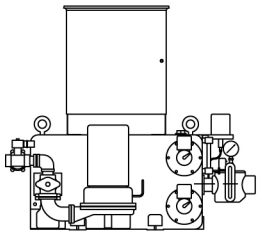
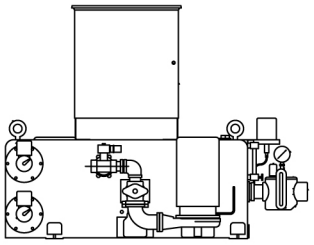
Bell & Gossett®
Domestic® Pump Series VLR™
Vacuum Heating Units

Guide Specification Index





Model Designations and Arrangements

Series VLR vacuum units feature combination air and water pumps; i.e., each pump and motor assembly performs the dual function of removing air from the system and pumping condensate to the boiler. Units feature low inlet heights (8" [203mm] Max.) for installation where returns are lower than standard. Cast iron receivers for maximum corrosion resistance are standard.

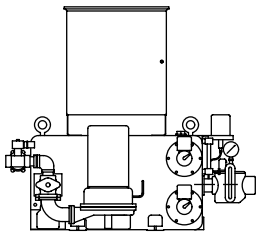
Series VLR Units are available in the following arrangements:

SIMPLEX	Model VLR1, standard capacity Model VLRS1, special capacity
DUPLEX	Model VLR2, standard capacity Model VLRS2, special capacity

For specific ratings on VLR standard and special capacity units consult the VLR Product Bulletin.

Guide Specification

Domestic® Series VLR™ Simplex Vacuum Heating Unit



NOTE: Optional Accessories are Underlined

PART 1 – GENERAL

1.1 SECTION INCLUDES
- A. Unit shall be a Domestic Series VLR™ simplex vacuum heating and condensate pumping unit as manufactured by Bell & Gossett
  1. (1) Cast iron receiver
  2. (1) Dual purpose pump
  3. (1) Multi-jet vacuum producer
  4. (1) Discharge valve assembly
  5. (1) Vacuum and float controls
  6. (1) Pump Control Panel

1.2 REFERENCES
- A. HI - Hydraulic Institute
- B. NEMA - National Electric Manufactures Association
- C. UL - Underwriters Laboratories
- D. CSA - Canadian Standards Association
- E. ISO - International Standards Organization
- F. IEC - International Electrotechnical Commission

1.3 SUBMITTALS
- A. Submittals shall include the following:
  1. Submittal data cover sheet
  2. Unit description sheet
  3. Dimensional print
  4. Sales bulletin
  5. Piping diagram
  6. Wiring diagram
  7. Instruction manual

1.4 QUALITY ASSURANCE
- A. The manufacturer shall have a minimum of 20 years experience in the design and construction of condensate return equipment.
- B. The manufacturer shall be fully certified by the International Standards Organization per ISO 9001. Proof of this certification shall be furnished at the time of submittal.
- C. The manufacturer shall carry a minimum product liability insurance of $5,000,000.00 per occurrence.
- D. All control cabinet components shall be U.L. listed or recognized. The control panel assembly shall be listed by Underwriters' Laboratories, Inc.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
- A. Subject to compliance with these specifications, the following manufacturers shall be acceptable:
  1. Bell & Gossett Domestic VLR™
  2. Pre-approved equal

2.2 COMPONENTS
- A. CAST IRON RECEIVER
  1. The receiver shall be of close grained cast iron construction (warranted for 20 years from the date of shipment against failure due to corrosion).
  2. Receiver inlet centerline shall be no higher then 8 inches (203 mm) as shown on the drawings.
  3. Condensate discharge shall be controlled by a solenoid operated discharge valve.
  4. Receiver shall be furnished with:
     a. Control equipment:
        1. Double pole vacuum switch
        2. Externally adjustable double pole float switch
     b. (1) Vacuum gauge
     c. (1) Angle Thermometer
     d. (1) Multijet vacuum producer
     e. (1) Solenoid operated discharge valve
     f. (1) Suction swing check valve
     g. (1) Vacuum breaker
     h. (1) Water level gauge glass for visual tank inspection
     i. (2) Lifting eye bolts
     j. (1) Cast iron inlet strainer with vertical self-cleaning bronze screen and large dirt pocket shall be mounted on the receiver. The screen shall be easily removable for cleaning, requiring no additional floor space for servicing.
- B. WATER PUMP
  1. The water pump shall be centrifugal design, bronze fitted with enclosed cast bronze centrifugal impeller, permanently aligned and flanged mounted for vertical operation.
  2. Capacities and electrical characteristics for the pump shall be scheduled on the drawings.
  3. Each pump shall be close-coupled to a 1750 or 3500 rpm, vertical, drip-proof motor.
  4. Carbon/ceramic mechanical shaft seal shall be rated for 250°F (121°C).
  5. The pump shall be rated and tested according to the latest ASRAE Standard Code for "Return Line Low Vacuum Heating Pumps," 5.5 inches Hg and 160 °F (71°C)
  6. Each pump shall include:
     a. Dynamically balanced cast bronze centrifugal impeller
     b. Renewable bronze case ring
     c. Stainless steel shaft
     d. Discharge gauge port tapping
     e. Drain tapping
- C. CONTROL PANEL
  1. The control panel shall be a mounted and wired NEMA 2 control cabinet with drip lip and piano hinged door enclosing the following:
     a. (1) Combination magnetic contactor with adustable thermal overload protection with fused disconnect and cover interlock
     b. (1) "OFF – Float Only – Float and Vacuum – Continuous" selector switch
     c. (1) Numbered terminal strip
     d. (1) Fused control circuit transformer when the motor voltage exceeds 230 Volts

PART 3 – EXECUTION

3.1 INSTALLATION
- A. Install equipment in accordance with manufacturer 's instructions.
- B. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal, and local codes.
- C. All factory wiring shall be numbered for easy identification and the numbers shall coincide with those shown on the wiring diagram.
- D. All interconnecting wiring between the pump controls and control panel shall be enclosed in liquid tight flexible conduit.
- E. The unit shall be factory tested as a complete unit and the unit manufacturer shall furnish elementary and connection wiring diagrams, piping diagrams, installation and operation instructions.
- F. The unit manufacturer shall furnish, mount on the unit and wire a NEMA 2 control cabinet with drip lip and piano hinged door.
- G. The unit shall be shipped completely assembled.
- H. Certified test report shall be provided by the factory.
- I. Unit shall be a Domestic Series VLR™ as manufactured by Bell & Gossett, Morton Grove, IL.

Domestic® Series VLR™ Simplex Vacuum Heating Unit

STANDARD UNIT FEATURES:

- Cast iron receiver with low inlet
- Cast iron receiver warranted for 20 years from date of shipment against failure due to corrosion
- Multi-jet vacuum producer
- Vacuum switch, diaphragm type, double pole
- Float switch, double pole, externally adjustable with seamless float and stainless steel rod
- Centriflo® pumps with open drip proof motor; 1750 or 3500 RPM
- Solenoid operated discharge valve
- Vacuum gauge, vacuum breaker, gauge glass and thermometer
- NEMA 2 – U.L. Listed Control Panel, mounted and wired with liquid tight conduit
- Inlet basket strainer

OPTIONAL EQUIPMENT AS SPECIFIED:

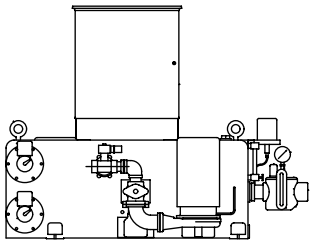
- TEFC or Explosion Proof motors and controls
- Combination magnetic starters with fused disconnect switch or circuit breaker
- Control circuit transformer

10 SOLID REASONS TO CHOOSE DOMESTIC®:

- Cast iron receiver for years of dependable service
- Bronze fitted centrifugal pumps
- Stainless steel pump shaft
- Renewable bronze pump wearing ring
- Mechanical seal construction
- Factory wired and tested before shipment
- Compact construction for easy installation
- Quiet ball-bearing motors
- Engineered reliability
- 100 years of experience

Guide Specification

Domestic® Series VLR™ Duplex Vacuum Heating Unit



NOTE: Optional Accessories are Underlined

PART 1 – GENERAL

1.1 SECTION INCLUDES
- A. Unit shall be a Domestic Series VLR™ duplex vacuum heating and condensate pumping unit as manufactured by Bell & Gossett
  1. (1) Cast iron receiver
  2. (2) Dual purpose pumps
  3. (2) Discharge valve assemblies
  4. (2) Vacuum and float controls
  5. (1) Pump Control Panel

1.2 REFERENCES
- A. HI - Hydraulic Institute
- B. NEMA - National Electric Manufactures Association
- C. UL - Underwriters Laboratories
- D. CSA - Canadian Standards Association
- E. ISO - International Standards Organization
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1.3 SUBMITTALS
- A. Submittals shall include the following:
  1. Submittal data cover sheet
  2. Unit description sheet
  3. Dimensional print
  4. Sales bulletin
  5. Piping diagram
  6. Wiring diagram
  7. Instruction manual

1.4 QUALITY ASSURANCE
- A. The manufacturer shall have a minimum of 20 years experience in the design and construction of condensate return equipment.
- B. The manufacturer shall be fully certified by the International Standards Organization per ISO 9001. Proof of this certification shall be furnished at the time of submittal.
- C. The manufacturer shall carry a minimum product liability insurance of $5,000,000.00 per occurrence.
- D. All control cabinet components shall be U.L. listed or recognized. The control panel assembly shall be listed by Underwriters' Laboratories, Inc.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
- A. Subject to compliance with these specifications, the following manufacturers shall be acceptable:
  1. Bell & Gossett Domestic™ VLR™
  2. Pre-approved equal

2.2 COMPONENTS
- A. CAST IRON RECEIVER
  1. The receiver shall be of close grained cast iron construction (warranted for 20 years from the date of shipment against failure due to corrosion).
  2. Receiver inlet centerline shall be no higher then 8 inches (203 mm) as shown on the drawings.
  3. Condensate discharge shall be controlled by a solenoid operated discharge valve.
  4. Receiver shall be furnished with:
     a. Control equipment:
        1. Double pole vacuum switch
        2. Externally adjustable double pole float switch
     b. (1) Vacuum gauge
     c. (1) Angle Thermometer
     d. (2) Multijet vacuum producer
     e. (2) Solenoid operated discharge valve
     f. (2) Suction swing check valve
     g. (1) Vacuum breaker
     h. (1) Water level gauge glass for visual tank inspection
     i. (2) Lifting eye bolts
     j. (1) Cast iron inlet strainer with vertical self-cleaning bronze screen and large dirt pocket shall be mounted on the receiver. The screen shall be easily removable for cleaning, requiring no additional floor space for servicing.
- B. WATER PUMP
  1. The water pumps shall be centrifugal design, bronze fitted with enclosed cast bronze centrifugal impeller, permanently aligned and flanged mounted for vertical operation.
  2. Capacities and electrical characteristics for the pump shall be scheduled on the drawings.
  3. Each pump shall be close-coupled to a 3500 rpm, vertical, drip-proof motor.
  4. Carbon/ceramic mechanical shaft seal shall be rated for 250°F (121°C).
  5. The pump shall be rated and tested according to the latest ASRAE Standard Code for "Return Line Low Vacuum Heating Pumps," 5.5 inches Hg and 160 °F (71°C).
  6. Each pump shall include:
     a. Dynamically balanced cast bronze impeller
     b. Stainless steel shaft
     c. Renewable bronze case ring
     d. Discharge gauge port tapping
     e. Drain tapping
- C. CONTROL PANEL
  1. The control panel shall be a mounted and wired NEMA 2 control cabinet with drip lip and piano hinged door enclosing the following:
     a. (2) Combination magnetic contactor with adustable thermal overload protection with fused disconnect and cover interlock
     b. (2) "OFF – Float Only – Float and Vacuum – Continuous" selector switch
     c. (1) Numbered terminal strip
     d. (1) Fused control circuit transformer when the motor voltage exceeds 230 Volts
     e. (1) Electrical alternator

PART 3 – EXECUTION

3.1 INSTALLATION
- A. Install equipment in accordance with manufacturer 's instructions.
- B. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal, and local codes.
- C. All factory wiring shall be numbered for easy identification and the numbers shall coincide with those shown on the wiring diagram.
- D. All interconnecting wiring between the pump controls and control panel shall be enclosed in liquid tight flexible conduit.
- E. The unit shall be factory tested as a complete unit and the unit manufacturer shall furnish elementary and connection wiring diagrams, piping diagrams, installation and operation instructions.
- F. The unit manufacturer shall furnish, mount on the unit and wire a NEMA 2 control cabinet with drip lip and piano hinged door.
- G. The unit shall be shipped completely assembled.
- H. Certified test report shall be provided by the factory.
- I. Unit shall be a Domestic Series VLR™ as manufactured by Bell & Gossett, Morton Grove, IL.

Domestic® Series VLR™ Duplex Vacuum Heating Unit

STANDARD UNIT FEATURES:

- Cast iron receiver with low inlet
- Cast iron receiver warranted for 20 years from date of shipment against failure due to corrosion
- Multi-jet vacuum producers
- Vacuum switch, diaphragm type, double pole
- Float switch, double pole, externally adjustable with seamless float and stainless steel rod
- Centriflo® centrifugal pump with open drip proof motor; 1750 or 3500 RPM
- Solenoid operated discharge valve
- Vacuum gauge, vacuum breaker, gauge glass and thermometer
- NEMA 2 – U.L. Listed Control Panel, mounted and wired with liquid tight conduit
- Inlet basket strainer
- Selector switch

OPTIONAL EQUIPMENT AS SPECIFIED:

- Automatic electric alternation
- TEFC or explosion proof motors and controls
- Combination magnetic contactor and fused disconnect switch or circuit breaker
- Control circuit transformer

10 SOLID REASONS TO CHOOSE DOMESTIC®:

- Cast iron receiver for years of dependable service
- Bronze fitted centrifugal pumps
- Stainless steel pump shaft
- Renewable bronze pump wearing ring
- Mechanical seal construction
- Factory wired and tested before shipment
- Compact construction for easy installation
- Quiet ball-bearing motors
- Engineered reliability
- 100 years of experience

Domestic® Series VLR™ Vacuum Heating Units

Description of Standard and Optional Equipment and Controls

Receiver – Close grained cast iron construction with low inlet.

Cast Iron Receiver Warranty – The Cast Iron Receiver is warranted for 20 years from date of shipment against failure due to corrosion. In the event of receiver failure due to corrosion, the receiver will be replaced free of charge with transportation charges prepaid to any location within the continental U.S.A. Labor charges for replacement are not allowed nor shall Bell & Gossett, be liable for any special indirect or consequential damages. All implied warranties of merchantability and fitness for a particular purpose are hereby disclaimed.

Inlet strainer – has vertical self-cleaning bronze screen with large dirt pocket.

Vertical pump and motor assembly – close-coupled and permanently aligned, features bronze fitted construction with enclosed impeller and renewable bronze wear ring. Oversized suction passages with low inlet velocities are specially designed for handling hot water.

Electric Motors – are vertically mounted drip-proof, ball bearing type. Standard voltages are: Three phase – 208-230/460V. Single phase – 115/230V.

Multi-jet vacuum producer – consists of a simple, yet efficient nozzle and venturi assembly. This sound design does not require close clearances or critical adjustments. Its proven ability to retain original efficiencies eliminates the need for oversizing.

Combination magnetic starters – are available with fusible disconnect switches or circuit breakers. Safety cover interlocking switches are furnished with all combination starters. Enclosures are available to comply with JIC specifications. NEMA 2 enclosures are standard.)

Magnetic starters – automatic across-the-line type are furnished. Manual reset over-loads are standard equipment … for the protection of all windings of 3 phase motors against open circuit and/or unbalanced conditions.

Special motors – wound for 200V single or three phase or other special voltages are available. When open construction, drip-proof motors are not adequate, totally enclosed, explosion-proof or other special motors can be furnished.

Control circuit transformers – are available and required for all JIC specifications and motor voltages exceeding 230V.

Pressure gauge – dial type for pump discharge are available.

Automatic pump controls for duplex units:

(1) Electrical Alternators – This control consists of an automatic electrical sequence relay used in conjunction with 2 magnetic starters, 2 float switches, 2 vacuum switches and 2 selector switches. When magnetic starters and selector switches are furnished, the alternator is installed in a "Consolitrol" panel. This control provides for (1) automatic change of operating sequence after each cycle, (2) simultaneous operation of both pumps under peak load conditions and (3) automatic operation of the inactive or lag pump if the lead pump or its control fails.

(2) Manual Sequence Control (Lead-Lag) – This control consists of 3 selector switches uses in conjunction with 2 magnetic starters, 2 float switches and 2 vacuum switches. The third selector switch, supplied in addition to two standard switches, has the following complete reading: "Vacuum Pump No. 1 Leads – Vacuum Pump No. 2 Leads." This control provides for (1) manual selection of the active pump, (2) simultaneous operation of both pumps under abnormal load conditions and (3) automatic operation of the inactive or lag pump if the lead pump or its control fails.

Control Power Switching Relay – should be supplied in Duplex or Triplex units when individual pump disconnect switches are specified and a control power transformer is required. This relay is recommended in order to maintain control power in the event pump #1's disconnect switch is turned off or pump #1 fails. In this event the control power will be automatically supplied by pump #2.

Float switches – in both upper and lower compartments are double pole type, externally adjustable, operated by seamless float, mounted on a stainless steel rod.

Vacuum switch – diaphragm type, double pole switch, with minimum differential of 4" Hg.

Solenoid operated discharge valve – positive acting float switch actuates solenoid operated discharge valve to control discharge of condensate while retaining adequate "hurling" water for air evacuating cycle.

Selector switches – with "Off – Float Only – Float & Vacuum – Continuous" positions furnished in unit "Consolitrol" panel when magnetic starters are supplied. A selector switch with "Float – Float & Vacuum – Continuous" positions is installed on the vacuum switch when starters are not supplied on 1 phase applications less than 1½ HP.

Return lines too low* – when the pump cannot be located so that the inlet is below the lowest return, one of the following devices may be used:

(a) Mechanical Lift – Available for any lift height and any flow rate.
(b) Accumulator tanks – Practical limit: 4 ft. (1219mm) lift and any flow rate required.
(c) Lift Fitting – Practical limit: 5 ft. (1524mm) lift and small flow rate only.

Accumulator Tanks* – are recommended when using the vacuum to lift condensate from blow grade returns. Tanks are cast iron and rectangular in shape. For best pump and system performance, the following accumulator tanks are sized as closely as practical to the pump receiver:

Simplex or Duplex Pump EDR ($^{lbs}/_{hr}$)	Accumulator Tank	Accumulator Tank Volume
1000 thru 15,000 (250 thru 1,250)	14CR	14 Gallons (53L)
20,000 (5,000)	15CR	23 Gallons (87L)

When an accumulator tank is furnished with a VLR unit, the float switches in the lower compartment are omitted. Float switch(es) and vacuum breaker are installed in the accumulator tank.

*See Pg. 3 of Installation-Operation DNO134 manual for piping details and Section 390 for dimension drawings.

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Let's Solve Water

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