZE	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
RELIEF VALVE RATING (MBH)	535	535	535	535	535	535
RELIEF VALVE PRESSURE RATING (PSI)	30	30	30	30	30	30
GAS						
INLET CONNECTION	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
MAX. INLET PRESSURE, NAT	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, NAT	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.
MAX. INLET PRESSURE, LP	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, LP	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.
BTU/HR INPUT	55,000	85,000	110,000	155,000	199,999	285,000
BTU/HR OUTPUT (HIGH FIRE)	52,250	80,750	104,500	147,250	189,999	270,750
BTU/HR OUTPUT (LOW FIRE)	7,790	8,075	10,450	14,725	18,999	27,075
ELECTRICAL (Boiler and Pump Only)						
VOLTAGE/HEATER	120	120	120	120	120	120
VOLTAGE/CONTROL	24	24	24	24	24	24
FLA	1.8	2.1	2.1	2.2	3.3	3.6
MCA	2.3	2.7	2.7	2.8	4.2	4.5
DIMENSIONS						
HEIGHT	43-1/2"	43-1/2"	43-1/2"	43-1/2"	43-1/2"	43-1/2"
WIDTH	16"	16"	16"	16"	16"	16"
DEPTH	19"	19"	19"	19"	19"	19"
SERVICE CLEARANCES						
FRONT	24"	24"	24"	24"	24"	24"
REAR	0"	0"	0"	0"	0"	0"
RIGHT SIDE	0"	0"	0"	0"	0"	0"
LEFT SIDE	24"	24"	24"	24"	24"	24"
TOP	24"	24"	24"	24"	24"	24"
DIRECT VENTING						
SIZE	2"	2"	3"	3"	3"	3"
VENT CATEGORY	IV	IV	IV	IV	IV	IV
VENT MATERIAL	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C	PVC/CPVC/PP/ AL29-4C

Lochinvar, LLC • 300 Maddox Simpson Pkwy • Lebanon, TN 37090 • 615-889-8900 / Fax: 615-547-1000
www.Lochinvar.com

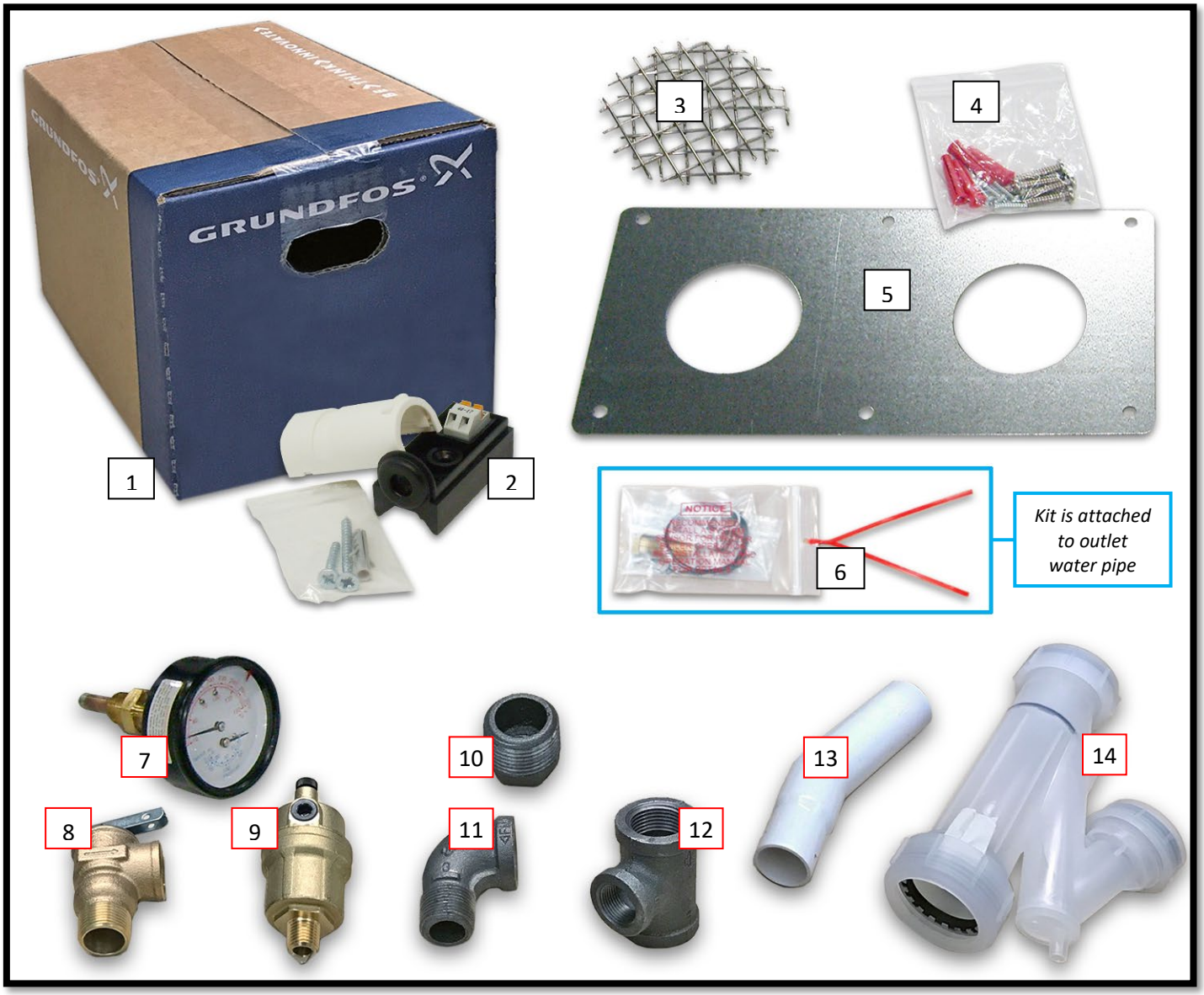
06/18-Printed in U.S.A.

"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

Location: _____

Engineer: _____

Agent/Whls: AES

Contractor: _____

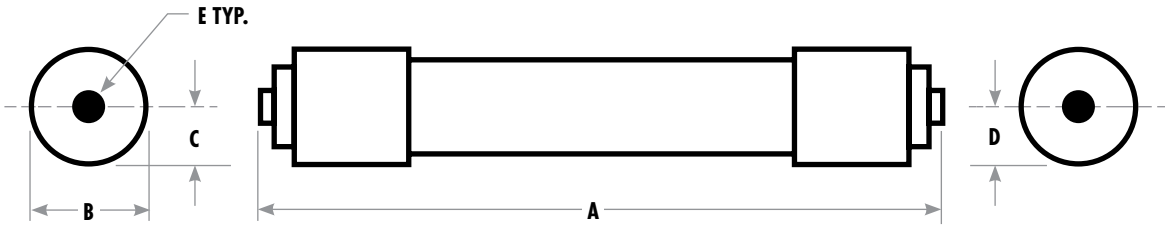
Model No. _____

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

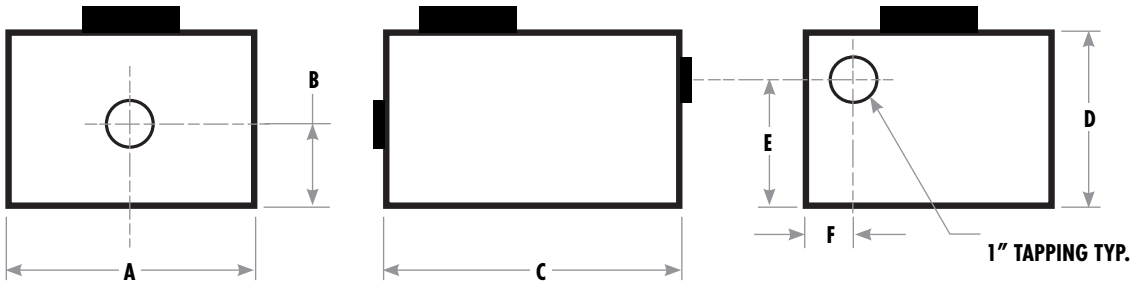
MODEL
CN2-300
CN4-850
CN4-2000



	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
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GRUNDFOS

SUBMITTAL

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

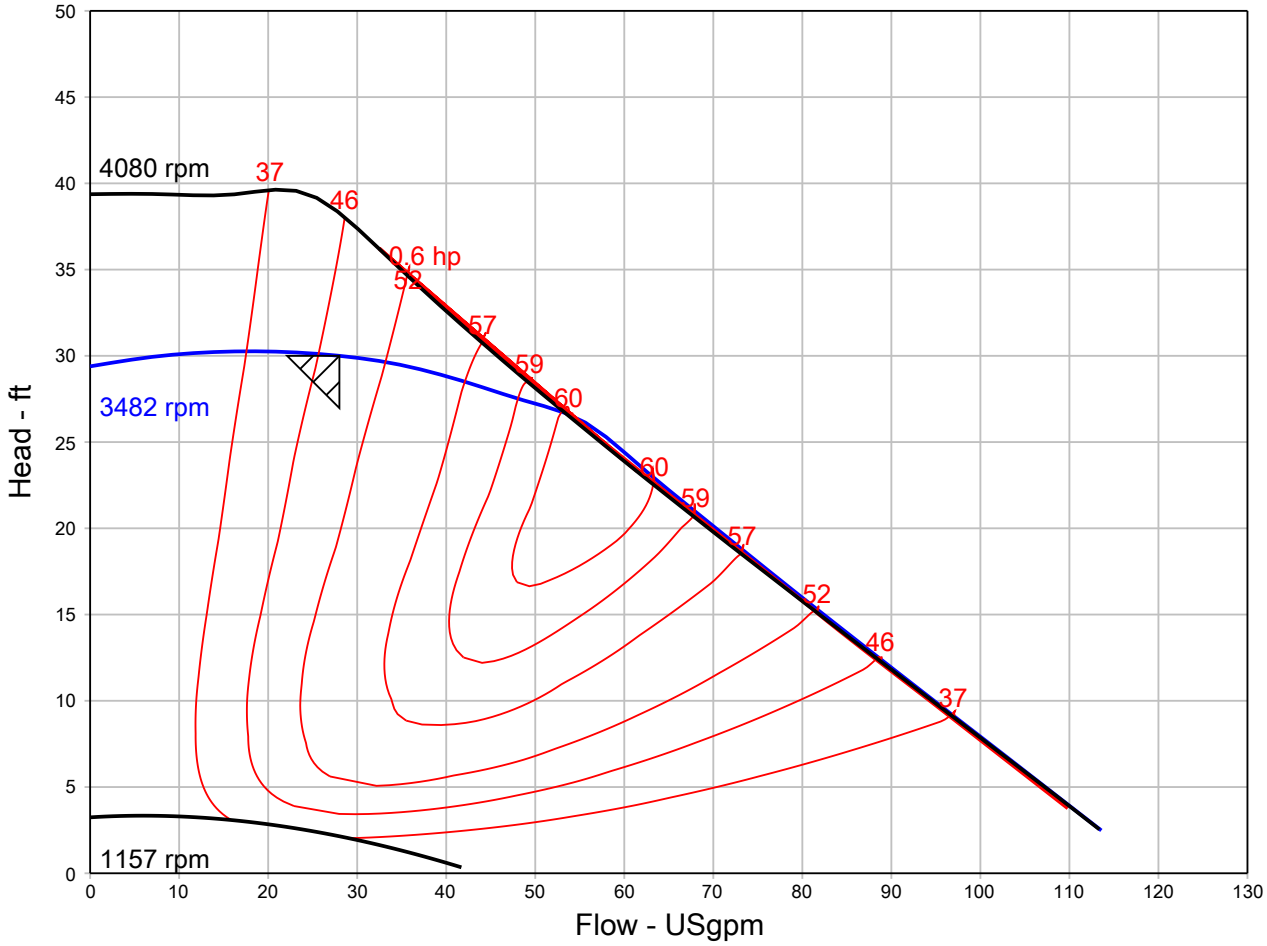
QUOTE NUMBER / ID 2383667	**UNIT TAG 008**	**QUANTITY 1**
	SERVICE	
REPRESENTATIVE	**SUBMITTED BY**	**DATE**
ENGINEER	**APPROVED BY**	**DATE**
CONTRACTOR	**ORDER #**	**DATE**



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				

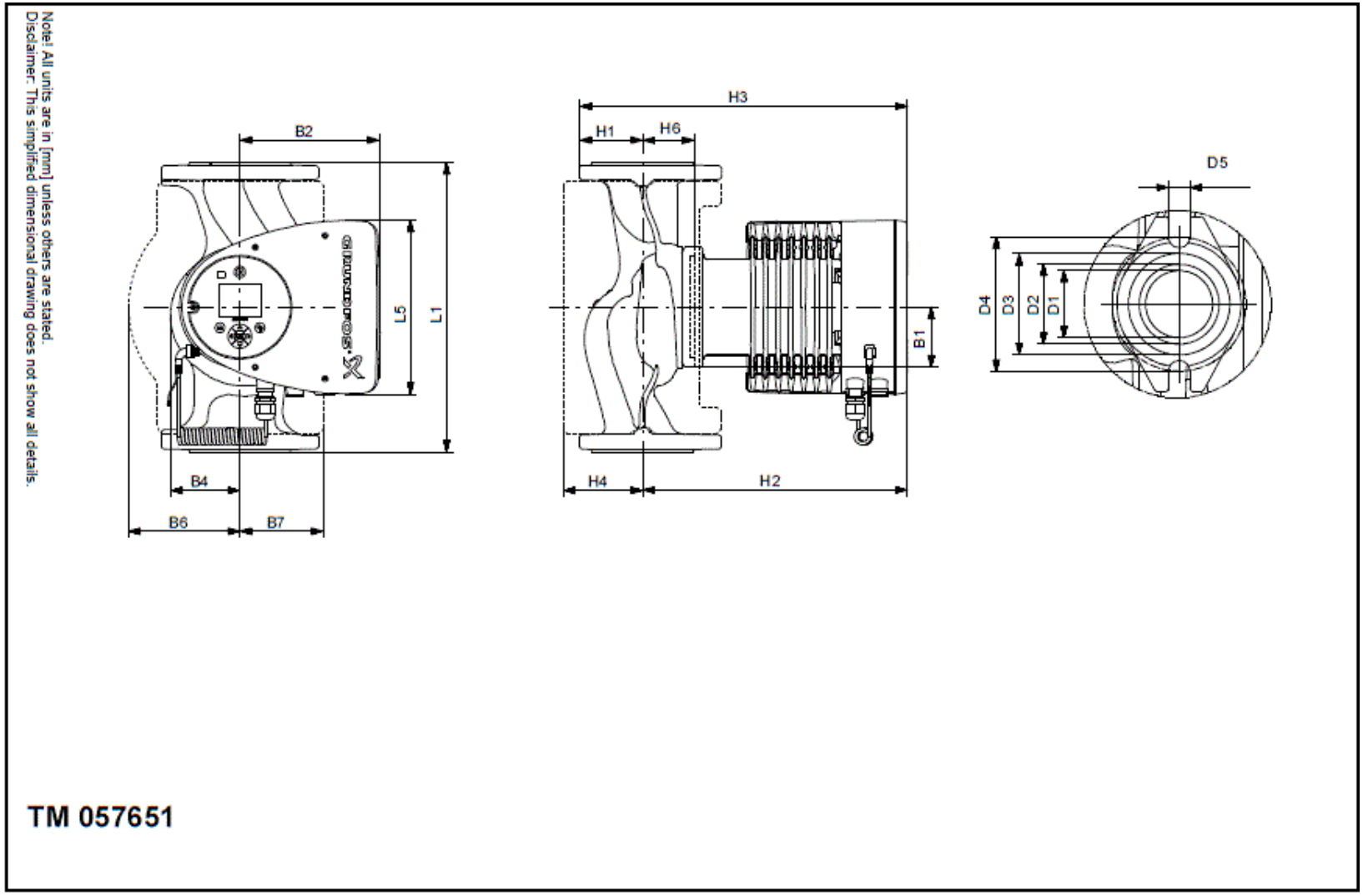


GRUNDFOS

SUBMITTAL

QUOTE NUMBER / ID 2383667 **UNIT TAG 008** **MAGNA3 40-120 GF 115V**

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



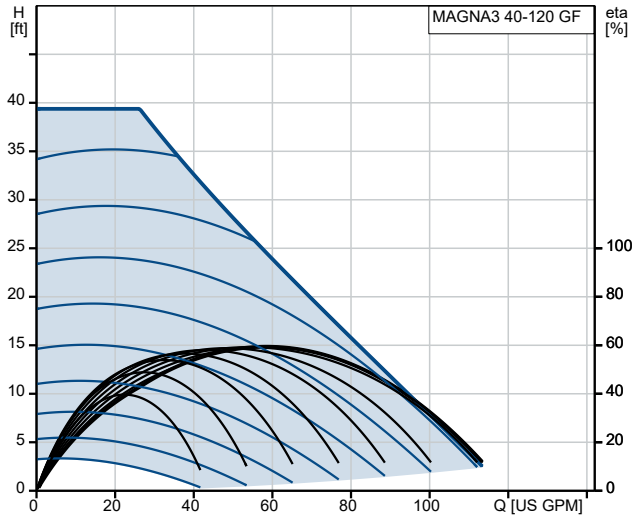
NOT FOR CONSTRUCTION, unless certified and referenced on order

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

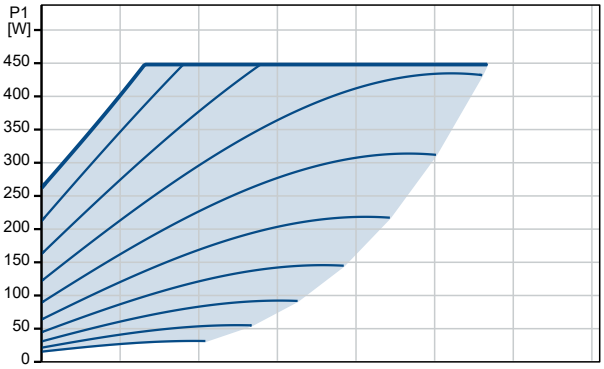
Company name:
Created by:
Phone:

Date: 04/03/2025

Description	Value
General information:	
Product name:	MAGNA3 40-120 GF
Product No:	98126804
EAN number:	5710629499660
Technical:	
Rated flow:	55.5 US GPM
Rated head:	25.59 ft
Maximum head:	39.37 ft
TF class:	110
Approvals:	cETLus, Proposition 65
Model:	E
Materials:	
Pump housing:	Cast iron
	EN 1561 EN-GJL-250
	ASTM A48-250B
Impeller:	Composite
Installation:	
Range of ambient temperature:	32 .. 104 °F
Maximum operating pressure:	174.05 psi
Flange standard:	GF
Pipe connection:	GF15/26/40/43
Pressure rating for connection:	PN 12
Port-to-port length:	8 9/16 in
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	14 .. 230 °F
Selected liquid temperature:	140 °F
Density:	61.35 lb/ft³
Electrical data:	
Maximum power input - P1:	448 W
P1 min.:	16 W
Mains frequency:	60 Hz
Rated voltage:	1 x 115 V
Minimum current consumption:	0.26 A
Maximum current consumption:	3.96 A
Maximum speed:	4080 rpm
Enclosure class (IEC 34-5):	X4D
Insulation class (IEC 85):	F
Others:	
Energy (EEI):	0.19
Net weight:	32.2 lb
Gross weight:	35.5 lb
Shipping volume:	1.06 ft³
Country of origin:	US
Custom tariff no.:	8413.70.2005



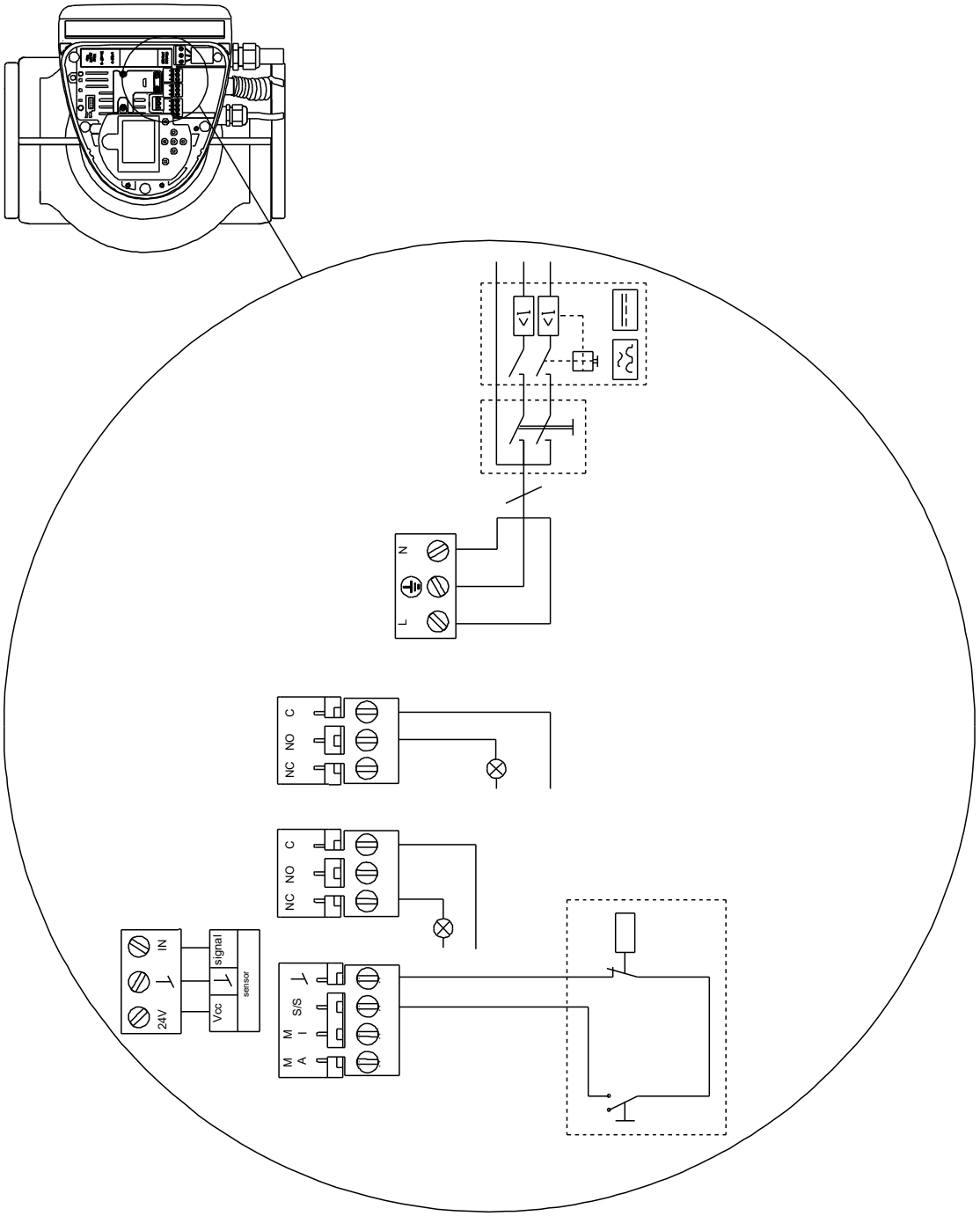
Pumped liquid = Water
Liquid temperature during operation = 140 °F
Density = 61.35 lb/ft³



Company name:
Created by:
Phone:

Date: 04/03/2025

98126804 MAGNA3 40-120 GF 60 Hz



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

Pietro Fiorentini

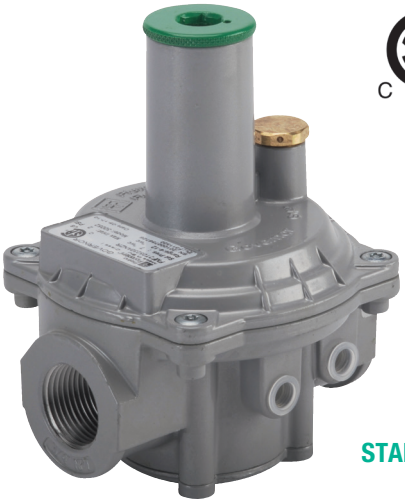


GOVERNOR & PF400

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: ½” - 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

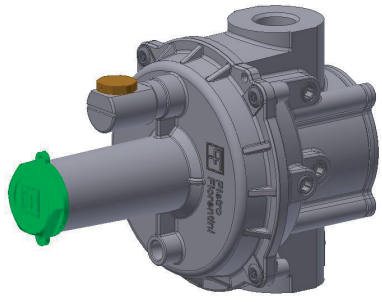
GOVERNOR STANDARD MODEL

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

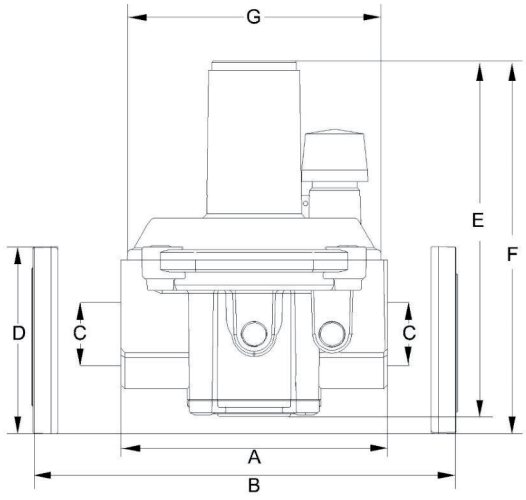
	Outlet Pressure Set Point	Operating Inlet Pressure		
		14" W.C.	1 PSIG	2 PSIG
31051 ½"	8" W.C.	306 (360)	552 (649)	785 (923)
	11" W.C.	218 (256)	511 (601)	788 (927)
31052 ¾"	8" W.C.	369 (450)	665 (812)	946 (1,154)
	11" W.C.	363 (321)	616 (751)	950 (1,158)
31053 1"	8" W.C.	495 (585)	893 (1,055)	1,270 (1,154)
	11" W.C.	353 (417)	826 (977)	1,274 (1,506)
31150 ½" 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 ¾" 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 1¼"	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 1½"	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 2½"	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

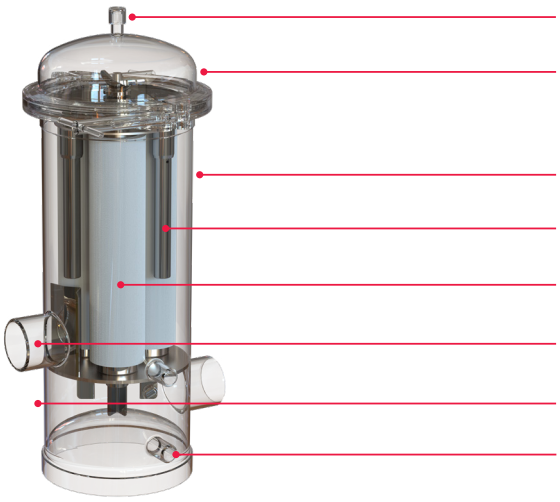
Innovative, adaptive sidestream & inline filtration

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





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

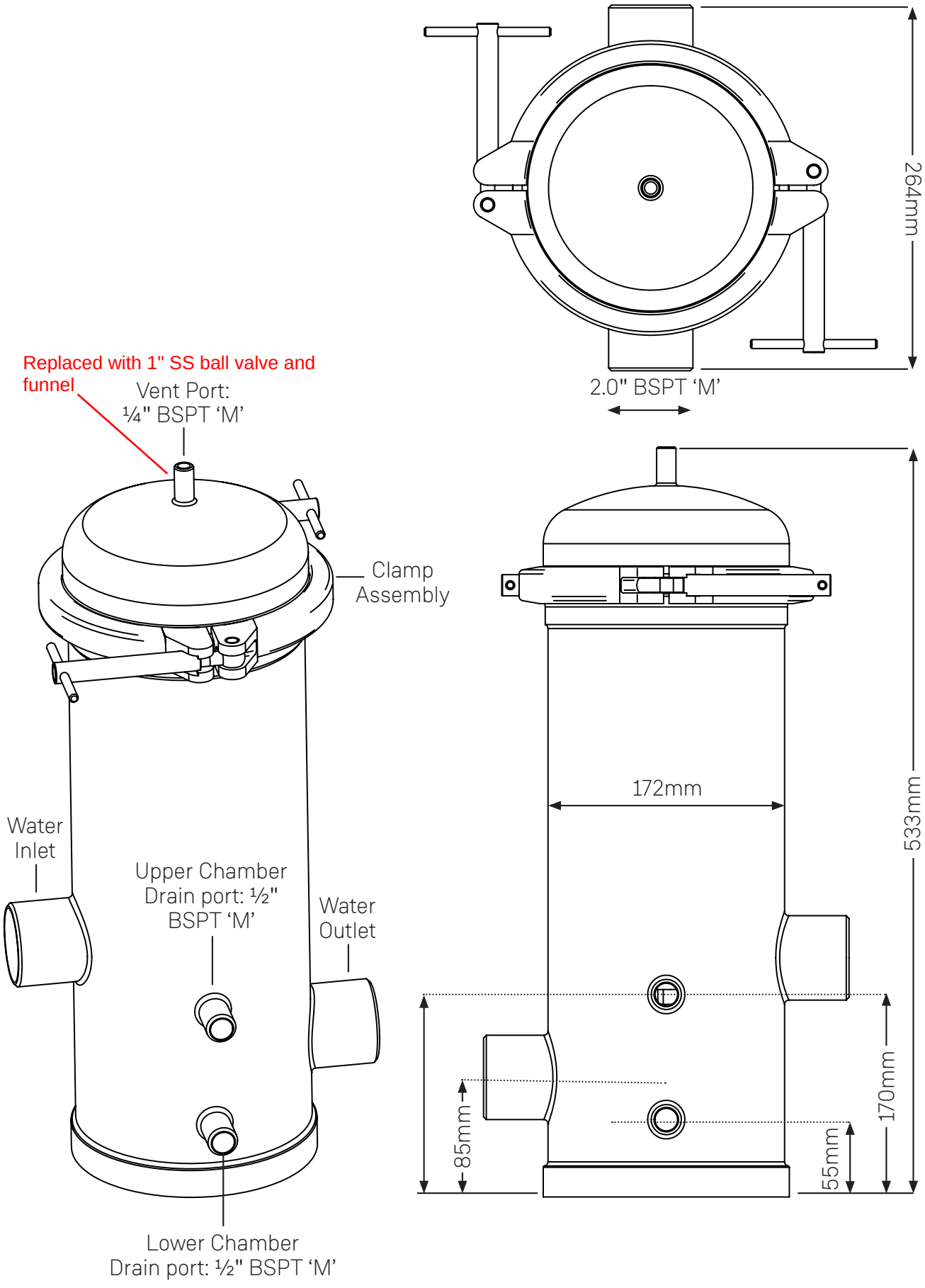
An ADEY system kit is available for the *MagnaClean CMX* Midi filter comprised of three 20-micron cartridge filters, an automatic air vent, magnetite scraper tool and five litres of ADEY's award winning *MC1+ Protector* which passivates and protects bare metal surfaces.



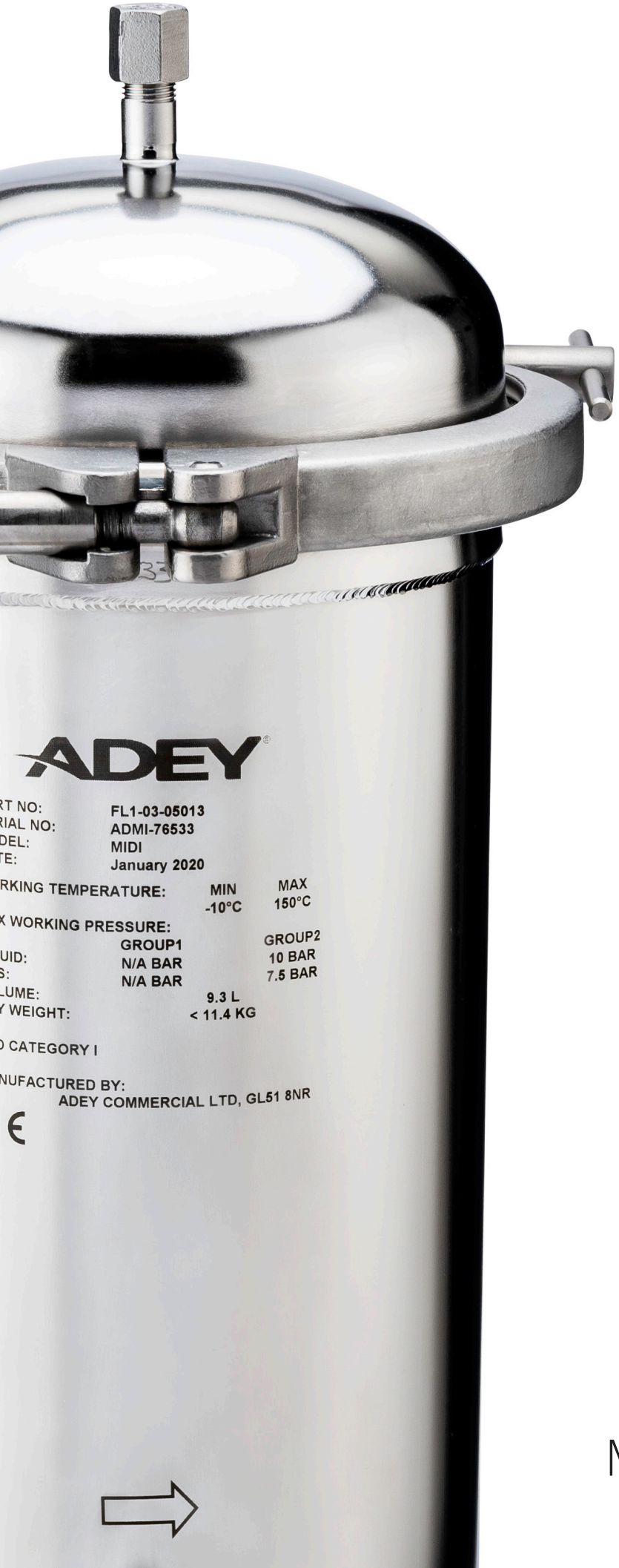




Technical Specification



MagnaClean™
CMX













Midi

Technical Specification

MagnaClean CMX			
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 mechancial 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

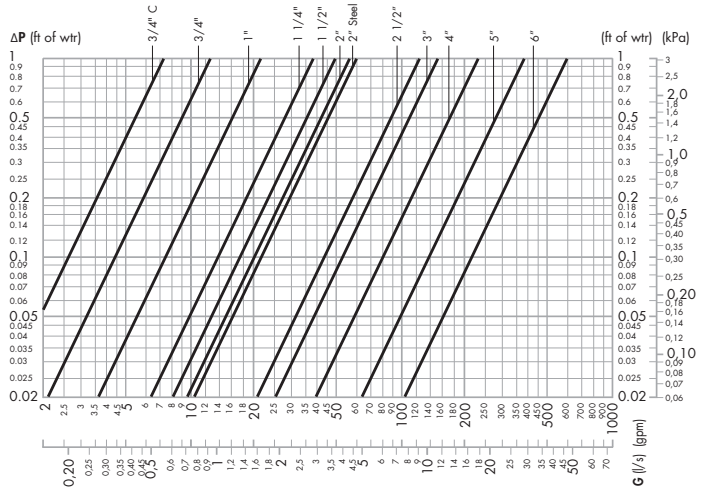
Max working pressure: 150 psi (10 bar)

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

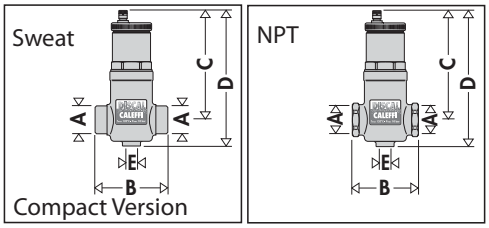
Connections:

- 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

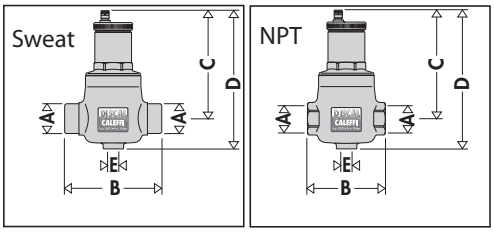
Hydraulic characteristics



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"
Optimal (4.0 f/s)	GPM	6.0	8.0	9.3	15.3	23.9	36.1
	l/s	0.4	0.5	0.6	1.0	1.5	2.3
Max. (10.0 f/s)	GPM	14.3	19.0	22.1	36.4	56.8	86.0
	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

Caleffi North America, Inc. 3883 West Milwaukee Road / Milwaukee, WI 53208
Tel: 414.238.2360 / Fax: 414.238.2366 / www.caleffi.us
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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

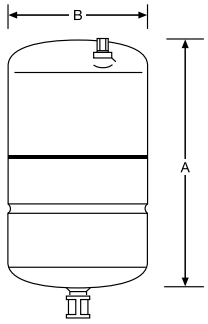
Maximum Operating Temperature	200°F (93°C)
Maximum Working Pressure	150 PSIG (10.3 bar)
Maximum Relief Valve Setting	125 PSIG (8.6 bar)
Warranty	7 Year

Application

• Controls pump cycling in residential well water systems.

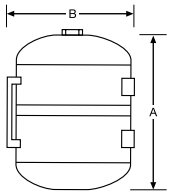
Undergound Models (BLACK)

Model Number	Tank Volume		Max. Acceptance Factor	A Tank Height		B Tank Diameter		System Connection (NPTM)	Shipping Weight	
	Gal	Lit		In	mm	In	mm	In	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



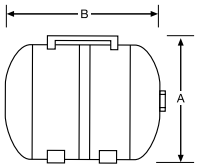
Wall Hung Model for VFD Systems

Model Number	Tank Volume		Max. Acceptance Factor	A Tank Height		B Tank Diameter		System Connection (NPTM)	Shipping Weight	
	Gal	Lit		In	mm	In	mm	In	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	In	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. _____ _____

CERTIFIED TO NSF/ANSI 61

ISO 9001:2008 REGISTERED

MADE IN USA

LOW-LEAD IAPMO R&T

ANTIMICROBIAL PROTECTION

TURBULATOR

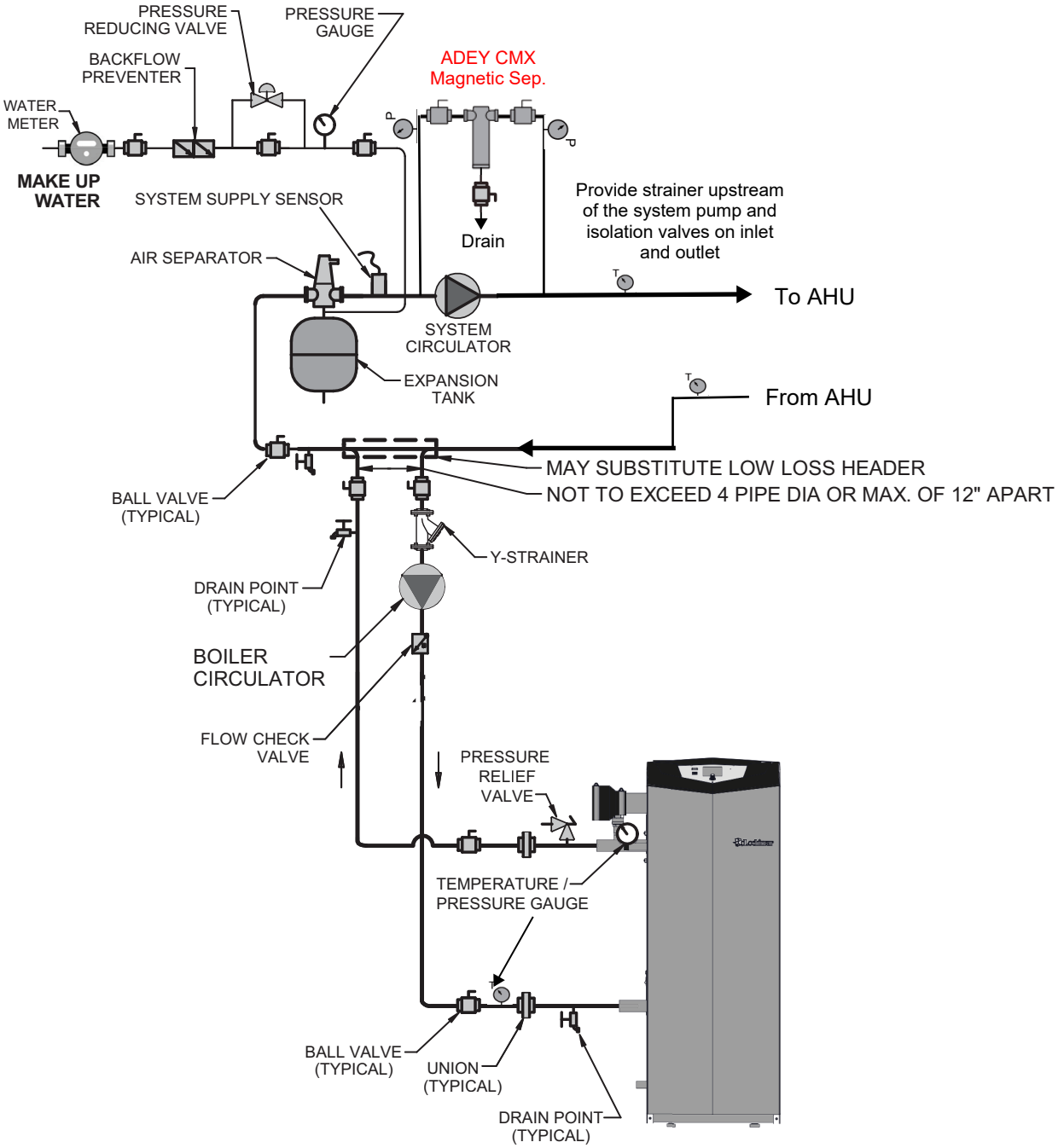
Amtrol Inc., 1400 Division Road, West Warwick, RI 02893 USA T: 401.884.6300 **www.amtrol.com**

MC 4400 (01/15)

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.