THE CITY OF
ROME, GEORGIA

WATER AND SEWER DIVISION

PROJECT MANUAL FOR

BID NUMBER 011-018

HAMLER WTP
FILTER CONSOLE REPLACEMENT

INSITE PROJECT NUMBER 16121.01

MARCH 2018

PREPARED BY:

InSite Engineering, LLC
5800 Feldspar Way
Hoover, Alabama 35244
Telephone: (205) 733-9696
Fax: (205) 733-9697

BID FORM

TO: City of Rome – Purchasing Department
ATTN: JOHNNA M. ALLEN
P.O. Box 1433
601 Broad Street
Rome, Georgia 30162-1433

"011-18 – "Hamler WTP Filter Console Replacement"

Quantity	Description	Total Price
1	Replacement of Eight (8) Filter Consoles Lump Sum	$_____

Proposed Calendar Days from Notice to proceed until Equipment Delivery: _____

Proposed Calendar Days form Notice to proceed until Completion of Installation: _____

All bids submitted shall be subject to acceptance or rejection and the City of Rome specifically reserves the right to accept or reject any or all bids, to waive any technicalities and formalities in the bidding.

The undersigned understands that any conditions stated above, clarifications made to the above or information other than that requested should be under separate cover and to be considered only at the discretion of the Purchasing Department.

_____ _____
Name of Individual, Partner Company
Or Corporation

_____ _____
Title Address

_____ _____
Authorized Signature City, State, Zip Code

_____
Company phone number

Please Attach Company Contact's Business Card:

CERTIFICATE OF NON-DISCRIMINATION

In connection with the performance of work under this contract, the bidder agrees as follows:

The bidder agrees not to discriminate against any employee or applicant for employment because of race, creed, color, sex, national origin, ancestry or disability. The vendor shall take affirmative action to insure that employees are treated without regard to their race, creed, color, sex, national origin, ancestry or disability. Such action shall include, but not be limited to the following: employment, upgrading, demotion, transfer, recruiting or recruitment, advertising, lay-off or termination, rates of pay or other compensation and selection for training, including apprenticeship.

In the event of the bidder's non-compliance with this non-discrimination clause, the contract may be canceled or terminated by the City of Rome. The bidders may be declared, by the City of Rome, ineligible for further contracts with the City of Rome until satisfactory proof of intent to comply shall be made by the vendor.

The bidder agrees to include this non-discrimination clause in any sub-contracts connected with the performance of this agreement.

_____

BIDDER

_____

SIGNATURE

_____

TITLE

NON-COLLUSION AFFIDAVIT

The following affidavit is to accompany the bid:

STATE OF

COUNTY OF

Owner, Partner or Officer of Firm

Company Name, Address, City and State

Being of lawful age, being first duly sworn, on oath says that he/she is the agent authorized by the bidder to submit the attached bid. Affidavit further states as bidder, that they have not been a party to any collusion among bidders in restraint of competition by agreement to bid at a fixed price or to refrain from bidding; or with any office of the City of Rome or any of their employees as to quantity, quality or price in the prospective contract; or any discussion between bidders and any official of the City of Rome or any of their employees concerning exchange of money or other things of value for special consideration in submitting a sealed bid for:

FIRM NAME _____

SIGNATURE _____

TITLE _____

Subscribed and sworn to before me this_____ day of _____ 20_____

_____

NOTARY PUBLIC

STATE OF GEORGIA PROMPT PAY ACT AFFIDAVIT

THIS AFFIDAVIT IS TO ACCOMPANY THE BID

GEORGIA PROMPT PAY ACT: The Georgia Prompt Pay Act was enacted by the General Assembly in 1994 and took effect January 1, 1995. This act requires owners to pay contractors within 15 days of receipt of a pay request by the owner or the owner's representative. If payment is not made the owner shall pay the contractor 1% per month interest on the delayed payment. Additionally, the contractor must pay subcontractors within 15 days of receipt of payment from the owner.

This Act is Code Section 13-11-1 (Georgia Laws of 1994, p. 1398 par. 4)

Firm Name: _____

Signature: _____

Title: _____

Subscribed and Sworn to before me this_____ day of _____, 20_____

_____
Notary Public

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See **Specific Instructions** on page 2.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification; check only **one** of the following seven boxes:

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____

Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number

☐☐☐ – ☐☐ – ☐☐☐☐

or

Employer identification number

☐☐ – ☐☐☐☐☐☐☐

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here **Signature of U.S. person ▶** **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding?* on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

CITY OF ROME

DRUG-FREE WORKPLACE CERTIFICATE

By signature on this certificate, the Bidder certifies that the provisions of O.C.G.A. Section 50-24-1 through 50-24-6 related to the "Drug-Free Workplace Act" will be complied with in full. The Bidder further certifies that:

1. A drug-free workplace will be provided for the Bidder's employees during the performance of the contract; and

2. Each contractor who hires a subcontractor to work in a drug-free workplace shall secure from that subcontractor the following written certification: "As part of the subcontracting agreement with (contractor's name), (subcontractor's name) certifies to the contractor that a drug-free workplace will be provided for the subcontractor's employees during the performance of this contract pursuant to O.C.G.A. Section 50-24-3(b)(7)."

By signature on this certificate, the Bidder further certifies that it will not engage in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the contract.

Bidder: _____

By: _____

Name Printed: _____

Title: _____

Date: _____

CITY OF ROME, GEORGIA
E-VERIFY COMPLIANCE AFFIDAVIT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of the City of Rome, Georgia has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A, § 13-10-91 (b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification number
(Not Required if Less than 10 Employees)

_____
Signature (if less than 10 employees)

_____
Date of Authorization

_____
Name of Contractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ____, 20____ in _____(city) _____ (state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 20_____

_____
NOTARY PUBLIC
My Commission Expires:

CITY OF ROME, GEORGIA

SAVE COMPLIANCE AFFIDAVIT
O.C.G.A § 50-36-1(e) (2) Affidavit

By executing this affidavit under oath, as an applicant for a (n) Contract or Services, as referenced O.C.G.A. C. § 50-36-1, from the City of Rome, Georgia, the undersigned applicant verifies one of the following with respect to my application for a public benefit:

1) _____ I am a United State citizen.

2) _____ I am a legal permanent resident of the United States

3) _____ I am a qualified alien or non-immigrant under the Federal Immigration and Nationality Act with an alien number issued by the Department of Homeland Security or other federal immigration agency.

My alien number issued by the Department of Homeland Security or other federal immigration agency is: _____.

The undersigned applicant also hereby verifies that he or she is 18 years of age or older and has provided at least one secure and verifiable document, as required by O.C.G.A. § 50-36-1(e) (1), with this affidavit.

The secure and verifiable document provided with this affidavit can best be classified as: _____.

In making the above representation under oath, I understand that any person who knowingly and willfully makes a false, fictitious, or fraudulent statement or representation in an affidavit shall be guilty of a violation of O.C.G.A. § 16-10-20, and face criminal penalties as allowed by such criminal statute.

Executed in _____ (city), _____ (state).

_____
Signature of Applicant

_____ Printed Name of Applicant

SUBSCRIBED AND SWORN

BEFORE ME ON THIS THE

_____DAY OF _____, 20_____

_____
NOTARY PUBLIC
My Commission Expires:

S C O P E O F W O R K

DATE: **MARCH 15, 2018**

BID NO: **011-018**

PROJECT NAME: **HAMLER WATER TREATMENT PLANT**
FILTER CONSOLE REPLACEMENT
ROME WATER & SEWER DIVISION

The City of Rome, Georgia Water & Sewer Division is seeking proposals from qualified SCADA System integrators to replace the eight (8) existing filter consoles at its Bruce Hamler Water Treatment Facility. The Hamler WTF is an 18 million gallon per day conventional surface water treatment plant utilizing flocculation, sedimentation, and gravity filtration through granular activated carbon media.

GENERAL SCOPE

The new filter control system shall provide a means for initiating an automatic backwash and air scour of each gravity filter on the basis of elapsed run time, filter headloss, filter effluent turbidity, or push button. The system should be interlocked so that only one of the eight filters can backwash at a time. The control system shall automatically sequence valves, blowers, and pumps during the backwash cycle, and shall return the filter to service automatically at the end of the rewash cycle.

A more detailed scope of work is listed below.

SCHEDULE

This is a time-critical project that the Owner desires to have online and operational by October 1, 2018.

DETAILED SCOPE OF WORK

- Modify the eight (8) existing stainless steel filter control consoles as required to accept the new controls, including but not necessarily limited to:
    - Remove all existing chart recorders, switches, push buttons, indicators, and other appurtenances.
    - Mount all new controls and PLCs inside the existing stainless steel consoles.
    - Provide new stainless steel doors in the upper section.
    - Provide new manual back up push buttons, switches, and/or indicators in the same general location as the existing push buttons, switches, and indicators. Use standard size (full 30mm) and shape, heavy duty oil-tight units for push buttons, lights, and selector switches. Pilot lights should be LED type & push to test.
    - Provide all new labels all new push buttons, switches, and indicators.
    - Cover all remaining holes and openings in the lower section with new stainless steel bezels/plates.

5800 Feldspar Way
Hoover, Alabama 35244
Phone 205.733-9696
Fax 205.733-9697
www.insiteengineering.org

  - Provide new 12" color touchscreen OIT in the left doorfront, similar to Allen Bradley Panel View Plus 7, Model 2711P-T12W22D8S.
  - Provide a new Allen Bradley CompactLogix PLC in each filter console to allow for automatic & remote control from the SCADA system. Replace the existing subpanel with a new factory-wired subpanel with all new components mounted inside the existing filter console.
  - Record all data for reporting and trending in the SCADA system.
- Modify the existing Backwash Panel as required to fully automated the backwash process, including but not necessarily limited to:
  - Remove all existing chart recorders, switches, push buttons, indicators, and other appurtenances.
  - Modify the panel to interface with the new console controls and SCADA system.
  - Provide a new Allen Bradley CpmpactLogix Series PLC in the existing backwash panel.
  - The new PLC will:
    - Accept analog input signals from the filter controls
    - Control the backwash flow control valve
    - Control the air scour blowers
    - Replace the other controls in the panel
  - Record all data for reporting and trending in the SCADA system.
- Upgrade existing Computer Hardware and SCADA Software as required for full functionality and integration with the existing plant operations, including but not necessarily limited to:
  - Modify the current GE Proficy HMI/SCADA if possible or upgrade to iFIX from GE Digital. Note: It is anticipated that the existing plant SCADA will be replaced in the next 18 months with a new VT SCADA HMI.
  - Include, at a minimum, the following capabilities:
    - New HMI graphics screens for the filter control process.
    - New Custom Reports to provide daily and/or monthly reports, including customization ability to generate compliance reports and historical trends.
- Provide wiring and ethernet between instruments, consoles, panels, and computers.

TRAINING

Provide 8 hours of training (exclusive of travel time) to the Owner's staff over the course of two (2) calendar days.

QUALITY ASSURANCE

The System Integrator shall have and shall maintain a qualified technical and support staff and shall employ a Control Systems Engineer or Electrical Engineer to supervise or perform the work. The System Integrator shall maintain their own UL508 panel shop. The geographic location of a fully staffed office with Engineers, Service Personnel, and programmers shall be within a 150-mile radius of the project site.

Provide operations and maintenance manuals which include:

- A functional description of the entire system, including system schematics which reflect the "As-Built" conditions.

- Special maintenance requirements particular to the system, along with any special calibration and/or test procedures.
- A flash drive containing copies of all final programs utilized within the control panel, with provisions/cable assemblies as required to connect the flash drive provided to the controller to download the programs. Attach the flash drive to a retractable cord (long enough to reach the associated port) attached to the inside of the panel door.

Provide a minimum one-year warranty from the date that the final filter control console is online and operational.

Provide 100% Performance and Payment Bonds for the Work.

MANDATORY PRE-BID MEETING

A mandatory pre-bid meeting will be held at 10:00 AM local time on Monday, April 2, 2018. Participants will meet in the parking lot of the Rome Civic Center (400 Civic Center Drive, Rome, Georgia 30161) then caravan to the Hamler Water Treatment Plant together.

Proposals from integrators not in attendance at the Mandatory Pre-Bid Meeting will not be considered.

SUBMISSION OF PROPOSALS

Address and submit proposals to:

Ms. Johnna Allen, Purchasing Director
City of Rome – Purchasing Department
RE: Bid 011-18 Hamler WTP Filter Console Replacement
Post Office Box 1433
601 Broad Street
Rome, Georgia 30162-1433

Proposals must be received no later than 10:00 AM local time Tuesday, April 10, 2018, at which time all proposals will be opened and read in the City of Rome Purchasing Department Conference Room, 601 Broad Street, Rome, Georgia 30162.

Proposals must include the following attachments:

1. City of Rome Bid Form
2. Certificate of Non-Discrimination
3. Non-Collusion Affidavit
4. State of Georgia Prompt Pay Act Affidavit
5. Request for Taxpayer Identification Number (W-9)
6. Drug-Free Workplace Certificate
7. E-Verify Compliance Affidavit
8. SAVE Compliance Affidavit
9. Any clarifications or exceptions to the above Scope of Work
10. A list of at least five (5) references with names and phone numbers where the bidder has performed similar work in the past 10 years.

AWARD

The bid will be awarded to the reliable bidder with the combination of bid amount, delivery and installation schedule, and similar experience considered most advantageous to the City of Rome. The bidder to whom award is made will be notified at the earliest possible date. The purchaser reserves the right to reject the proposal of any integrator who has previously failed to perform properly or complete on time contracts of a similar nature, or the proposal of an integrator who, in the sole opinion of the purchaser is not in a position to perform the Work, or whose name appears on the United States Comptroller General's list of ineligible contractors.

Bids may be withdrawn by written or faxed request, provided such withdrawals are received prior to the bid opening time established above.

QUESTIONS

Submit all questions to Bryan Pate via email to bryan@insiteengineering.org no later than Wednesday, April 4, 2018.

Attachments: Photograph of Existing Console
Air Scour Rate of Flow Controller, 2005
C2I SCADA Drawings, 2005
Central Panel & Console Drawings, 1996 (Revere)
Filter Rate of Flow Controller, 1996
Instrument Loop Diagrams, 1996 (Revere)

Picture 1. Filter Console #1 (Typ. of 8)

COMPONENT INFORMATION

PROJECT: Bruce Hamler WTF Upgrade, Rome, GA

COMPONENT: Venturi Flowmeter

SPEC. REFERENCE: 13620 Para 11.1A

MANUFACTURER: Primary Flow Signal

MODEL: HVT-CI

QTY./SYSTEM: 1

SIZE: 10"

TAG: FE 9-1

DESCRIPTION: 10" HVT-CI venturi, cast iron body per ASTM A-126, Grade B, and Class 125 flanged ends; 304 stainless steel throat and taps; coating per NSF.

Tag	Service	Flow Rate
FE 9-1	Air Scour Flow	2,000 SCFM

PFS TECHNICAL DATA BULLETIN

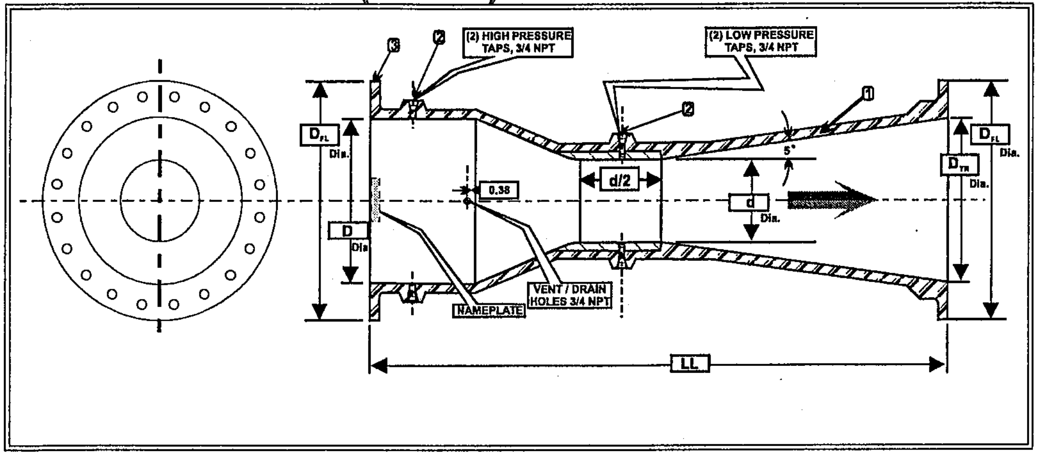
PRIMARY FLOW SIGNAL, INC.

HVT-CI

HALMI Cast(Ductile) Iron *Venturi Meter (Pressure Vessel)*

SUITABLE FOR THESE USES:
- [ ] INDUSTRIAL APPLICATIONS
- [X] MUNICIPAL APPLICATIONS

HVT-CI Halmi Cast(Ductile) Iron Venturi-Pressure Vessel



General Features:
- High Accuracy, Reliability
- Low Permanent Pressure Loss
- Long Service Life(Up to 25 year warranty)
- Unaffected by downstream piping
- Sealed System optional for Solids bearing line fluids
- Bi-Directional designs are available
- Field verifiable
- Prompt, reliable response to your technical inquiries, with custom computer generated documentation, calcs, drawings, performance curves and operating information
- Total Support from Design through Installation and Beyond

GENERAL DESCRIPTION:
The HVT-CI, Halmi Cast(Ductile) Iron Venturi primary flow element is,arguably, the industry standard for high accuracy and reliable, properly substantiated(2 sigma), differential producing flow measurement devices in the world today. With thousands of successful installations worldwide, the cast-pressure vessel version of the HVT design provides standard line sizes from 4" thru 96" in 3 different beta ratios each, with ANSI flanges being standard, but mechanical joint end arrangements as well as foreign standard equivalents being provided as dictated by the application. Intended for clean gas or liquid full pipe flow, incorporating the *HVT-SM Sealed Metering System* allows measurement of solids bearing(contaminated) line fluids like, for example sewage, without metering performance deterioration. Adding PFS products like the PFS-FM FLOWMASTER and PFS-IMS Intelligent metering System can further extend the intrinsic benefits of the HVT primary flow element by providing fully integrated secondary groups, and Pentium based processor analysis, control and reporting capabilities. Accessories such as vent cleaners, inspection ports, special gaskets, and hardware are also available.

APPLICATIONS:
The HVT-CI, has found its greatest currency with municipal water and waste water flow measurement and control applications, including combinations with close-coupled butterfly valves to form highly efficient and effective rate controllers for filter effluent control. The *Sealed Metering System* version makes sewage flow measurement, cost effective, accurate and reliable without concern for blocked pressure taps. No limitations similar to Magnetic or ultrasonic flow meters obtain with the HVT product line. Measurement of air(methane) and other gasses consistent with raw and finished water treatment are also frequent utilizations of the HVT-CI. Higher line pressure applications are possible using ductile iron.

MATERIALS OF CONSTRUCTION:
Although special materials can be utilized by request, the standard cast iron product line consists of ASTM A126, Grade B, for the body material, and 304(optional 316) stainless steel for the throat as well as the piezometer tap sleeves. The flanges are ANSI 150# rating and drilling with a minimum hydrostatic pressure test to 1-1/2 times service pressure, per the code.
The HVT-DI is the ductile iron casting version produced in accordance with ASTM A560, 65-45-12 for body material with the same throat and tap sleeve specifications as above can provide an ANSI 300# flange rating.
Interior paint is usually ANSI/NSF - 61 primer and exterior is generally factory primer. On request, construction materials and coatings other than the foregoing may be entertained.

DESIGN AND MANUFACTURING STANDARDS:
- All applicable codes and standards are considered such as section 8 of the Boiler and Pressure Vessel Code as well as ASME B31.1 and 31.3. ASME fluid meters, MFC-3M-1985, ISO 5167, BS-7045, compliant.
- Designed for use with raised face, flat faced,or mechanical joint flanges of ANSI 150-300# rating, or equivalent, of either U. S. or foreign standards.

PRODUCT SPECIFICATIONS:

Accuracy:
+/- 0.50% of actual reading (2 Sigma)
+/- 0.25% of actual reading or better based on hydraulic calibration.

Range Ability:
100:1 or more depending on secondary group capabilities and arrangement.

Operating Conditions:
Line Fluid Capability:
Gas or liquid full pipe flow.
Clean with minimal particulate contamination.
HVT-SM Sealed System accommodates contaminated flow applications.
Temperature Range:
-150°F to 400°F (as limited by capabilities of the associated secondary device(s) used.)
Line Pressure Capacity:
From full vacuum to 150 psi service pressure(HVT-CI) and up to 300psi (HVT-DI.)

Line Size Capability/End Arrangement
Unlimited, between 4" through 96" in service.
Flange ends, mechanical joint, as required.

Beta Ratio Capability:
Custom sized and designed for Beta ratio range between 0.30 through 0.75

Pipe Reynolds Number R_d Capability
Discharge coefficient is constant above 75,000 R_d
Discharge coefficient bias and random error between 12,000 R_d and 75,000 R_d is empirically established and highly repeatable

Permanent Pressure Loss:
Varies from 3% of differential and up depending on application conditions, beta ratio, and exit cone truncation ratio, and can be engineered to meet your requirements.

PLEASE NOTE: Use this data as general application guidance for the equipment and/or services referenced herein. Users may reasonably expect this disclosure to constitute an accurate factual representation at the time of publication, however all data and specifications contained herein are subject to change without prior notice. This is not a contractual obligation of PFS, Inc. *Primary Flow Signal, Inc.* is bound SOLELY by its official SUBMITTAL document when presented in connection with an actual purchase and sale transaction, which SUBMITTAL shall form the controlling representation of any product or service claimed by *Primary Flow Signal, Inc.*

PFS PUBLICATION #: TDS-1500-HVT-CI

PRIMARY FLOW SIGNAL, INC.

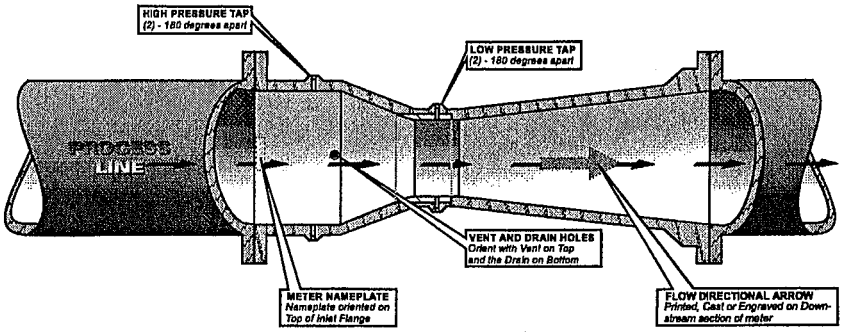
HEADQUARTERS LOCATION: 81 BLEACHERY COURT WARWICK RI USA 02886
TEL: (401)-463-9199 FAX: (401)-463-3197 :\\www.PFSFlowProducts.com

1-877-PFS-FLOW

PFS INDUSTRIAL PRODUCTS GROUP: 7136 SOUTH YALE, SUITE 300 Tulsa, OK USA 74136
TEL: (918)-481-3210 FAX: (918)-481-3205 :\\www.PFSFlowProducts.com

INSTALLATION INFORMATION

Typical Installation Arrangement for HVT-Pressure Vessel Type Venturi



Metering Section is in **PLAN VIEW** LOOKING DOWN ON TOP OF METER

- - -FAILURE TO FOLLOW INSTALLATION DIRECTIONS MAY VOID WARRANTY! - - -

The Proper Method of Installing a Halmi Venturi Meter

PRESSURE VESSEL DESIGN

Item 1:
This is a high quality flow meter! Handle with care during installation.

Item 2:
If improperly installed, it must be reinstalled!

Item 3:
If damaged, it must be replaced!

Item 4:
Handle it from its outside ONLY!

Item 5:
Do not damage its inside!

Item 6:
Install meter in the pipe line so that the *Flow Directional Arrow* agrees with the direction of the flow!

Item 7:
Orient Pressure Taps HORIZONTALLY!

Item 8:
Provide necessary clearances as deemed practical for installation, inspection and maintenance!

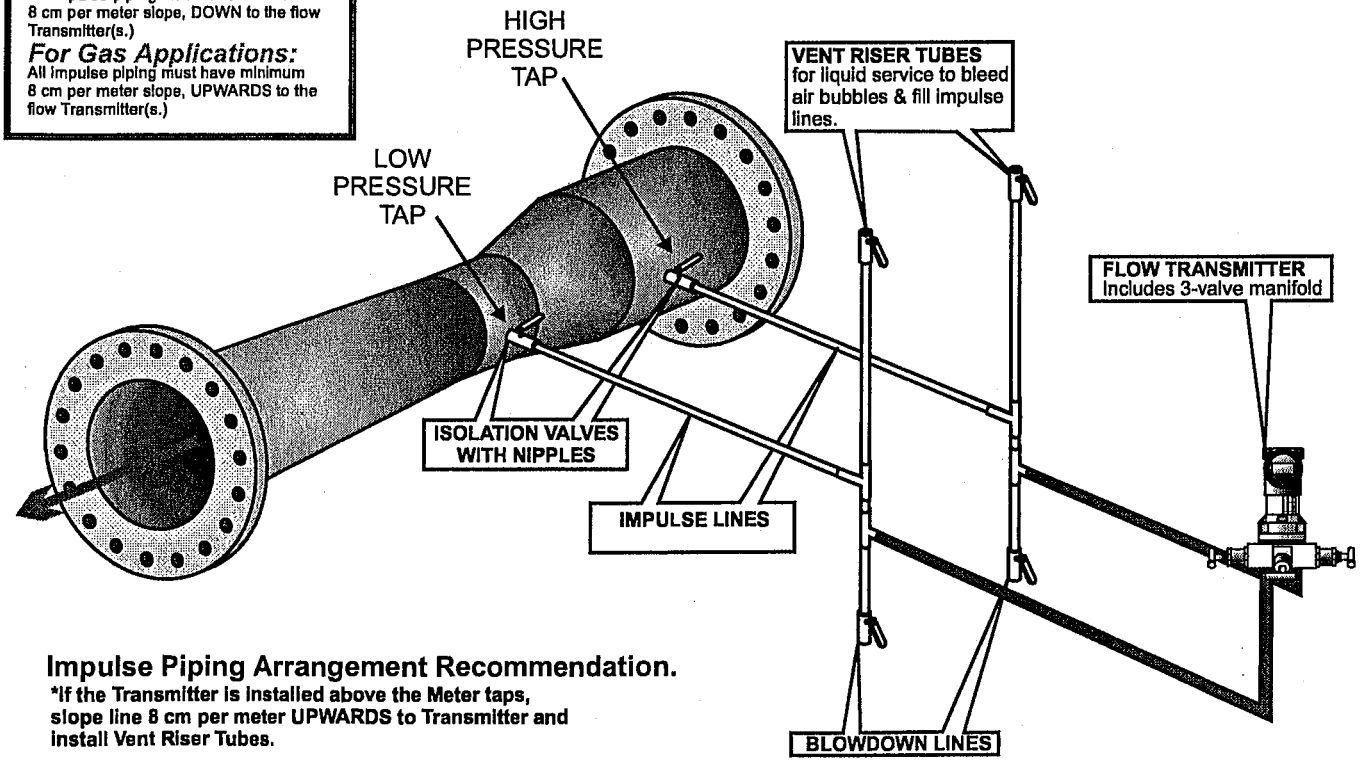
Item 9:
Tighten flange bolts according to typical industry flange assembly standards, adequate to prevent leakage from connection.

Item 10:
Tolerances should be within industry standards for these installation instructions!

GENERAL NOTE:

For Liquid Applications:
All impulse piping must have minimum 8 cm per meter slope, DOWN to the flow Transmitter(s.)

For Gas Applications:
All impulse piping must have minimum 8 cm per meter slope, UPWARDS to the flow Transmitter(s.)



Impulse Piping Arrangement Recommendation.

***If the Transmitter is installed above the Meter taps, slope line 8 cm per meter UPWARDS to Transmitter and install Vent Riser Tubes.**

PFS PUBLICATION #: TDS-1500-HVT-CI

HEADQUARTERS LOCATION:
81 BLEACHERY COURT WARWICK RI USA 02886
TEL: (401)-463-9199 FAX: (401)-463-3197 :\\www.PFSFlowProducts.com

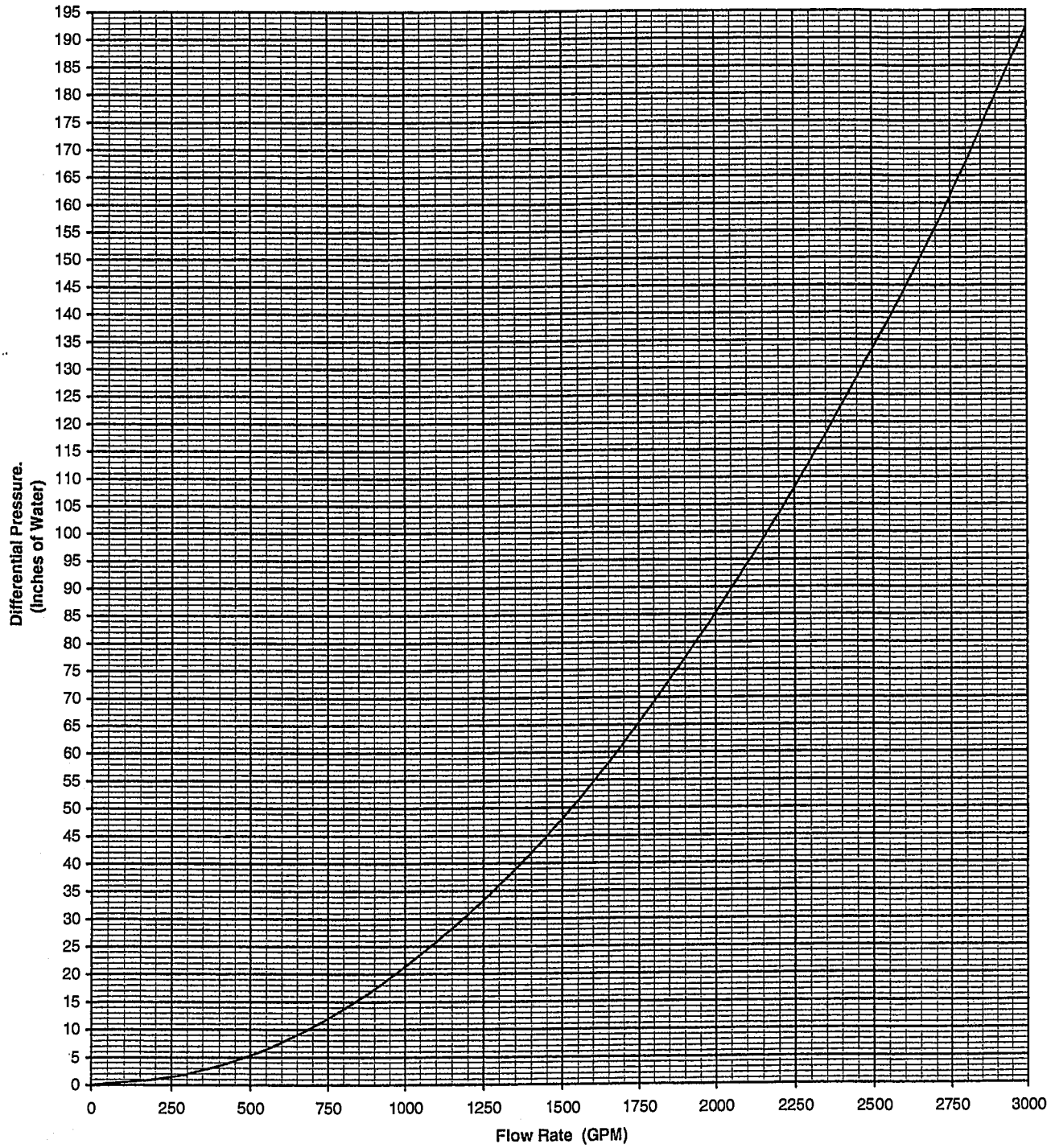
1-877-PFS-FLOW

PFS INDUSTRIAL PRODUCTS GROUP:
7136 SOUTH YALE, SUITE 300 Tulsa, OK USA 74136
TEL: (918)-481-3210 FAX: (918)-481-3205 :\\www.PFSFlowProducts.com

Model No.: 10" B HVT-CI
Serial Number: 7863
Tag: FE-6010
Size: 10.00" x 6.00"

At 3,000 GPM WATER FLOW
60 PSIG at 60° F
Differential = 192.02" OF WATER
Headloss = 12.93" OF WATER

Differential Pressure (Inches of Water, 68° F, 14.7 PSIA) versus Rate of Flow



Primary Flow Signal, Inc.
117 Pettaconsett Ave.
Cranston, RI 02920-8479
Tel. 877-737-3569

0+M 8/27/2004

Certified By: N. Milbert
PFS, Inc. Engineering

Summary of Calibration Data

Nominal Inlet Diameter	Beta Ratio	Flow Calibration Facility	Standard HVT Discharge Coefficient	Inlet Tap Factor	Actual Discharge Coefficient	Flow Calibrated Discharge Coefficient	Discharge Coefficient Deviation	n
2.00	0.4822	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	1.0000	0.9900	0.9888	-0.12%	1
2.00	0.5018	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	1.0000	0.9900	0.9919	+0.19%	2
6.00	0.3142	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9935	+0.35%	3
6.00	0.4730	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	0.9884	0.9785	0.9748	-0.38%	4
6.00	0.5999	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9906	+0.06%	5
6.00	0.5999	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9899	-0.01%	6
6.00	0.5999	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9814	0.9716	0.9728	+0.12%	7
6.00	0.5999	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9814	0.9716	0.9720	+0.04%	8
10.00	0.3601	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9868	-0.32%	9
10.00	0.4738	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9907	0.9808	0.9827	+0.19%	10
10.00	0.7059	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9912	+0.12%	11
10.00	0.7060	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9907	+0.07%	12
10.00	0.7060	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9917	+0.17%	13
10.00	0.7507	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9452	0.9357	0.9365	+0.08%	14
10.00	0.7507	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9452	0.9357	0.9362	+0.05%	15
10.00	0.7555	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9432	0.9338	0.9364	+0.28%	16
12.00	0.5875	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9934	+0.34%	17
12.00	0.5875	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9779	0.9681	0.9716	+0.36%	18
18.00	0.4996	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9865	-0.35%	19
18.00	0.4996	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9916	0.9817	0.9805	-0.12%	20
20.00	0.6307	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9922	+0.22%	21
24.00	0.5240	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9899	-0.01%	22
24.00	0.5240	ARL, Bldg. 2 - Master	0.9900	0.9897	0.9798	0.9790	-0.08%	23
24.00	0.5262	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9923	+0.23%	24
24.00	0.5262	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9874	-0.26%	25
24.00	0.5263	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9909	+0.09%	26
24.00	0.5378	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9832	0.9734	0.9755	+0.22%	27
29.00	0.5184	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9898	-0.02%	28
29.00	0.5184	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9902	0.9803	0.9812	+0.09%	29
29.00	0.5205	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9891	-0.09%	30
29.00	0.5205	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9900	0.9801	0.9812	+0.11%	31
29.00	0.5206	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9897	-0.03%	32
29.00	0.5206	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9900	0.9801	0.9798	-0.03%	33
36.00	0.5828	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9867	-0.33%	34
36.00	0.5828	ARL, Bldg. 2 - Master	0.9900	0.9836	0.9738	0.9721	-0.17%	35
48.00	0.5271	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9895	-0.05%	36
48.00	0.5271	ARL, Bldg. 2 - Master	0.9900	0.9894	0.9795	0.9778	-0.17%	37
48.00	0.5294	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9894	-0.06%	38
48.00	0.5294	ARL, Bldg. 2 - Master	0.9900	0.9893	0.9794	0.9829	+0.36%	39

Reynolds Number Range: 60 000 to 4 300 000

- σ = Standard Deviation $= \pm\sqrt{\dfrac{\Sigma\Delta C^2}{n-1}} = \pm 0.202\%$ of C
- R = Reproducibility of C for a New Meter $= 2\sigma = \pm 0.404\%$ of C
- P = C Precision $= \pm\dfrac{t \times \sigma}{\sqrt{n}} = \pm 0.065\%$ of C

  t = 2.02 = Student's t for 95% confidence level for 38 (n - 1) degrees of freedom
- A_B = Bench Calibrated C Accuracy $= \pm\sqrt{P^2 + R^2} = \pm 0.41\%$ of C

Certified by: ______________

D. Halmi, Engineering

Differential Producers - Working Flow Equations

The basic flow equation is derived in Section D. From this equation we compose the following working flow equations, each of which has a constant. The constants modify the ideal flow equation (Section D) for the flow and time units to be used; for the preference of using inches for length rather than feet; and for the fact that the ideal flow equation uses the differential pressure expressed in feet of line fluid at line temperature and pressure while the working equations use inches of water at 68°F, 14.7 PSIA.

Equation 1: $$Q = \frac{\text{Constant } d^2\, C\, Y\, F_a \sqrt{h_w \frac{g}{g_o}}}{\sqrt{1-\beta^4}\ \sqrt{\rho_1}}$$

Equation 2: $$Q = \frac{\text{Constant } d^2\, C\, Y\, F_a \sqrt{\rho_1\, h_w \frac{g}{g_o}}}{\sqrt{1-\beta^4}}$$

Equation 3: $$SCFM = \frac{5.982\ d^2\, C\, Y\, F_a \sqrt{\rho_1\, h_w \frac{g}{g_o}}}{\sqrt{1-\beta^4}\ \rho_s}$$

Constants:

	Cubic Feet Eq. 1	Gallons Eq. 1	Liters Eq. 1	Pounds Eq. 2
Second	0.09970	0.7458	2.823	0.09970
Minute	5.982	44.748	169.39	5.982
Hour	358.92	2684.9	10163.2	358.92
Day	8614.1	64438.0	243197.0	8614.1

Symbol ... Explanation ... Unit

A_B = Accuracy of Bench Calibrated C.... ±% of C
A_F = Accuracy of Flow Calibrated C.... ±% of C
C = Coefficient of Discharge .... Ratio
C_B = Bench Calibrated C .... Ratio
C_F = Flow Calibrated C .... Ratio
D = Inlet Diameter .... Inches
d = Throat Diameter .... Inches
F_a = Thermal Expansion Factor ..... Ratio
g = Local Gravitational Acceleration ..... ft/sec²
g_o = Standard Gravitational Acceleration ... ft/sec² (g_o = 32.174 ft/sec²)
G = Specific Gravity .....Ratio
HL = Headloss in % of differential....%
HL_b = Headloss at R_{Db}....%
h_w = Differential Pressure ... Inches of Water 68°F, 14.7 PSIA

$$I_C = \text{Cavitation Index} = \frac{144\,(P_1 - 0.0361\,h_W - P_W)}{VH_2\,\rho_2}$$

P_w = Liquid Vapor Saturation Pressure at Line Pressure .....PSIA
P_1 = Inlet Static Pressure ....PSIA
P_2 = Throat Static Pressure .... PSIA
R_D = Pipe Reynolds Number... Ratio
R_D= (6.32 x lb/hr)/μD
R_{Db}= R_D Value at Which HL_b Was Determined .... Ratio
RH = Relative Humidity .... %
T_1 = Inlet Temperature ..... °R
VH_1 = Velocity Head in Inlet ... Ratio

$$VH_1 = \frac{V_1^2}{64.348}$$

VH_2 = Velocity Head in Throat ... Ratio
V_1 = Average Inlet Velocity .... ft/sec
V_2 = Average Throat Velocity .... ft/sec
Y = Expansion Factor ... Ratio
Z_1 = Compressibility Factor at Inlet Conditions ... Ratio
β = d/D = Beta Ratio .... Ratio
μ = Absolute Viscosity ... centipoise
ρ_s = Fluid Density at Standard Conditions ... lb/ft³
ρ_1 = Fluid Density at Inlet Conditions ... lb/ft³
ρ_2 = Fluid Density at Throat Conditions ... lb/ft³

Effects of Installation

The differential pressure produced by an HVT is, to a governing extent, an indirect indication of the difference in kinetic energy content of the flowing fluid at the inlet and throat tap cross sections of the meter. Since the same flow rate can possess different kinetic energy contents (depending on the approaching flow pattern), that same flow rate can produce different differential pressures, thus causing errors in the indicated rate of flow.

Irregular flow patterns, which alter the "normal" C value and/or behavior, can be caused by the individual or combined effects of:

- Pipe Reynolds Number (R_D),
- Pipe surface roughness, shape, and diameter irregularities,
- Upstream fittings (elbow, increaser, etc.), and
- Downstream fittings. For HVTs with full or truncated recovery cones, this effect is zero.

The C effect of R_D is treated in Section E.

The C effects of some common fittings are shown in the "*Typical Installation Effects*" chart on page B10. From it we may conclude:

1. Corner inlet tapping increases the flow pattern sensitivity.
2. The C effect of nonrotational irregular flow patterns caused by a decreaser, increaser, single elbow, or tee are self-attenuating: the longer the upstream straight pipe, the lesser the effect.
3. The single elbow C effect is sensitive to orientation but preserves the direction of the effect, i.e., in the same orientation at different cross sections, the sign of the C deviation stays the same. Consequently, HVTs should be tapped as shown to permit the use of the presented data.
4. Diminishing the beta ratio diminishes the C effect.
5. Rotational flow patterns (two elbows, for example, direct-coupled in orthogonal planes) cause self-preserving C effects (40 pipe diameters of straight pipe between the disturbance and the meter is not enough to eliminate errors). Also, the errors vary in magnitude and sign with distance after the location of the disturbance, keeping orientation constant.

The following tools are offered for reducing the effects of irregular flow patterns:

- Use a smaller beta ratio.
- Use static inlet tapping instead of corner inlet tapping.
- Use a longer straight pipe upstream.
- Use flow straighteners for normalizing rotational flow patterns, but consult PFS before using them. **Improper use of flow straighteners can introduce greater errors than the ones they are expected to eliminate!**

Normal Flow Pattern Effects

A review of the thoughts presented below should help achieve the required field installed accuracy for HVTs with reliability.

Both experience and theory indicate that different flow calibrations performed on a flow meter in different water calibrating facilities can yield different C values. This deviation, however, may be significantly greater than can be accounted for in the precision of the C data and justifiable bias errors in the flow calibrations. Given properly designed hydraulic laboratories with properly executed flow calibrations, the precision of C is calculated from the calibration data, while the bias errors are estimates based on "historical" data. Since the precision and bias are "*known,*" the only recognized "*unknown*" is the effect which laboratory flow patterns (judged "normal") have on the discharge coefficient of the flow meter.

Typical Installation Effects

The table below was derived from flow test data. The accuracy of the tests, in view of the purpose for which they are used, is $\pm[0.25(\beta/0.7)^4]\%$. Meteringly similar flow disturbers should give similar effects.

Since HVTs have sufficiently long recovery Cones, a flow disturber coupled directly to its Outlet will have no effect on the throat pressure Sensation. Thus, it does not impair the accuracy of the flow measurement. The table below should Be used as follows:

- To secure the "normal" accuracy for the flow Measurement, the HVT should be located at a Distance following the disturber as indicated On the graph for the type of disturber, inlet Tapping, and beta ratio of the HVT.
- If there is insufficient piping available to Secure normal accuracy, read the disturbance Effect from the graph for the beta used and for the length of upstream pipe available.

Calculate the accuracy for the Metering section as follows:

Installed Accuracy = $(A_B + \Delta C)$
Where A_B from page E5 is:

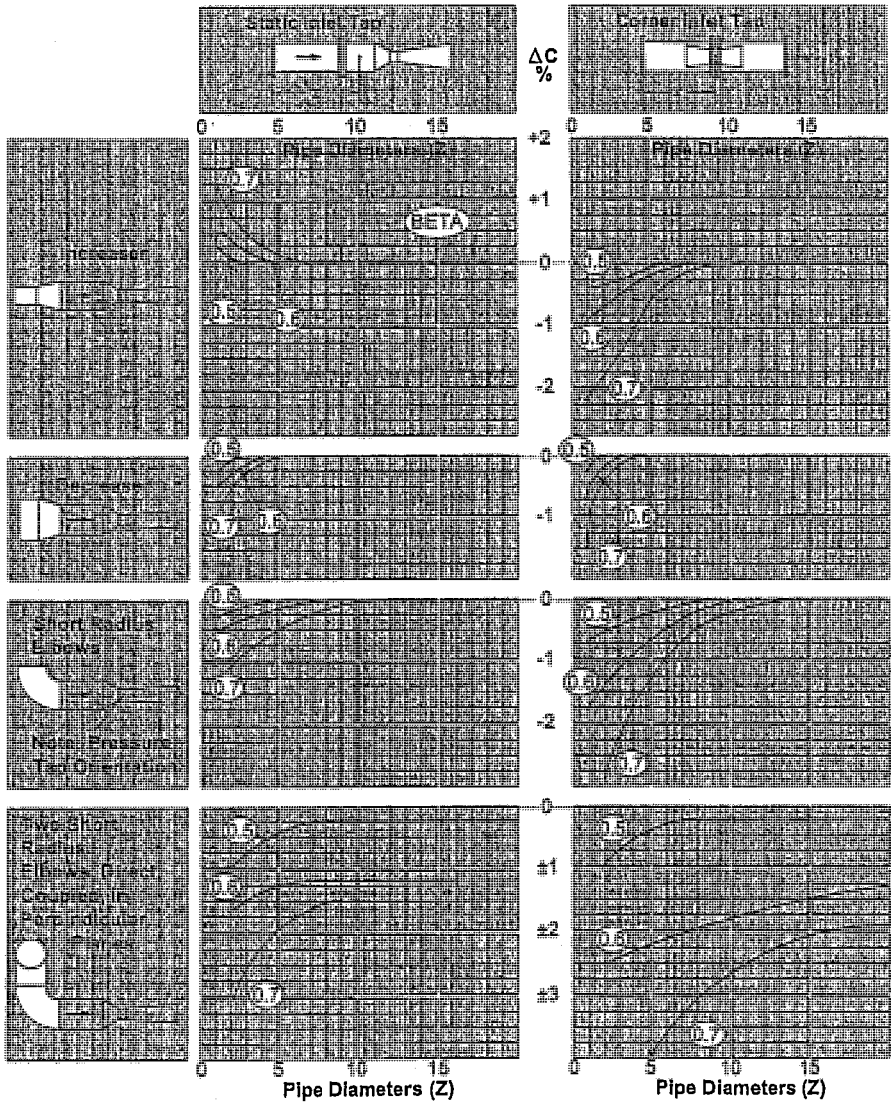
For static inlet tapped HVTs,

ß	A_B
0.5000	±0.50%
0.6000	±0.50%
0.7000	±0.50%

For corner inlet tapped HVTs,

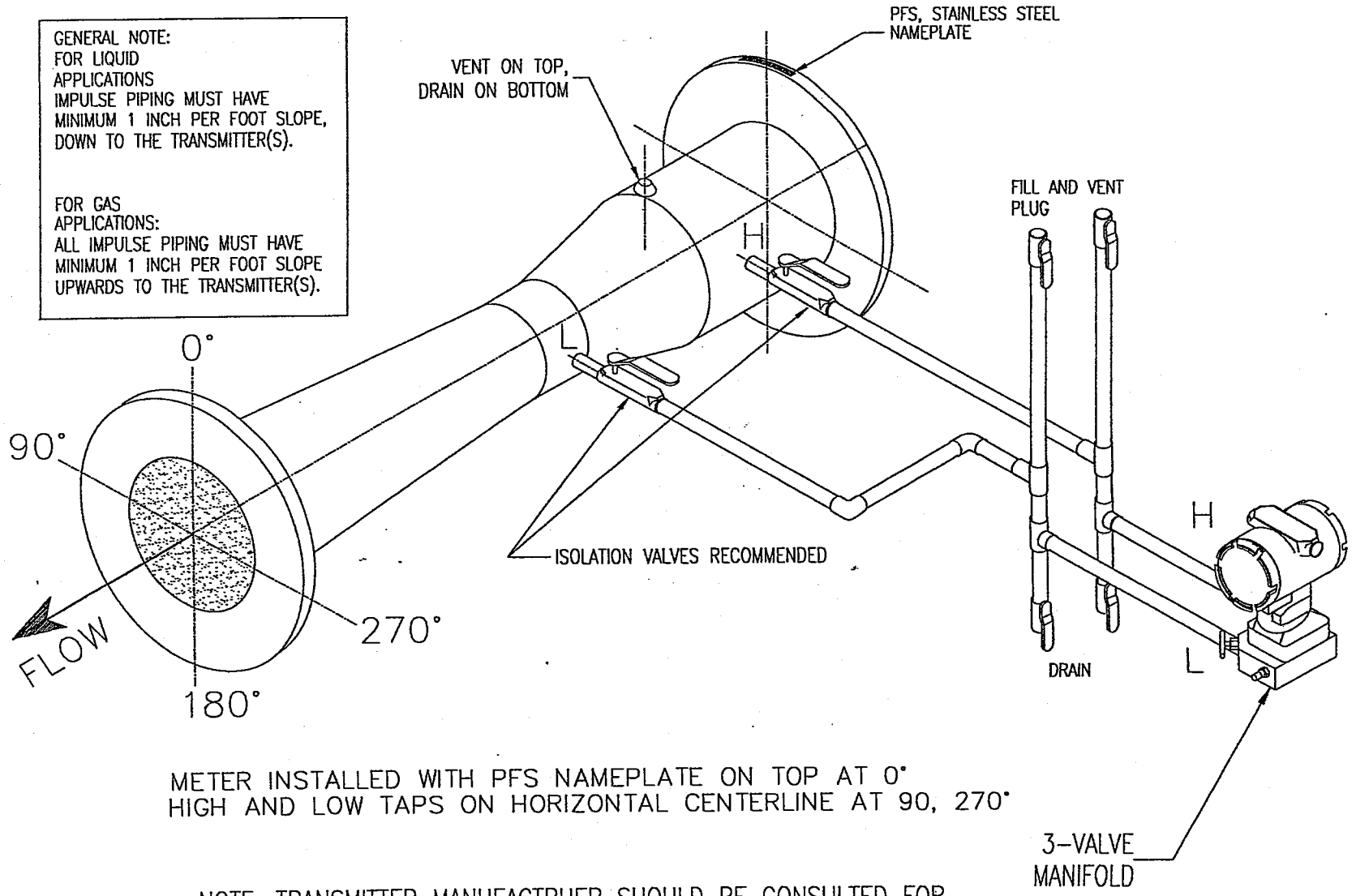
ß	A_B
0.5000	±0.50%
0.6000	±0.50%
0.7000	±0.53%

- Use flow straighteners only To stop swirls as in the case of two elbows which are direct-coupled in 90° planes. Contact PFS for design. **Improperly used straight-enres may cause greater errors than the ones they are supposed to eliminate.**
- For the effects of other types of disturbers or of disturbers in series, contact PFS.



GENERAL NOTE:
FOR LIQUID APPLICATIONS
IMPULSE PIPING MUST HAVE MINIMUM 1 INCH PER FOOT SLOPE, DOWN TO THE TRANSMITTER(S).

FOR GAS APPLICATIONS:
ALL IMPULSE PIPING MUST HAVE MINIMUM 1 INCH PER FOOT SLOPE UPWARDS TO THE TRANSMITTER(S).



METER INSTALLED WITH PFS NAMEPLATE ON TOP AT 0°
HIGH AND LOW TAPS ON HORIZONTAL CENTERLINE AT 90, 270°

NOTE: TRANSMITTER MANUFACTRUER SHOULD BE CONSULTED FOR THEIR RECOMMENDED MOUNTING ORIENTATION.

DATE:	SCALE:	IDENTIFICATION:
8/26/04	1/16	GENERAL PIPING FOR SINGLE RANGE METERING
DWN BY: DAB	QUOTE:	

PRIMARY FLOW SIGNAL, INC.
117 PETTACONSETT AVE.
CRANSTON, RHODE ISLAND 02920-8479
TEL (877) 737-3569 FAX (401) 461-4450

Preventive Maintenance

1. Check Flange and Pressure Tap Connections for Leaks	Annually	By Instrumentation Operator or Mechanical Personnel
2. Inspect Exterior Finish For Scrapes, Dings, or Blistering	Annually	By Instrumentation Operator or Mechanical Personnel

- No special tools or skills are necessary for preventive maintenance tasking.
- No preventive maintenance parts list is applicable.

Corrective Maintenance

In case of loss-of-signal or erratic output, check taps and impulse piping to secondary instrumentation for blockage or debris. Check impulse piping for leaks, trapped condensation (in the case of compressible gas flow), or trapped air (in the case of liquid flow). In case of blockage, purge lines with air or water (as is appropriate) pressurized to approximately 30 PSI above line pressure.

WARNING: **IN NO CASE SHOULD FLUSHING PRESSURE EXCEED THE DESIGN PRESSURE OF THE PROCESS OR IMPULSE PIPING**

In case of trapped condensate or trapped air, remove by use of bleed valves or plugs, or through the manifold at the flow transmitter.

Stop leaks by tightening, resealing, or regasketing as necessary.

Touch-up exterior finish with the same or a compatible coating system as necessary.

There are no test points, adjustments, or user-serviceable parts in the HVT venturi meter, nor is there any assembly or disassembly. If problems persist, contact the local PFS Sales Representative or service organization, or contact Primary Flow Signal, Inc. directly.

- Corrective maintenance can be performed by mechanical or plant personnel.
- No special tools are required for corrective maintenance.

Spare Parts

The venturi meters provided on this project were designed and manufactured specifically for this project. The HVT product line has no moving or removable parts.

There is no parts list and there is no recommended stocking level.

PRIMARY FLOW SIGNAL, INC.
117 Pettaconsett Avenue
Cranston, Rhode Island 02920-8479
Tel (877) 737-3569
Fax (401) 461-4450

Safety

Prior to Start-Up:	Determine that the meter is properly installed. The venturi meter is a piping component and should be handled accordingly with the same precautions. DO NOT HANDLE METER FROM ITS INSIDE.
	Determine that the pressure connections are properly made and are appropriate for the intended service.
	Determine that the meter has been installed in strict conformance with the "Installation Directions" included in this manual.
	If the meter appears damaged in any way, contact the local PFS Sales Representative or service organization, or contact Primary Flow Signal, Inc. directly.
At Start-Up:	Do not over-pressurize the meter. Refer to approval drawing for design pressure.
	Do not subject meter to shock pressures or water hammer.
	When filling pipe line, bleed-off air in the proper fashion.
After Start-Up:	Do not over-pressurize meter. Refer to approval drawing for design pressure.
	Do not subject meter to shock pressures or water hammer.
	Conform to "Preventive Maintenance" procedures included in this manual.

PRIMARY FLOW SIGNAL, INC.
117 Pettaconsett Avenue
Cranston, Rhode Island 02920-8479
Tel (877) 737-3569
Fax (401) 461-4450

BRUCE HAMLER WATER TREATMENT
FACILTIY UPGRADE
ROME, GEORGIA

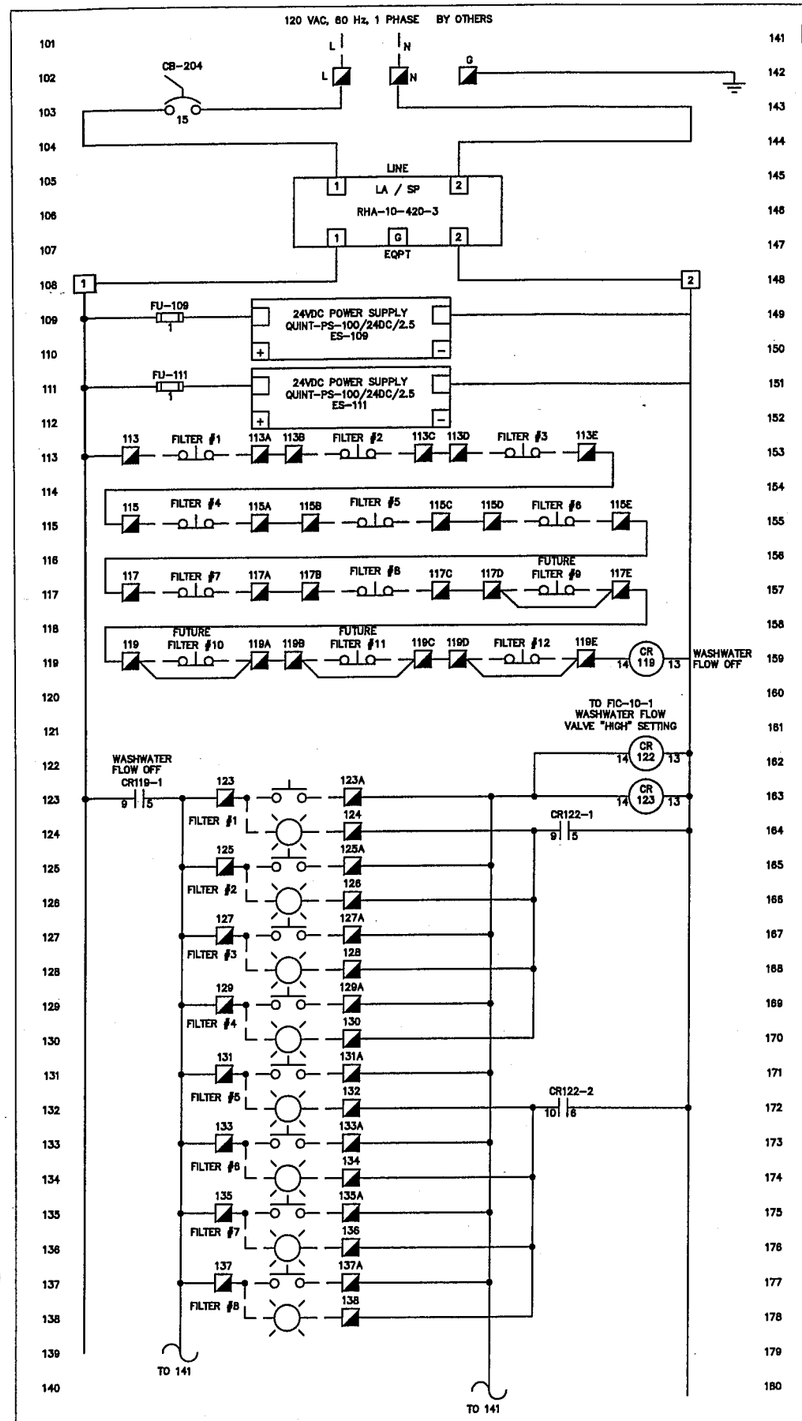
DRAWING:	DESCRIPTION:
686-CS-01	COVER SHEET, DRAWING INDEX
	CP-10-1 MAIN FITLER CONTROL PANEL
686A-ED-01	CP-10-1 ELECTRICAL DIAGRAM
686A-ED-02	CP-10-1 ELECTRICAL DIAGRAM
686A-ED-03	CP-10-1 ELECTRICAL DIAGRAM
686A-ED-04	CP-10-1 ELECTRICAL DIAGRAM
686A-ED-05	CP-10-1 ELECTRICAL DIAGRAM
686A-MD-01	CP-10-1 PANEL LAYOUT
	CP-12-1 CHLORINE & pH MONITORING
686B-ED-01	SHEET SAVED FOR FUTURE
686B-ED-02	CP-12-1 ELECTRICAL DIAGRAM
686A-MD-01	CP-12-1 PANEL LAYOUT
	MODIFICATION TO EXISTING PANELS
686C-MD-01	TYPICAL FILTER CONSOLE LAYOUT
686D-MD-01	MODIFICATION TO CENTERAL INSTRUMENT PANEL
	BOOSTER PUMP CONTROL
686E-ED-01	BOOSTER PUMP CONTROL ELECTRICAL DIAGRAM
686E-MD-01	BOOSTER PUMP CONTROL PANEL LAYOUT

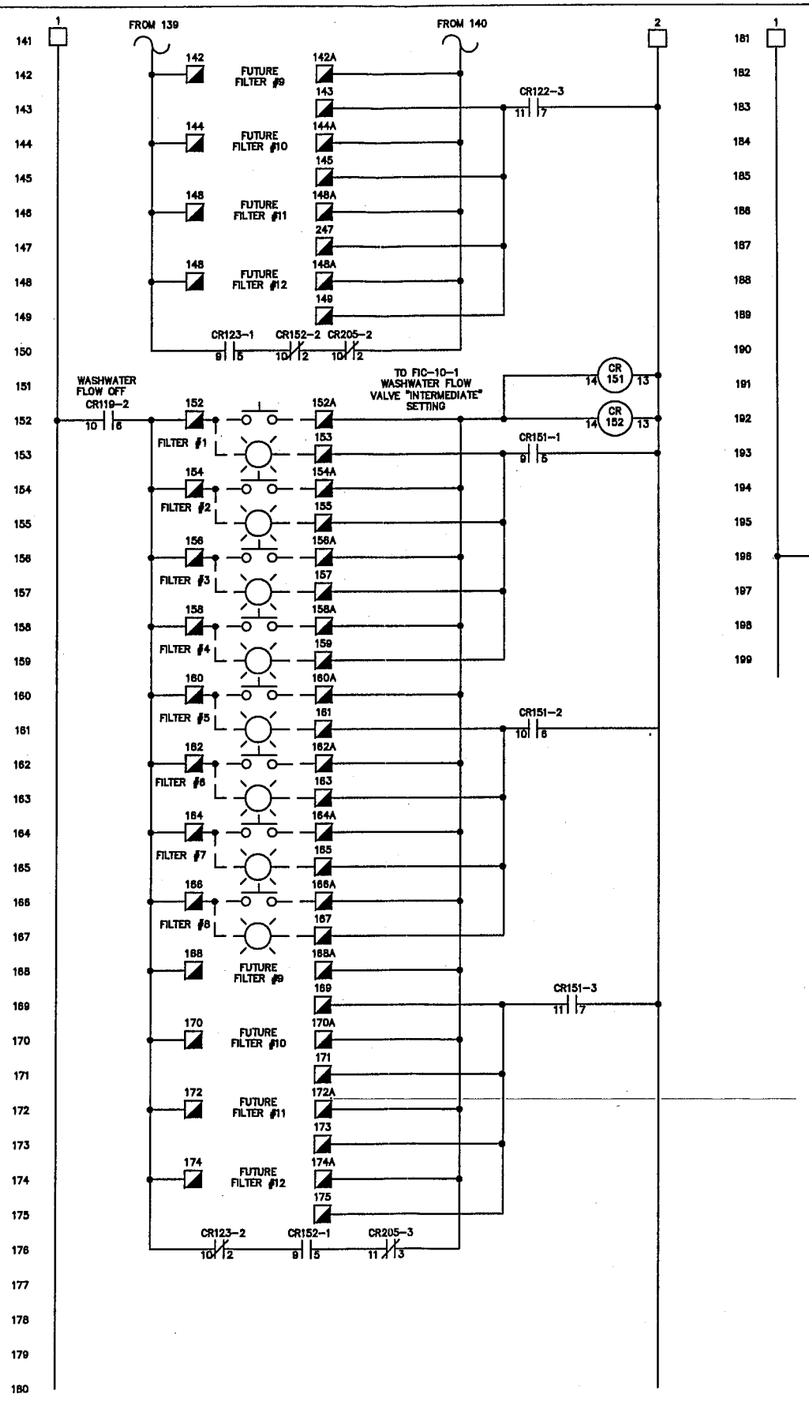
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1				6			
2				7			
3				8			
4				9			
5				10			

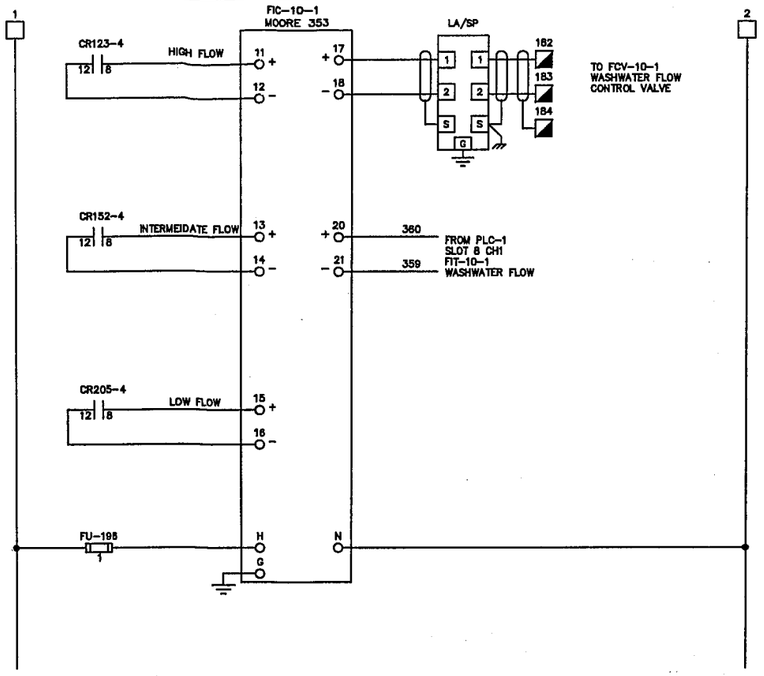
C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

COVER SHEET
BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
ANL		N/A		686-CS	1 of 1
FILE		DATE	JOB NO.		
686-CS-01		01/01/05	686		







LEGEND :

- EXISTING CONSOLE WIRING
- FIELD WIRING BY CONTRACTOR
- TERMINALS FOR FIELD WIRING
- EQUIPMENT NOT SUPPLIED BY C2i
- REVISION
- TERMINALS FOR PANEL WIRING

COLOR CODE :

EQUIPMENT GROUND	GREEN
120 VAC POWER	BLACK
120 VAC POWER NEUTRAL	WHITE
120 VAC CONTROL (INTERNALLY POWERED)	RED
120 VAC CONTROL (EXTERNALLY POWERED)	YELLOW
24 VDC CONTROL	ORANGE
12V DC POWER (+)	RED
12V DC POWER (-)	BLACK
24V DC POWER (+)	BLUE
24V DC POWER (-)	GREY

WIRE GAUGE :

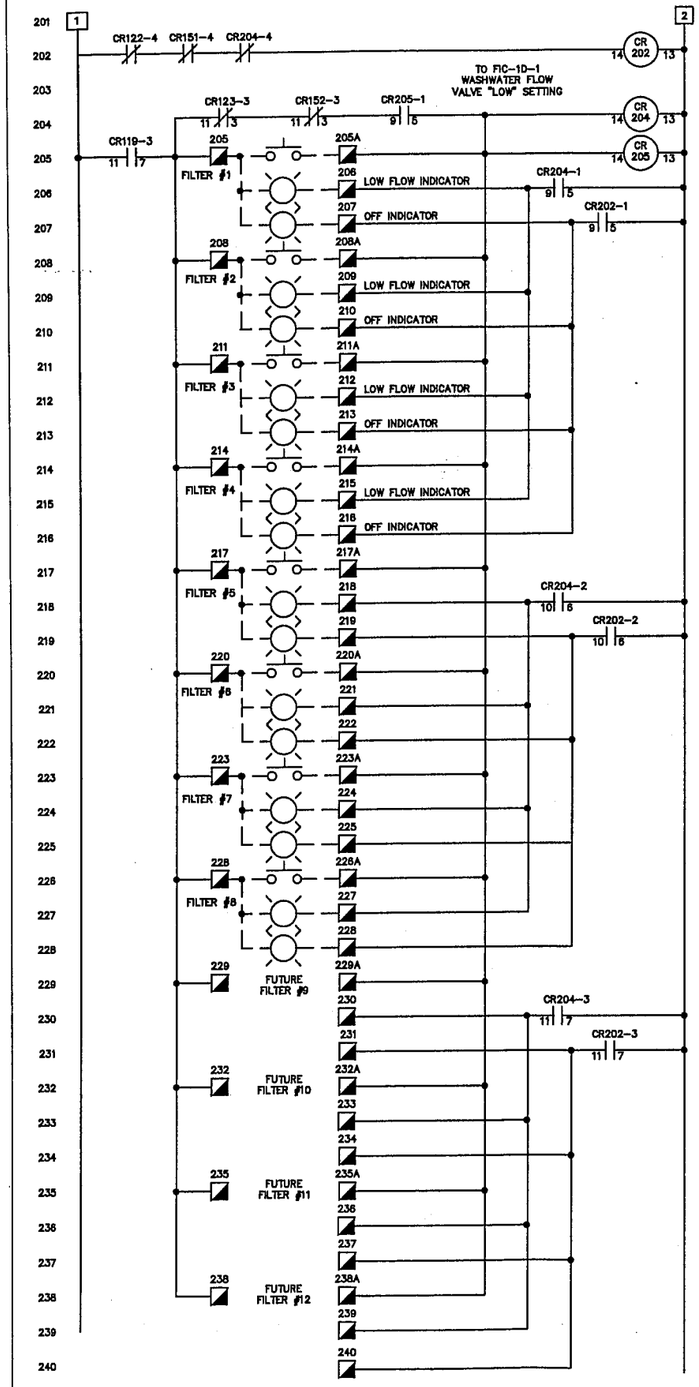
AC POWER	MTW 105° C #14 AWG	SHIELDED CABLE :	
AC/DC	MTW 105° C #16 AWG	WHITE	SIGNAL POSITIVE
ANALOG	BELDEN 8760 #18AWG	BLACK	SIGNAL NEGATIVE
		RED	REFERENCE

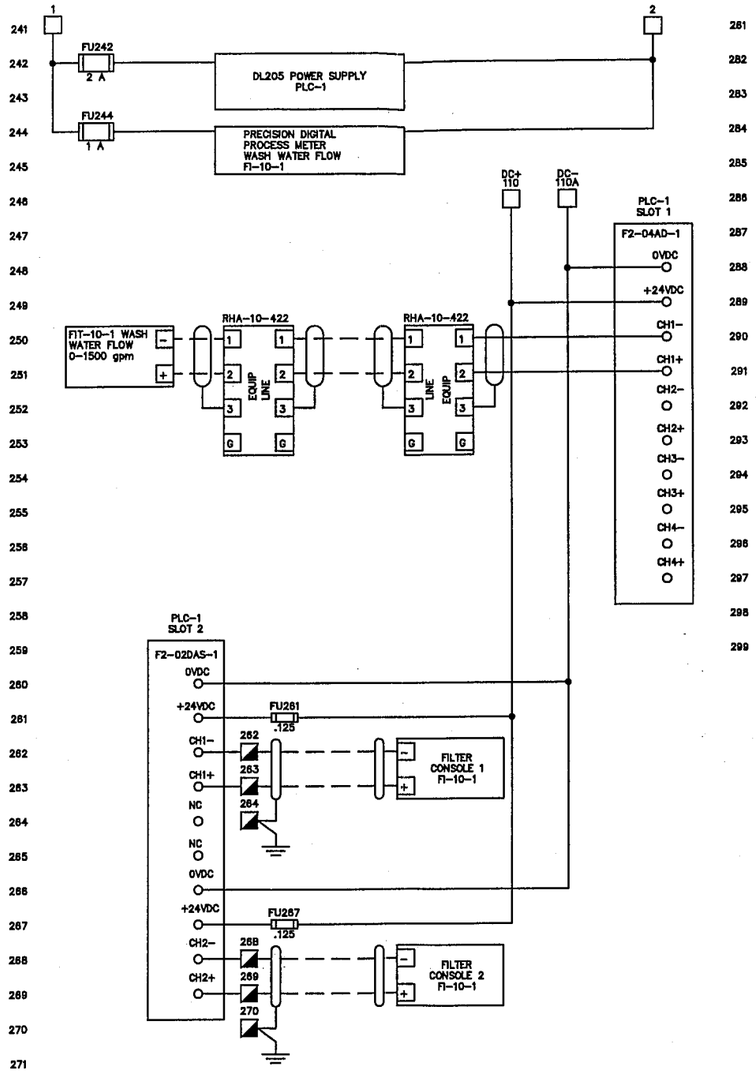
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1	4/11/05	ADDED PLC & SLOT NO.	RVW	6			
2	4/18/05	ADDED DESC. FOR CR-119	RVW	7			
3	5/1/05	AS BUILT	RVW	8			
4				9			
5				10			

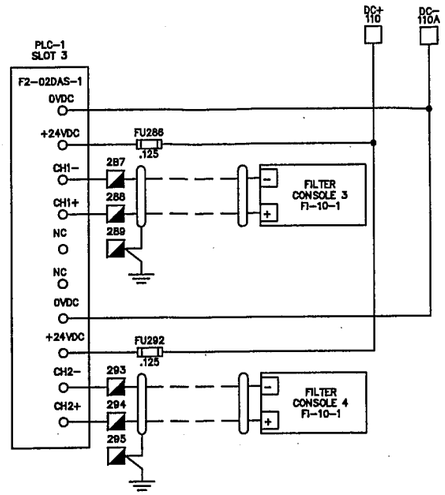
C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

ELECTRICAL DIAGRAM
CP-10-1 MAIN FILTER CONTROL PANEL
BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW		N/A		686A-ED	01
FILE 686A-ED-01		DATE 03/01/05	JOB NO. 686		







LEGEND :

EXISTING CONSOLE WIRING

FIELD WIRING BY CONTRACTOR

TERMINALS FOR FIELD WIRING

EQUIPMENT NOT SUPPLIED BY C2I

REVISION

TERMINALS FOR PANEL WIRING

WIRE GAUGE :

AC POWER	MTW 105° C #14 AWG	
AC/DC	MTW 105° C #18 AWG	
ANALOG	BELDEN 8760 #18AWG	

COLOR CODE :

EQUIPMENT GROUND	GREEN
120 VAC POWER	BLACK
120 VAC POWER NEUTRAL	WHITE
120 VAC CONTROL (INTERNALLY POWERED)	RED
120 VAC CONTROL (EXTERNALLY POWERED)	YELLOW
24 VDC CONTROL	ORANGE
12V DC POWER (+)	RED
12V DC POWER (-)	BLACK
24V DC POWER (+)	BLUE
24V DC POWER (-)	GREY

SHIELDED CABLE :

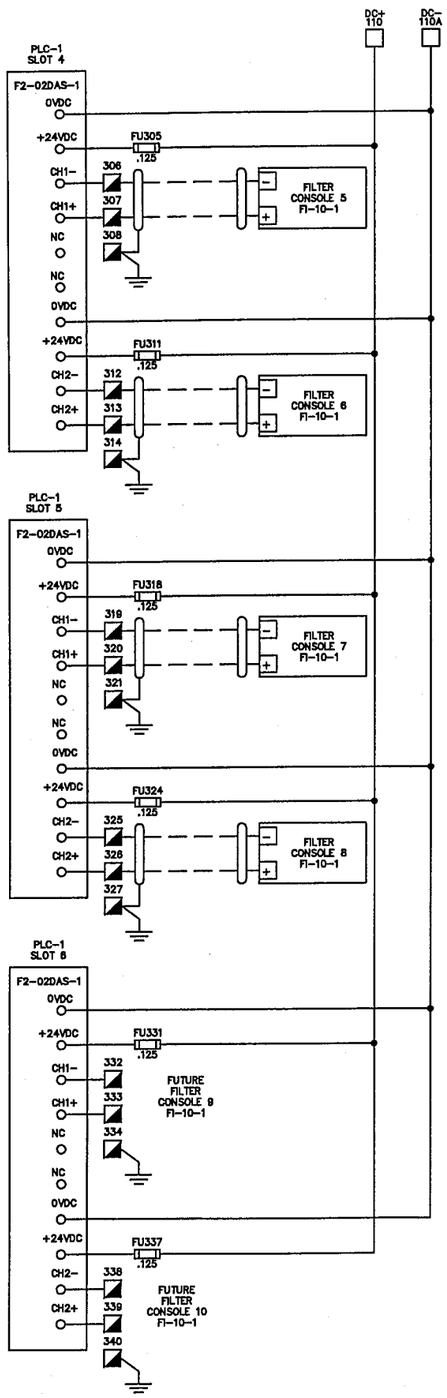
WHITE	SIGNAL POSITIVE
BLACK	SIGNAL NEGATIVE
RED	REFERENCE

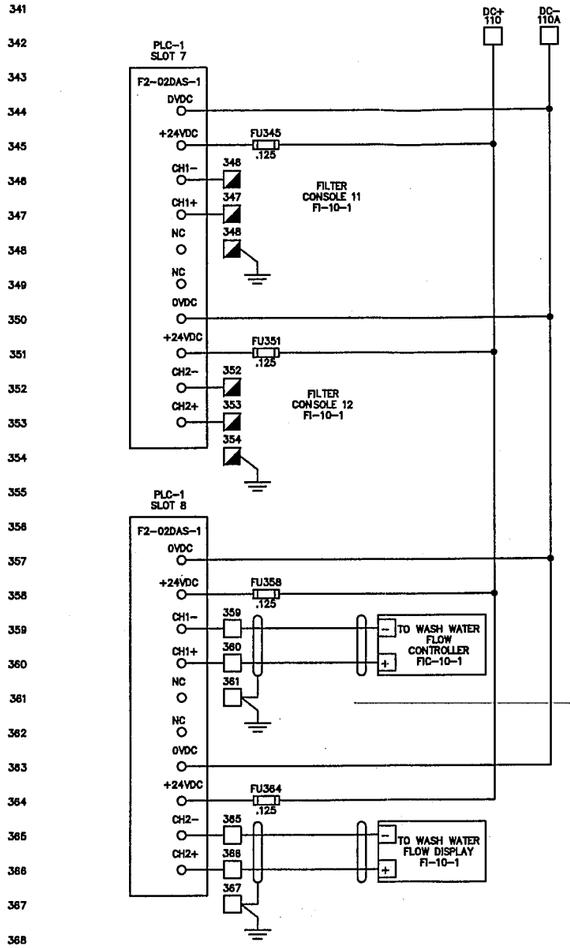
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1	4/11/05	ADDED PLC & SLOT NO.	RVW	6			
2				7			
3				8			
4				9			
5				10			

C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

ELECTRICAL DIAGRAM
CP-10-1 MAIN FILTER CONTROL PANEL
BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APP'VD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW		N/A		686A-ED	02
FILE 686A-ED-02		DATE 03/01/05	JOB NO. 686		





LEGEND :

- EXISTING CONSOLE WIRING
- FIELD WIRING BY CONTRACTOR
- TERMINALS FOR FIELD WIRING
- EQUIPMENT NOT SUPPLIED BY C2I
- REVISION
- TERMINALS FOR PANEL WIRING

WIRE GAUGE :

AC POWER	MTW 105° C #14 AWG	
AC/DC	MTW 105° C #16 AWG	
ANALOG	BELDEN 8760 #18AWG	

COLOR CODE :

EQUIPMENT GROUND	GREEN
120 VAC POWER	BLACK
120 VAC POWER NEUTRAL	WHITE
120 VAC CONTROL (INTERNALLY POWERED)	RED
120 VAC CONTROL (EXTERNALLY POWERED)	YELLOW
24 VDC CONTROL	ORANGE
12V DC POWER (+)	RED
12V DC POWER (-)	BLACK
24V DC POWER (+)	BLUE
24V DC POWER (-)	GREY

SHIELDED CABLE :

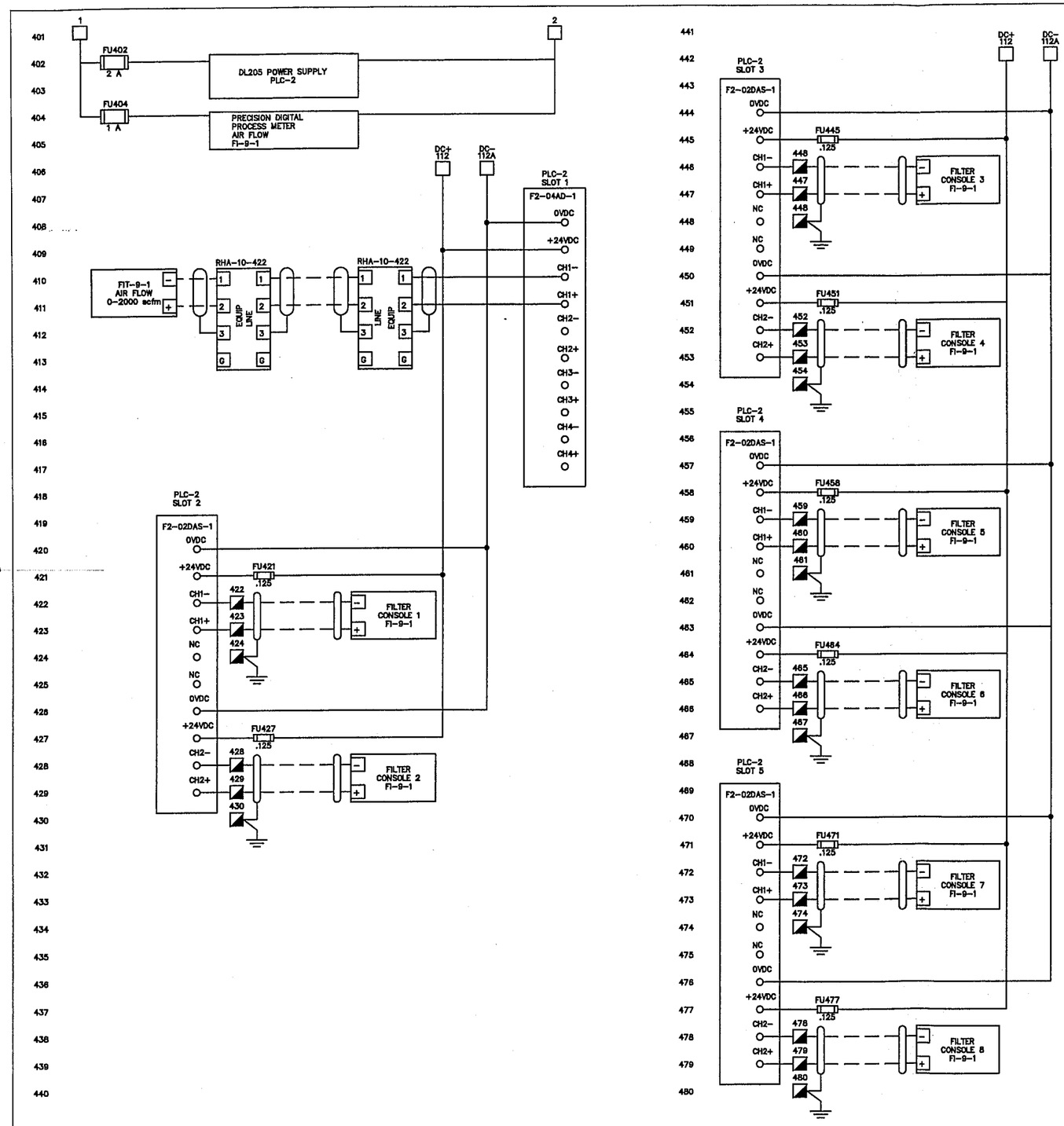
WHITE	SIGNAL POSITIVE
BLACK	SIGNAL NEGATIVE
RED	REFERENCE

NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1	4/11/05	ADDED PLC & SLOT NO.	RVW				

C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

ELECTRICAL DIAGRAM
CP-10-1 MAIN FILTER CONTROL PANEL
BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW				686A-ED	03
FILE 686A-ED-03.DWG		DATE 03/01/05	JOB NO. 686		



LEGEND :

- EXISTING CONSOLE WIRING
- FIELD WIRING BY CONTRACTOR
- TERMINALS FOR FIELD WIRING
- EQUIPMENT NOT SUPPLIED BY C2I
- REVISION
- TERMINALS FOR PANEL WIRING

WIRE GAUGE :

AC POWER	MTW 105° C #14 AWG	
AC/DC	MTW 105° C #18 AWG	
ANALOG	BELDEN 8760 #18AWG	

COLOR CODE :

EQUIPMENT GROUND	GREEN
120 VAC POWER	BLACK
120 VAC POWER NEUTRAL	WHITE
120 VAC CONTROL (INTERNALLY POWERED)	RED
120 VAC CONTROL (EXTERNALLY POWERED)	YELLOW
24 VDC CONTROL	ORANGE
12V DC POWER (+)	RED
12V DC POWER (-)	BLACK
24V DC POWER (+)	BLUE
24V DC POWER (-)	GREY

SHIELDED CABLE :

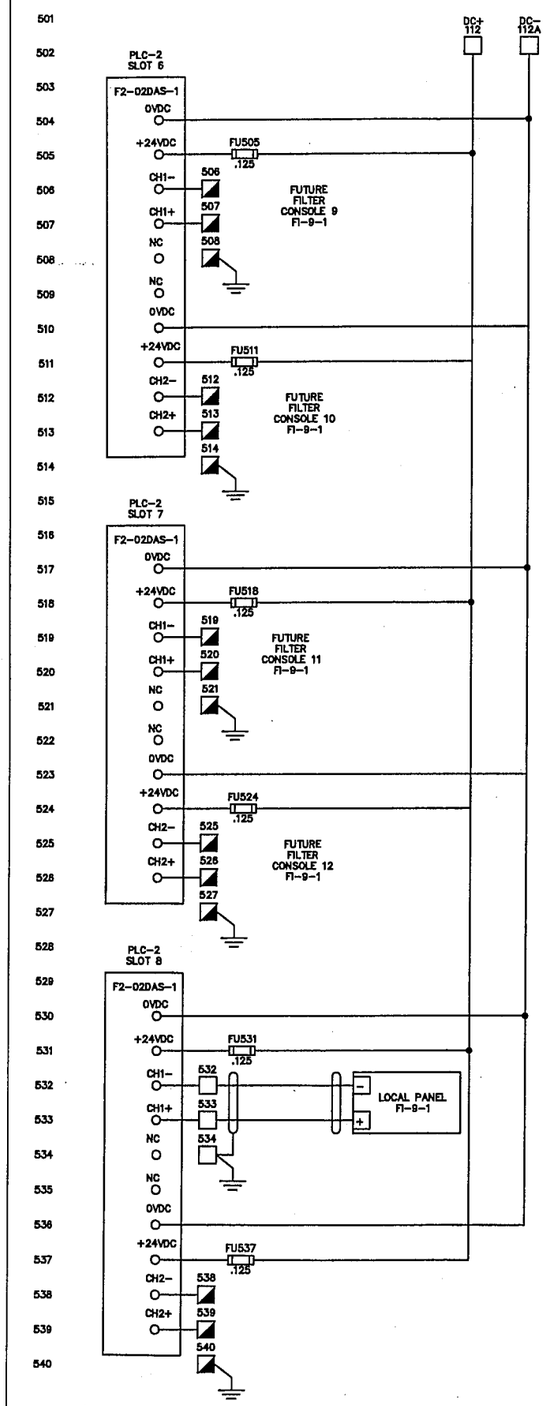
WHITE	SIGNAL POSITIVE
BLACK	SIGNAL NEGATIVE
RED	REFERENCE

NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1	4/11/05	ADDED PLC & SLOT NO.	RVW	6			
2				7			
3				8			
4				9			
5				10			

C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

ELECTRICAL DIAGRAM
CP-10-1 MAIN FILTER CONTROL PANEL
BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW		N/A		686A-ED	04
FILE 686A-ED-04		DATE 03/01/05	JOB NO. 686		



LEGEND :

- EXISTING CONSOLE WIRING
- FIELD WIRING BY CONTRACTOR
- TERMINALS FOR FIELD WIRING
- EQUIPMENT NOT SUPPLIED BY C2I
- REVISION
- TERMINALS FOR PANEL WIRING

COLOR CODE :

EQUIPMENT GROUND	GREEN
120 VAC POWER	BLACK
120 VAC POWER NEUTRAL	WHITE
120 VAC CONTROL (INTERNALLY POWERED)	RED
120 VAC CONTROL (EXTERNALLY POWERED)	YELLOW
24 VDC CONTROL	ORANGE
12V DC POWER (+)	RED
12V DC POWER (-)	BLACK
24V DC POWER (+)	BLUE
24V DC POWER (-)	GREY

WIRE GAUGE :

AC POWER	MTW 105° C #14 AWG	
AC/DC	MTW 105° C #18 AWG	
ANALOG	BELDEN 8760 #18AWG	

SHIELDED CABLE :

WHITE	SIGNAL POSITIVE
BLACK	SIGNAL NEGATIVE
RED	REFERENCE

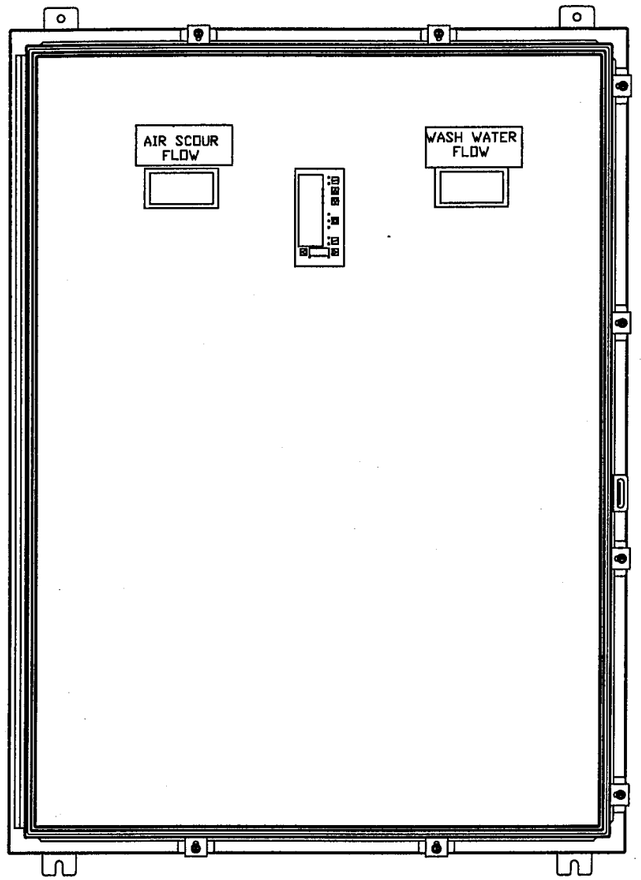
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1	4/11/05	ADDED PLC & SLOT NO.	RVW				

C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

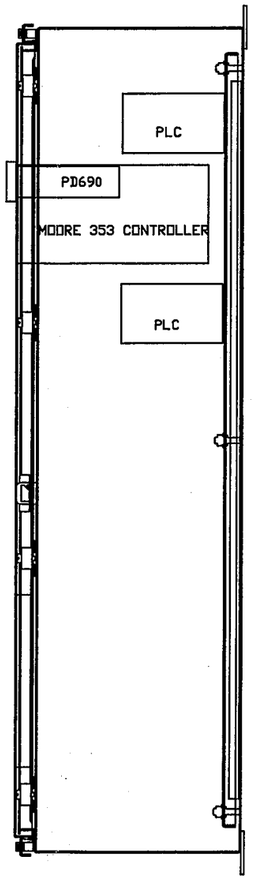
ELECTRICAL DIAGRAM
CP-10-1 MAIN FILTER CONTROL PANEL
BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

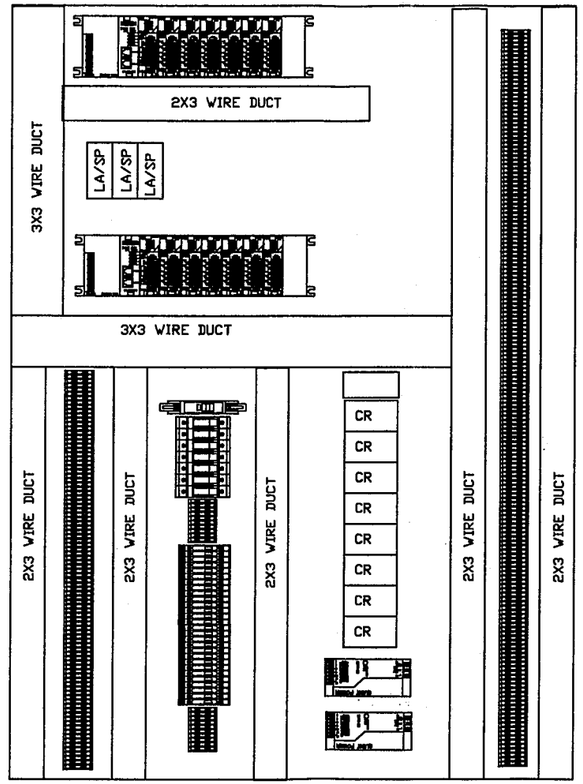
DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW				686A-ED	05
FILE 686A-ED-05		DATE 03/01/05	JOB NO. 688		

CP-10-1



HOFFMAN ENCLOSURE 48"H X 36"W X 12"D
P/N: A-48H3612SSLP





HOFFMAN BACK PANEL 45"H X 33"W
P/N: A-48P36

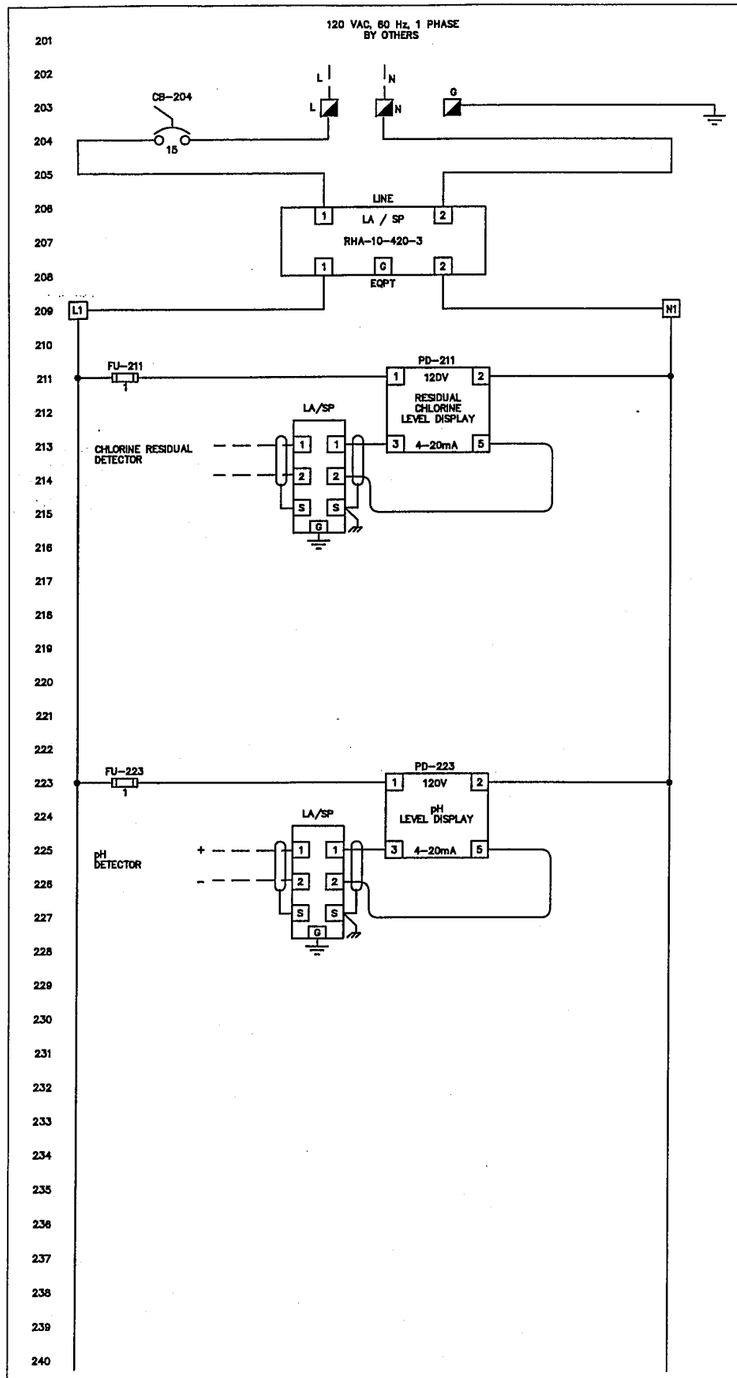
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY

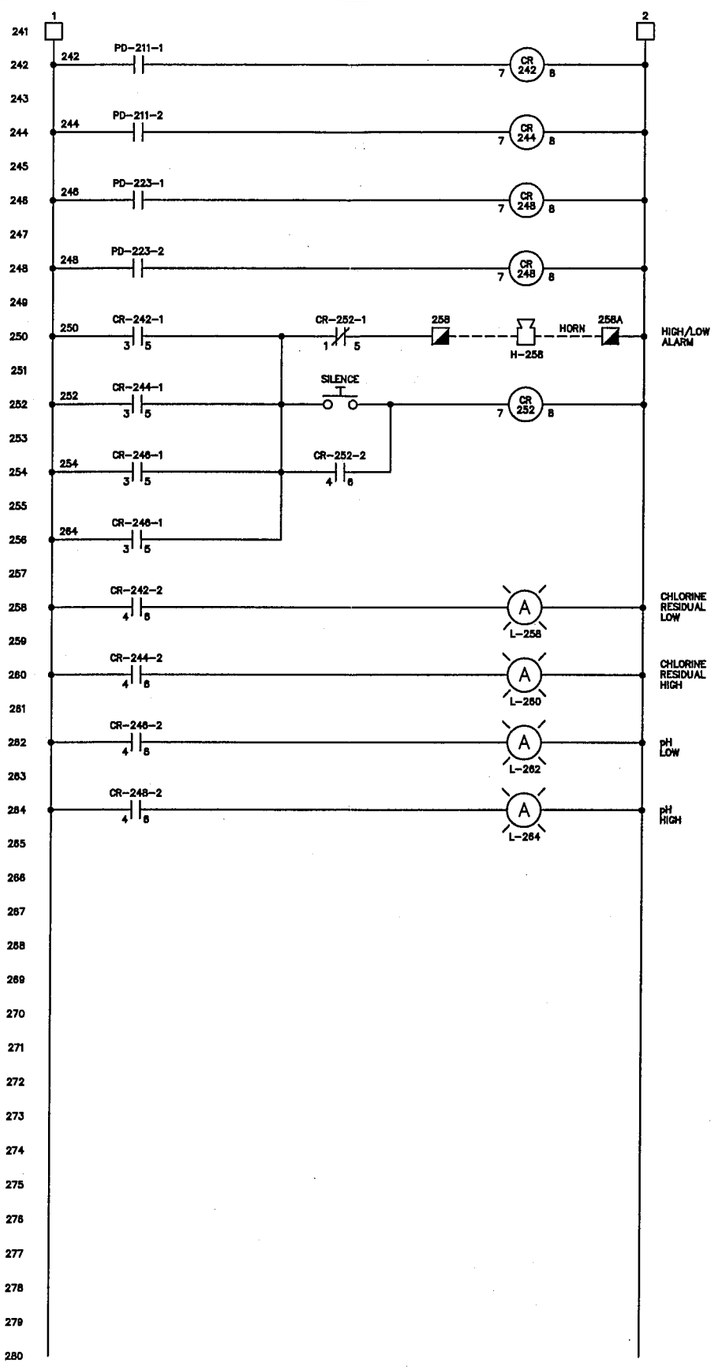
C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

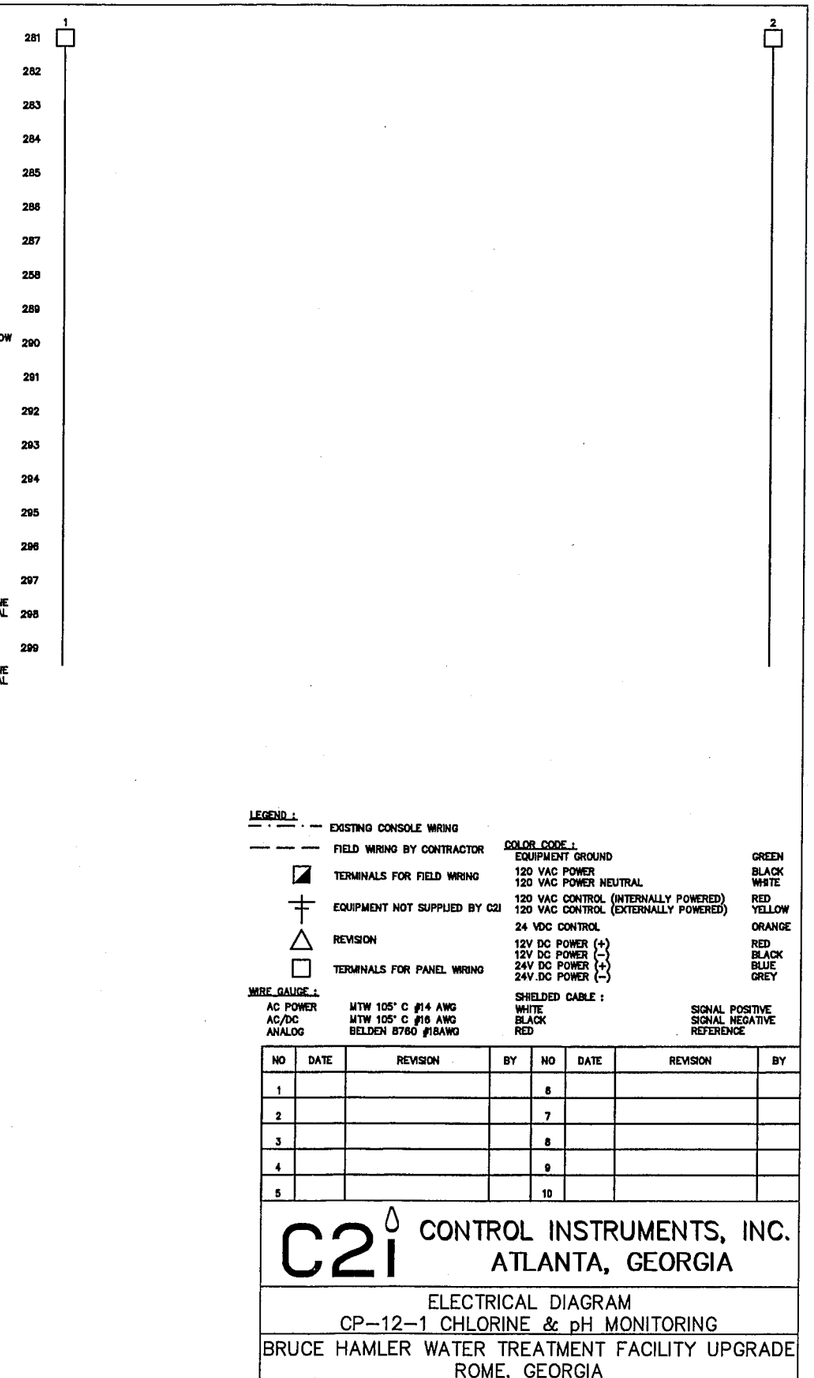
PANEL LAYOUT
CP-10-1 WASHWATER CONTROL PANEL

BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVV				686A-MD	01
FILE: 686A-MD-01.DWG		DATE: 2/1/05	JOB NO. 686		







LEGEND :

- EXISTING CONSOLE WIRING
- FIELD WIRING BY CONTRACTOR
- TERMINALS FOR FIELD WIRING
- EQUIPMENT NOT SUPPLIED BY C2I
- REVISION
- TERMINALS FOR PANEL WIRING

COLOR CODE :

EQUIPMENT GROUND	GREEN
120 VAC POWER	BLACK
120 VAC POWER NEUTRAL	WHITE
120 VAC CONTROL (INTERNALLY POWERED)	RED
120 VAC CONTROL (EXTERNALLY POWERED)	YELLOW
24 VDC CONTROL	ORANGE
12V DC POWER (+)	RED
12V DC POWER (-)	BLACK
24V DC POWER (+)	BLUE
24V DC POWER (-)	GREY

WIRE GAUGE :

AC POWER	MTW 105° C #14 AWG
AC/DC	MTW 105° C #16 AWG
ANALOG	BELDEN 8760 #18AWG

SHIELDED CABLE :

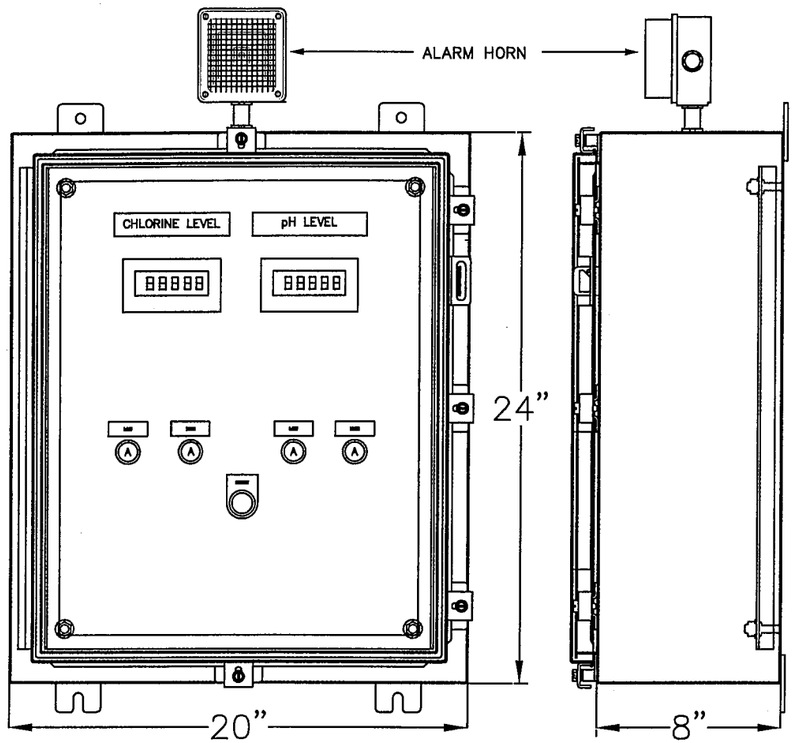
WHITE	SIGNAL POSITIVE
BLACK	SIGNAL NEGATIVE
RED	REFERENCE

NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1				6			
2				7			
3				8			
4				9			
5				10			

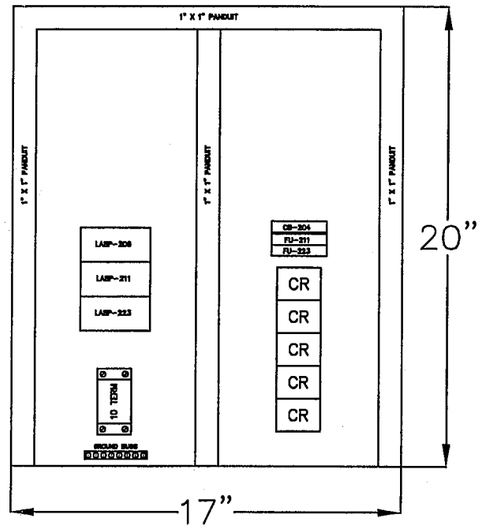
C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

ELECTRICAL DIAGRAM
CP-12-1 CHLORINE & pH MONITORING
BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
ANL		N/A		686B-ED	2 of 4
FILE 686B-ED-02		DATE 01/01/05	JOB NO. 686		



ENCLOSURE
HOFFMAN A–24H2008SSLP
24" H x 20" W x 08" D



LEGEND:
PILOT DEVICE COLOR REFERENCES:
A – AMBER
G – GREEN
R – RED

NOTES:
1. ALL EXTERIOR PANEL DEVICES HAVE BEEN SELECTED HEAVY DUTY.
2. ALL PANEL MOUNTED INDICATOR LIGHTS ARE PUSH TO TEST

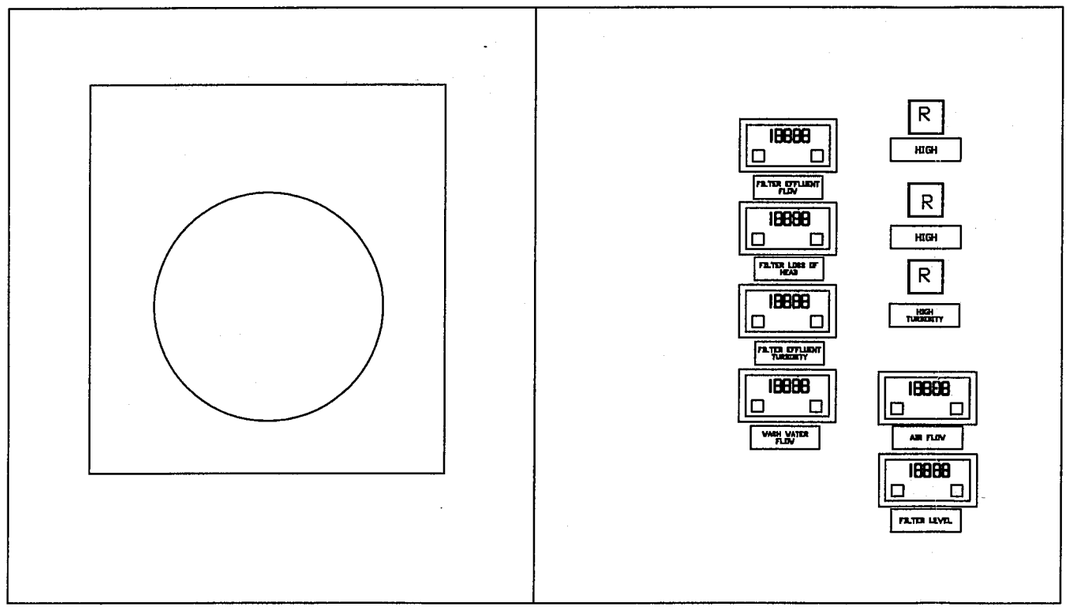
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1				6			
2				7			
3				8			
4				9			
5				10			

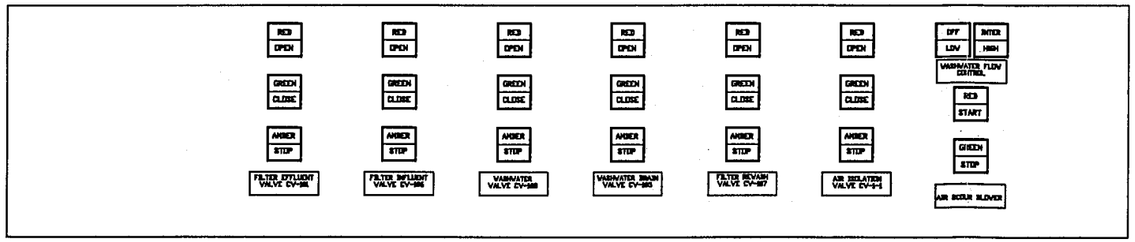
C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

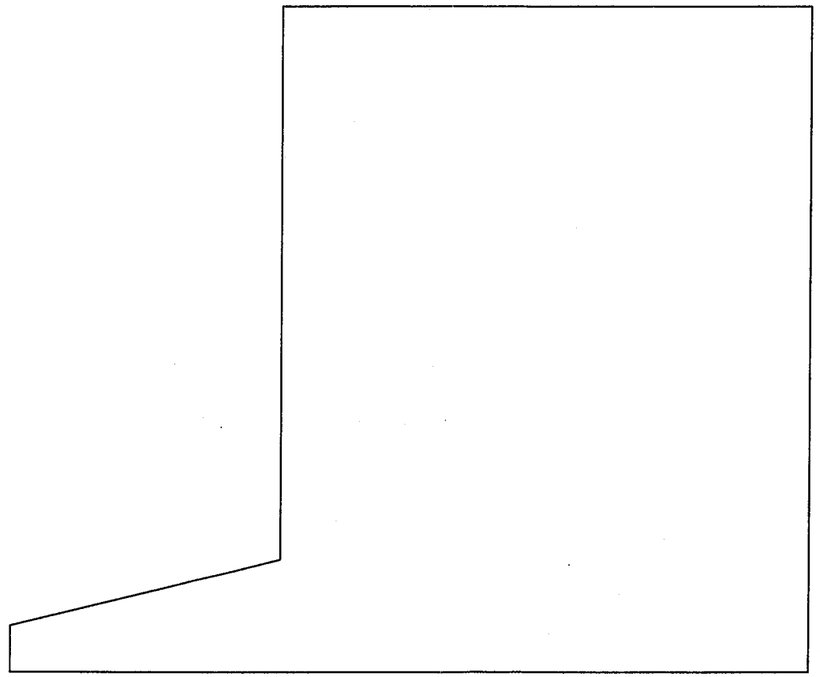
PANEL LAYOUT
CP–12–1 CHLORINE & pH MONITORING

BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
ANL		1"=1'		686B–MD	1 of 1
FILE		DATE	JOB NO.		
686B–MD–01		01/01/05	686		







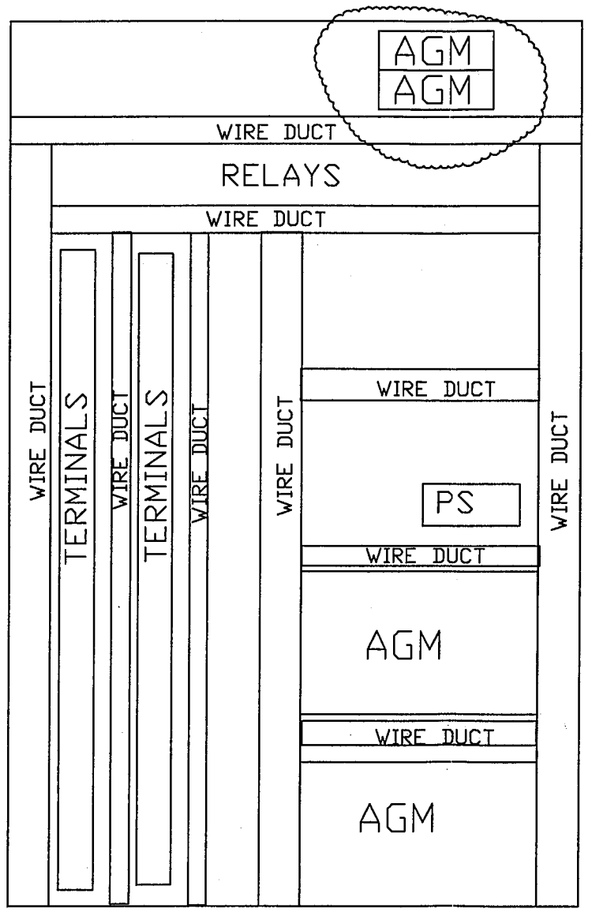
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY

C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

MODIFIED CONSOLE LAYOUT
TYPICAL 1-8

BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW				686C-MD	01
FILE 686C-MD-01.DWG		DATE 4/21/05	JOB NO. 686		



EXISTING BACK PANEL 65"H X 42"W
ADDING 2 AGM PTA4000-5 UNITS.

LEGEND :

-------	FIELD WIRING BY CONTRACTOR
◪	TERMINALS FOR FIELD WIRING
⏚	EQUIPMENT NOT SUPPLIED BY C2I
△	REVISION

COLOR CODE :

BLACK	AC HOT
WHITE	AC NEUTRAL
GREEN	AC GROUND
RED	AC CONTROL
BLUE	DC POSITIVE
GRAY	DC NEGATIVE
ORANGE	DC CONTROL
SHIELDED CABLE :	
WHITE	SIGNAL POSITIVE
BLACK	SIGNAL NEGATIVE
RED	REFERENCE

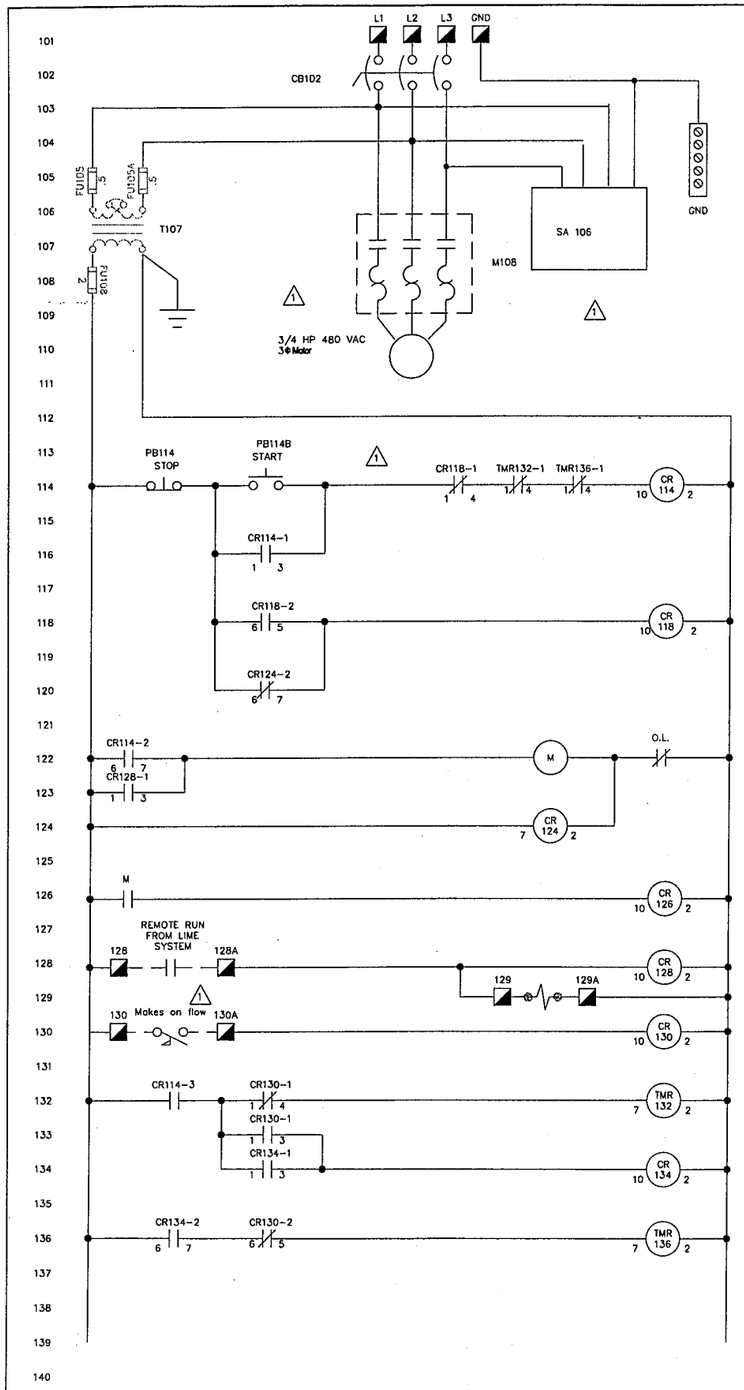
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY

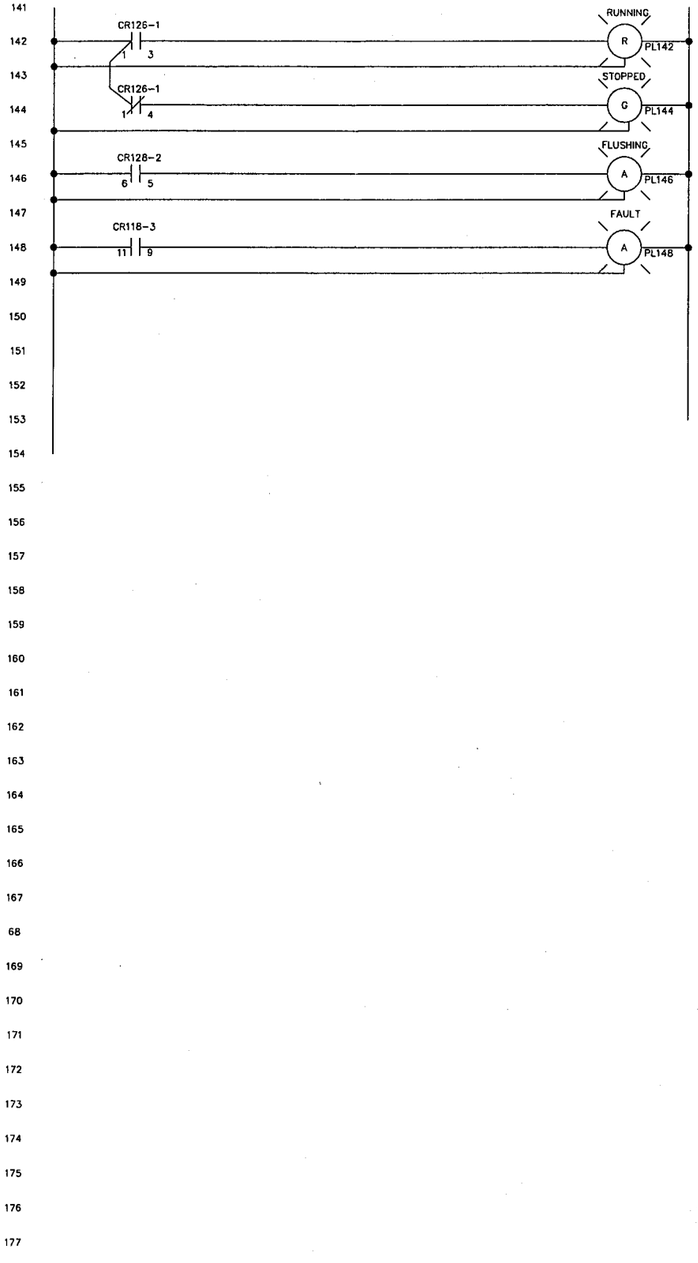
C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

MODIFICATIONS TO EXISTING CENTRAL INSTRUMENT CONTROL PANEL

BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GEORGIA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW				686D-MD	01
FILE 686D-MD-01.DWG		DATE 4/21/05	JOB NO. 686		





ITEM	DESCRIPTION	PART #
CB102	SQUARE D MOTOR GUARD CIRCUIT BREAKER	FAL 3600311M
	SQUARE D HANDLE ASSEMBLY NEMA 4X	9421-LC46
	SQUARE D OPERATING MECHANISM	9421-LF1
	SQUARE D SHAFT	9421-LS8
T107	SQUARE D CONTROLTRANSFORMER 500VA	9070 TF500D1
M108	SQUARE D MOTOR STARTER	8536 SCO3S
CR126	OMROM DPDT RELAY 120 VAC COIL	MK2PN-S-120
CR114, CR118, CR124, CR128, CR130, CR134	OMROM 3PDT RELAY 120 VAC COIL	MK3PN-5-S-120
TMR132, TMR136	SQUARE D .3-30 SEC TIMER	CLASS 9050 JCK-12V20
PB114	CUTLER-HAMMER NC PUSHBUTTON	10250T25R
PB114A	CUTLER-HAMMER NO PUSHBUTTON	10250T25G
PL142	CUTLER-HAMMER PANEL LAMP RED LENS PPT	10250T74NR
PL144	CUTLER-HAMMER PANEL LAMP GREEN LENS PPT	10250T74NG
PL146, PL147	CUTLER-HAMMER PANEL LAMP AMBER LENS PPT	10250T74NA
FS130	V.E. Anderson V8 flowswitch for 2" pipe	V8

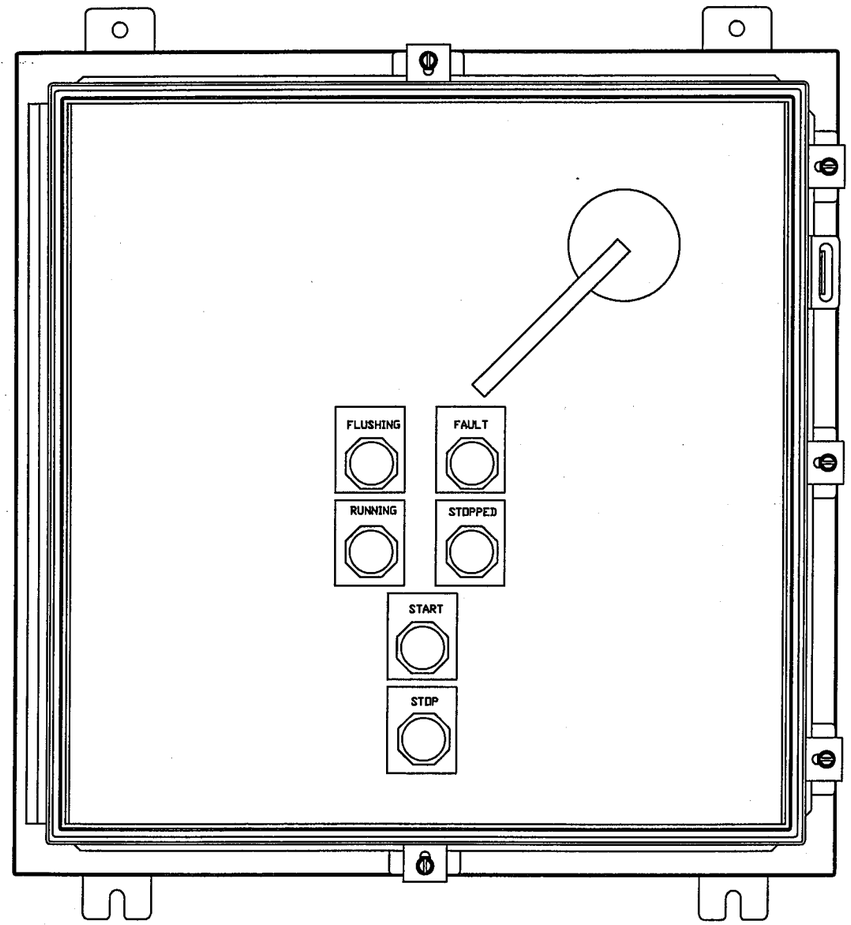
NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1	9/28/05	Changes from engineers comments.	RVW				

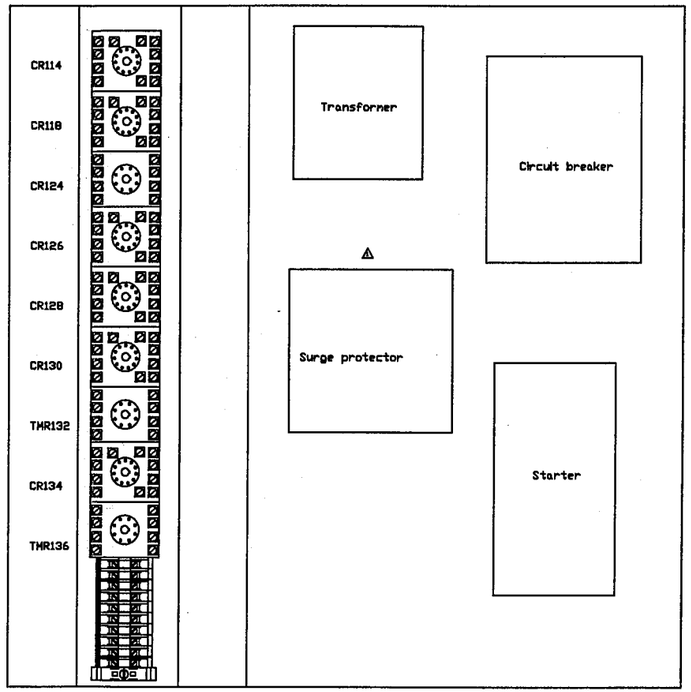
C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

BOOSTER PUMP CONTROL

BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW				686E-ED	01
FILE 686E-ED-01.DWG		DATE 8/27/05	JOB NO. 686		





LEGEND :

- FIELD WIRING BY CONTRACTOR
- TERMINALS FOR FIELD WIRING
- EQUIPMENT NOT SUPPLIED BY C2i
- REVISION

COLOR CODE :

BLACK	AC HOT
WHITE	AC NEUTRAL
GREEN	AC GROUND
RED	AC CONTROL
BLUE	DC POSITIVE
GRAY	DC NEGATIVE
ORANGE	DC CONTROL
SHIELDED CABLE :	
WHITE	SIGNAL POSITIVE
BLACK	SIGNAL NEGATIVE
RED	REFERENCE

NO	DATE	REVISION	BY	NO	DATE	REVISION	BY
1	9/28/05	Added surge protector	RVW				

C2i CONTROL INSTRUMENTS, INC.
ATLANTA, GEORGIA

BOOSTER PUMP CONTROL PANEL LAYOUT

BRUCE HAMLER WATER TREATMENT FACILITY UPGRADE
ROME, GA

DRAWN	APPVD	SCALE	CUSTOMER NO.	DWG. NO.	SHEET
RVW				686E-MD	01
FILE: 686E-MD-01.DWG		DATE: 8/27/05	JOB NO. 686		

TABLE OF CONTENTS

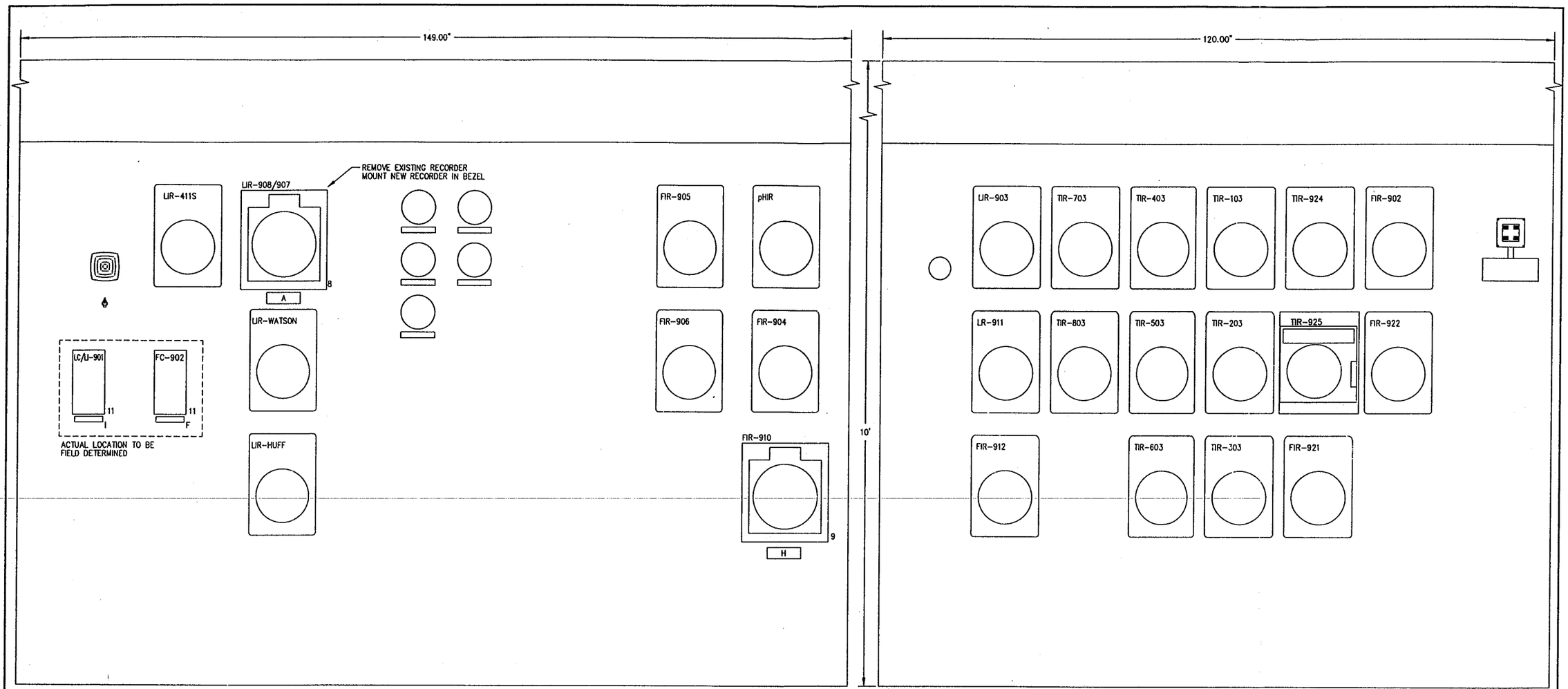
NO.	DATE	DESCRIPTION	BY
1	04-21-97	ADDED DWG. 16-238L	M.L.B.
		REVISION	

REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

SUBJECT:
TABLE OF CONTENTS
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	DATE: 05-03-96
CHECKED: W.A.H.	SCALE: NONE
JOB NO.	DWG. NO. 16-238 1/1



CENTRAL INSTRUMENTATION CONTROL PANEL

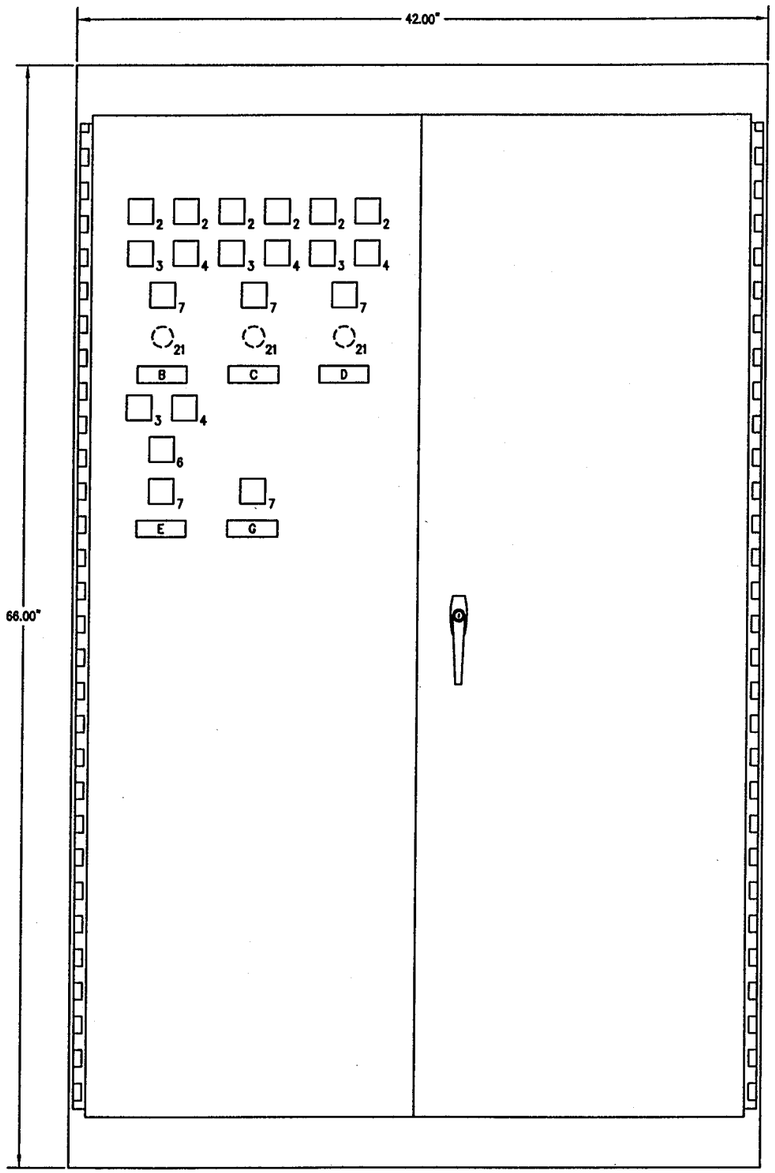
NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE
CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

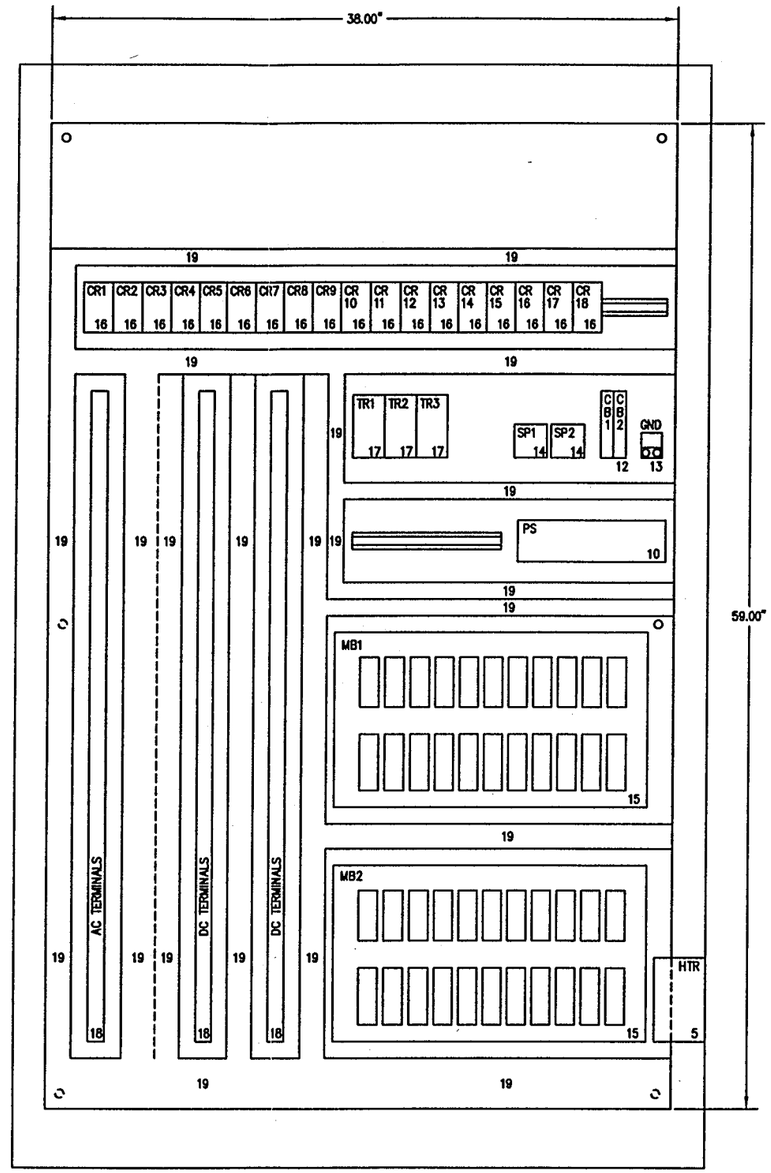
SUBJECT:
PANEL LAYOUT
CENTRAL INSTRUMENT CONTROL PANEL MODIFICATIONS
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	DATE: 04-15-96
CHECKED: W.A.H.	SCALE: 1/8
JOB NO.	DWG. NO. 16-238A 1/4



FRONT VIEW
(12" DEEP)



SUBPANEL LAYOUT

* ITEM TO BE SHIPPED LOOSE

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	ELECTRICAL BOX	SDF664212N12	ENCLOSURE, NEMA 12, FREE STANDING, 66"H x 42"W x 12"D
	1	ELECTRICAL BOX	6642P	SUBPANEL, 58"H x 39"W
2	6	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	8	CUTLER HAMMER	E30 KF30	AMBER LENS, TYPE F
3	4	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	4	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	4	CUTLER HAMMER	E30 KB 120	BUTTON, TYPE B, ENGRAVED "OPEN"
	4	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
4	4	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	4	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	4	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	4	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
5	1	HOFFMAN	D-AH1001A	HEATER, 100 WATT, 120VAC WITH FAN
6	1	CUTLER HAMMER	E30 AA	SINGLE BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KA231	BUTTON, TYPE A, ENGRAVED "STOP"
	1	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
7	5	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	4	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	4	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KB119	BUTTON, TYPE B, ENGRAVED "ON"
	1	CUTLER HAMMER	E30 KB218	BUTTON, TYPE B ENGRAVED "OFF"
	5	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
8	1	FOXBORO	740RA-A3300-R	CIRCULAR CHART RECORDER, 2 PEN, 120 VAC POWER, 4-20mA ISOLATED INPUTS, 4 RELAY OUTPUT, NEMA 4 PANEL MOUNT
9	1	FOXBORO	740RA-A3000-C	CIRCULAR CHART RECORDER, 1 PEN, 120 VAC POWER, 4-20mA INPUT, 1 OUTPUT RELAY, NEMA 4 PANEL MOUNT, W/ 1 TOTALIZER
10	1	POWER ONE	HD-24-4.8A	POWER SUPPLY, 120 VAC INPUT, 24 VAC OUTPUT, 4.8 AMP
11	2	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
12	2	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
13	1	ANDERSON	DU 20	GROUND LUG
14	2	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
15	2	AGM	MB 8800-11	MOTHERBOARD, 24 VDC POWER, 11 MODULE
	11	AGM	EA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, DUAL 4-20mA OUTPUT
	1	AGM	EA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
	6	AGM	EA 4035-8	DUAL ALARM MODULE, HIGH-HIGH, 4-20mA INPUT
	2	AGM	EA 4005-6	SUMMER MODULE, ISOLATED, FOUR 4-20mA INPUTS
	1	AGM	EA 4005-2	SUMMER MODULE, ISOLATED, TWO 4-20mA INPUTS
16	18	POTTER & BRUMFIELD	KUP14A35-120	RELAY, 3PDT, 10 AMP CONTACTS, 120 VAC COIL
	18	IDEC	SR3B05	RELAY BASE
17	3	ATC	328C200010XX	TIMER, SOLID STATE, MULTI-RANGE, DPDT
	3	ATC	00008256900	TIMER BASE
18	300	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE
19	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
20	1	FEDERAL	141-120 VAC	ALARM LIGHT, 120 VAC
	1	FEDERAL	8263073	RED GLOBE
21	3	HOFFMAN	A-SPB	PUSHBUTTON HOLE PLUGS

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: LIR-908 NEW 4MG TANK LEVEL PEN 2: LIR-907 EXISTING 4MG TANK LEVEL
B	1	N P	1" x 3"	BLACK	WHITE	CV-908 \ ALTITUDE CONTROL
C	1	N P	1" x 3"	BLACK	WHITE	CV-907A \ ALTITUDE CONTROL
D	1	N P	1" x 3"	BLACK	WHITE	CV-907B \ DIVERSION TO NEW TANK
E	1	N P	1" x 3"	BLACK	WHITE	CV-902 \ INFLUENT FLOW VALVE
F	1	N P	1" x 3"	BLACK	WHITE	FC-902 \ INFLUENT FLOW \ CONTROLLER
G	1	N P	1" x 3"	BLACK	WHITE	DCV-1 \ SOLENOID \ OVERRIDE
H	1	N P	1" x 3"	BLACK	WHITE	FILTERED WATER FLOW
I	1	N P	1" x 5"	BLACK	WHITE	LC/LI-901 \ INFLUENT CHANNEL \ LEVEL CONTROL

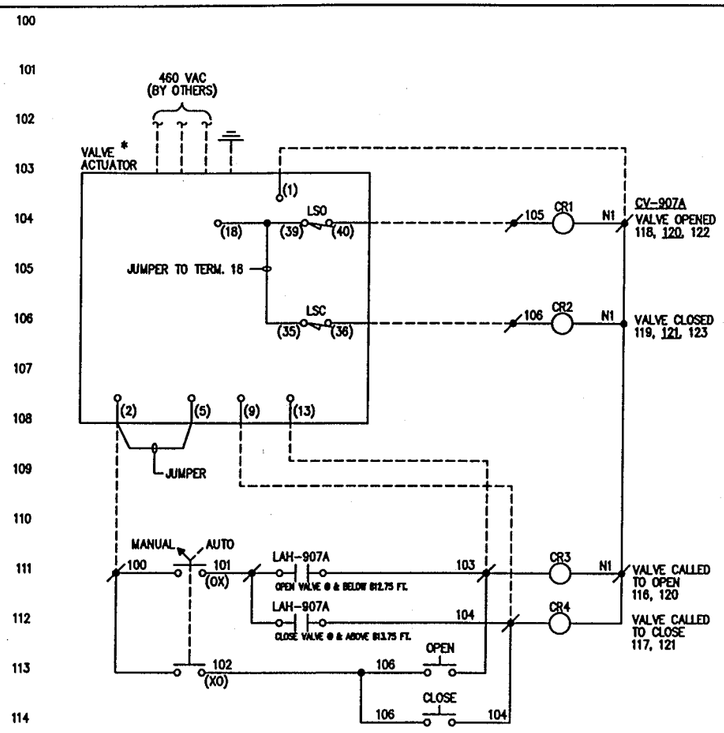
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

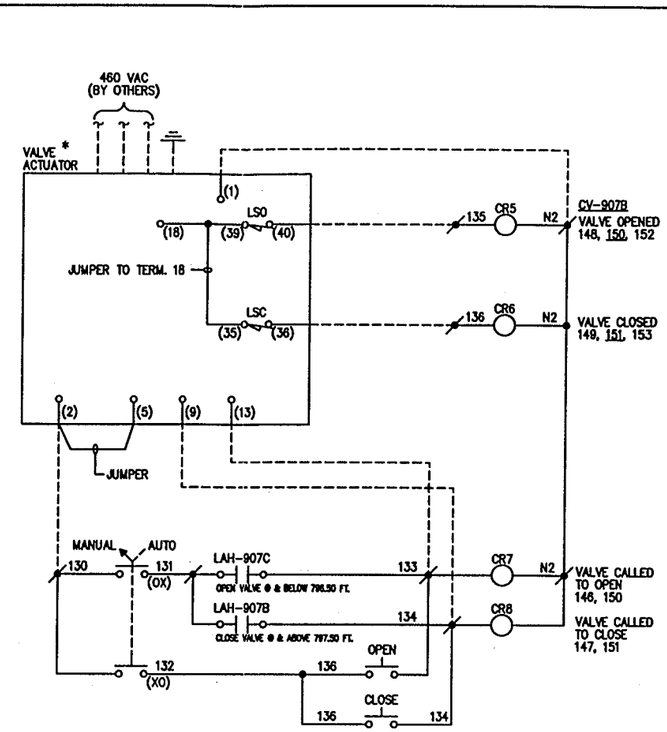
SUBJECT:
SUBPANEL LAYOUT, ENGRAVING SCHEDULE AND BILL OF MATERIAL
CENTRAL INSTRUMENT CONTROL PANEL MODIFICATIONS
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

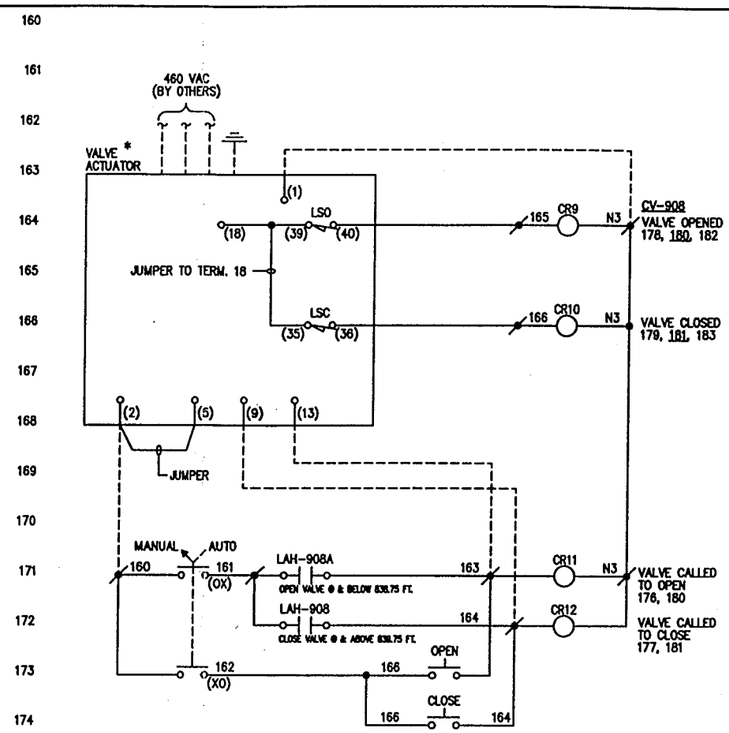
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

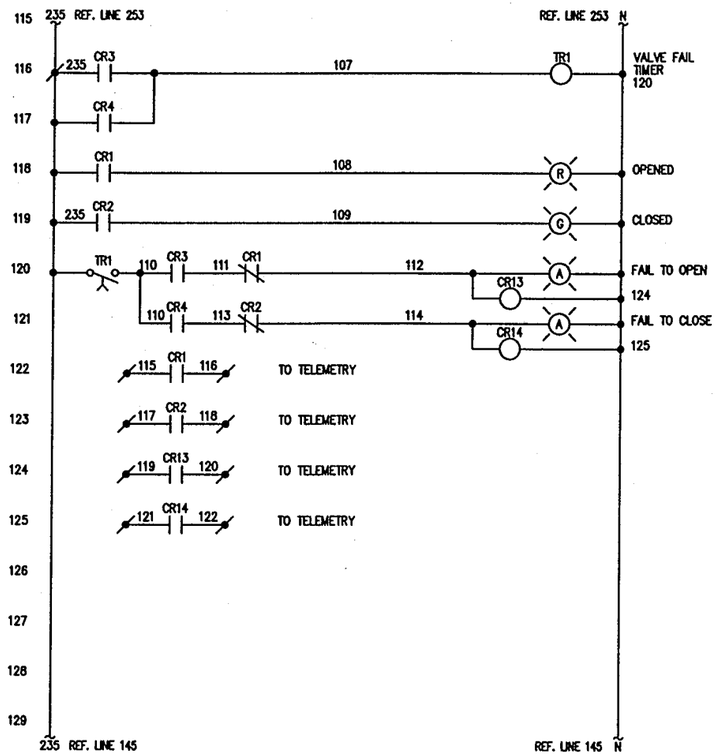
NO.	DATE	DESCRIPTION	BY
		REVISION	

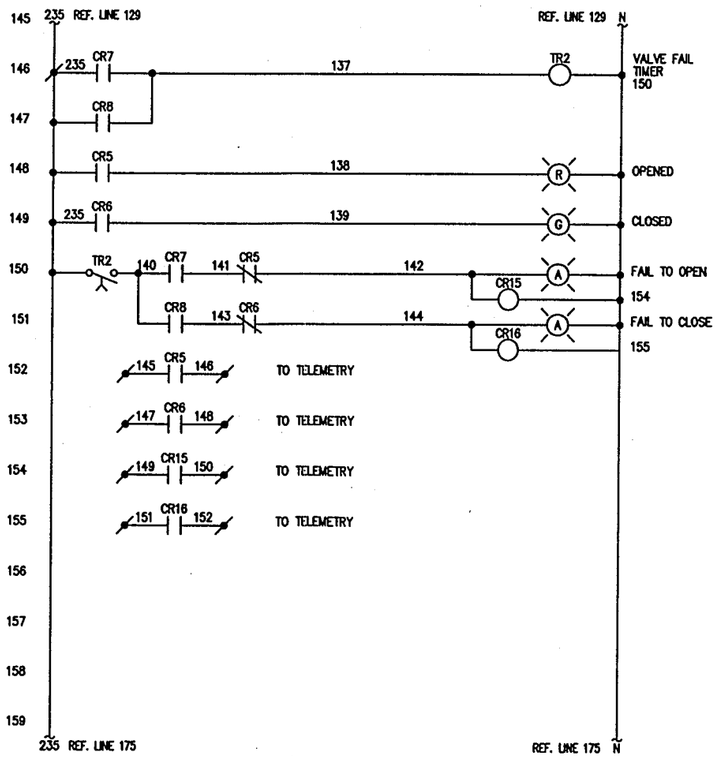
DRAWN BY: W.S.D. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238A 2/4

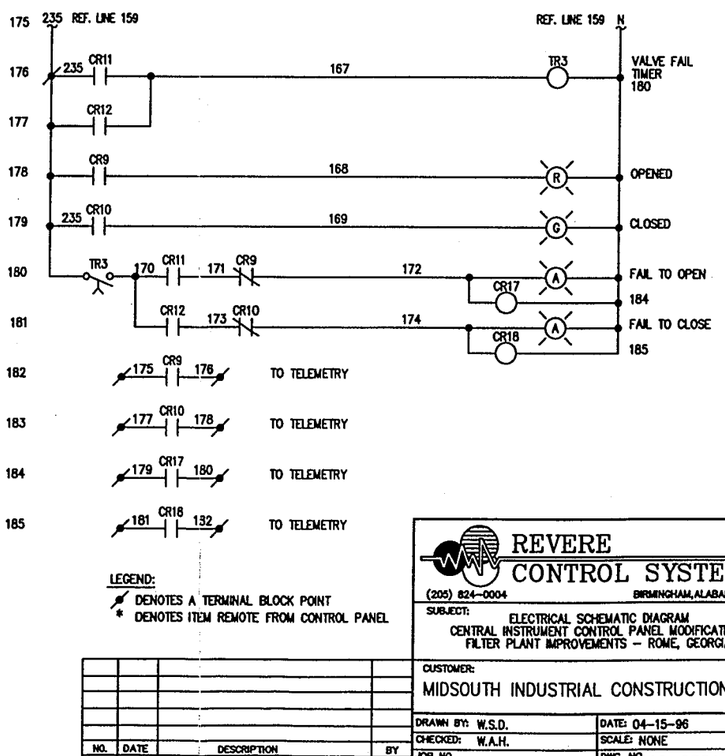












LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

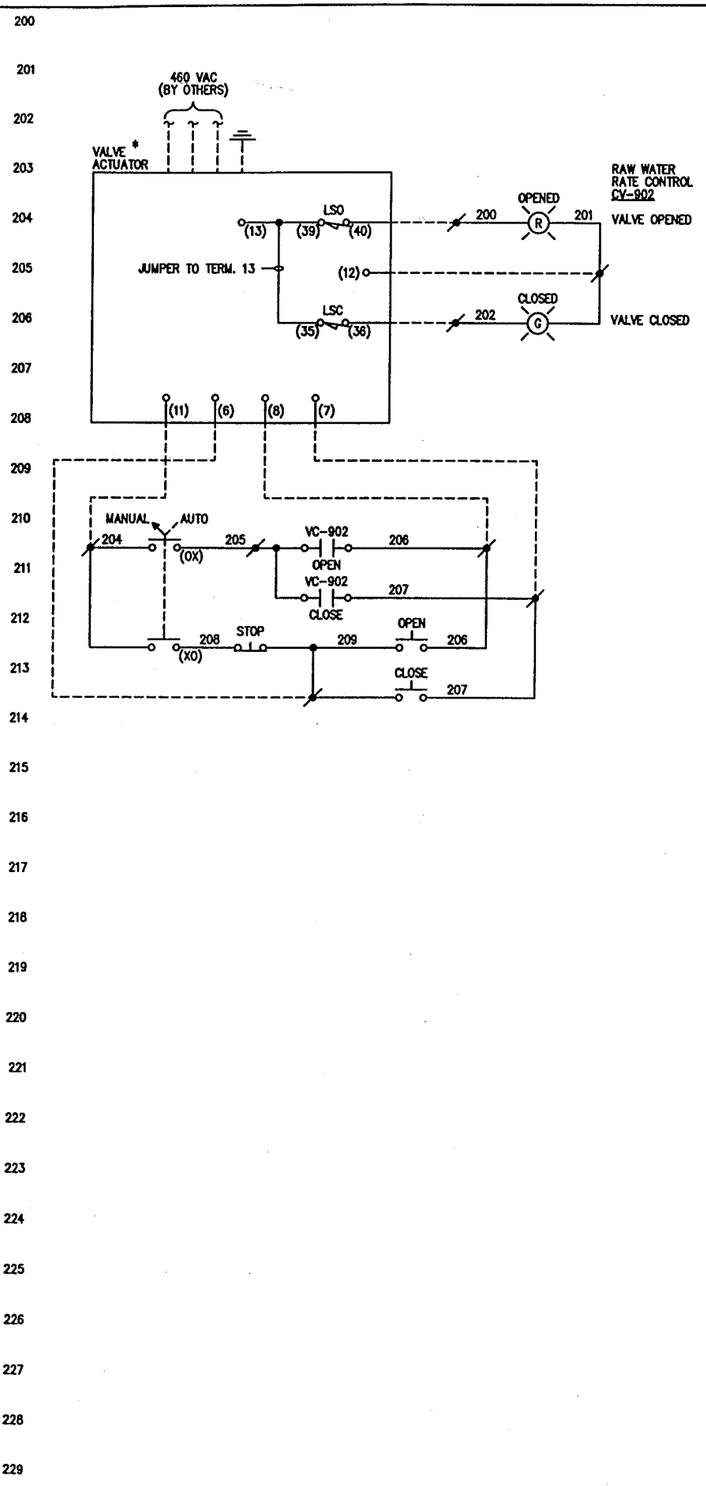
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

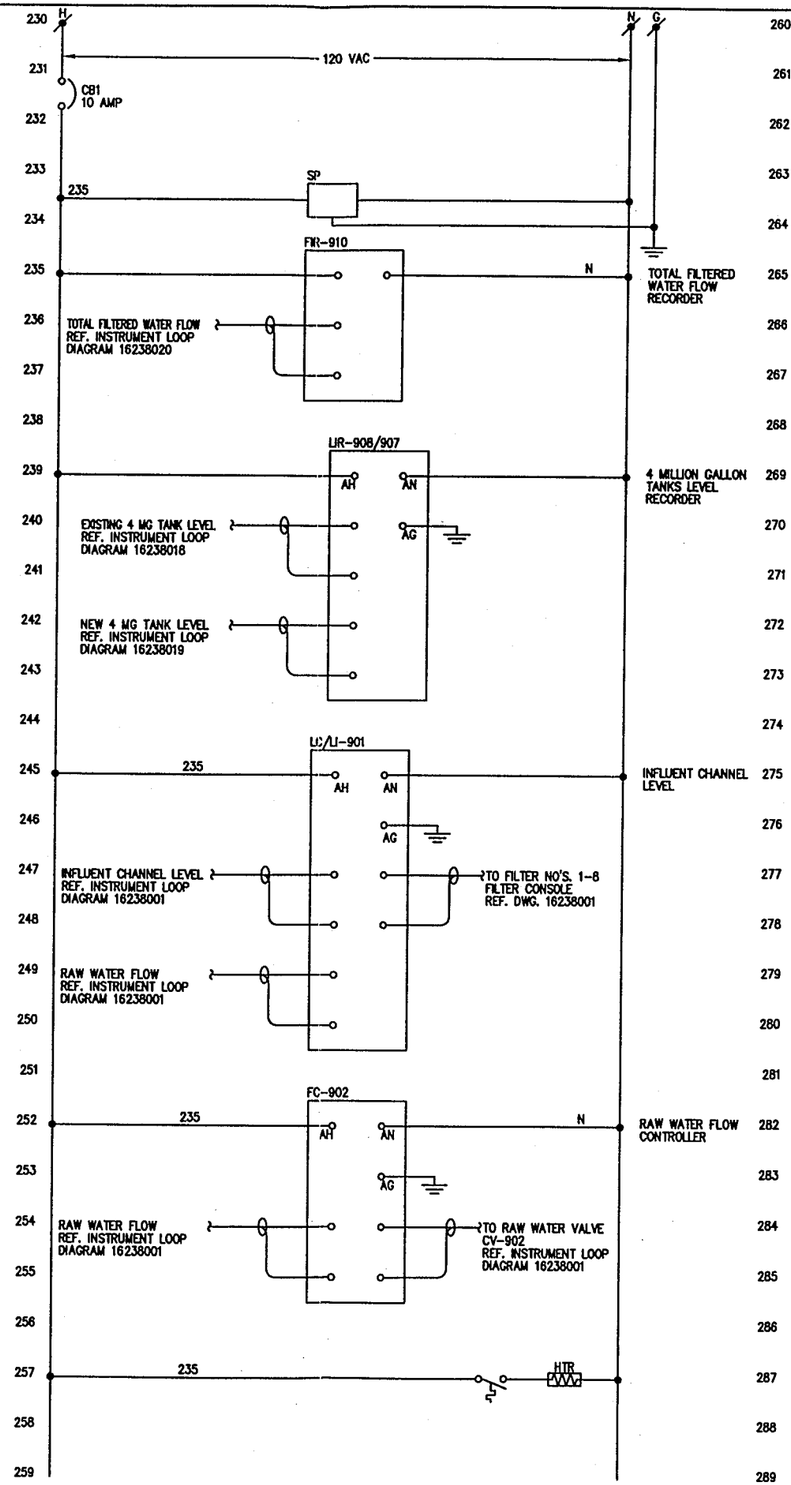
SUBJECT:
ELECTRICAL SCHEMATIC DIAGRAM
CENTRAL INSTRUMENT CONTROL PANEL MODIFICATIONS
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

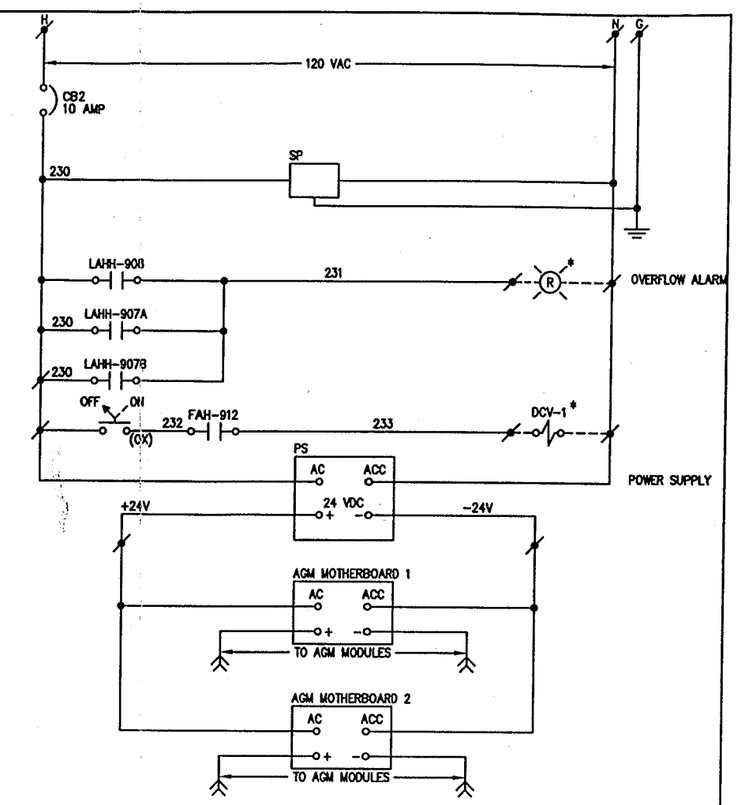
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	DESCRIPTION	BY
		REVISION	

DRAWN BY: W.S.D. DATE: 04-15-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238A 3/4







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- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

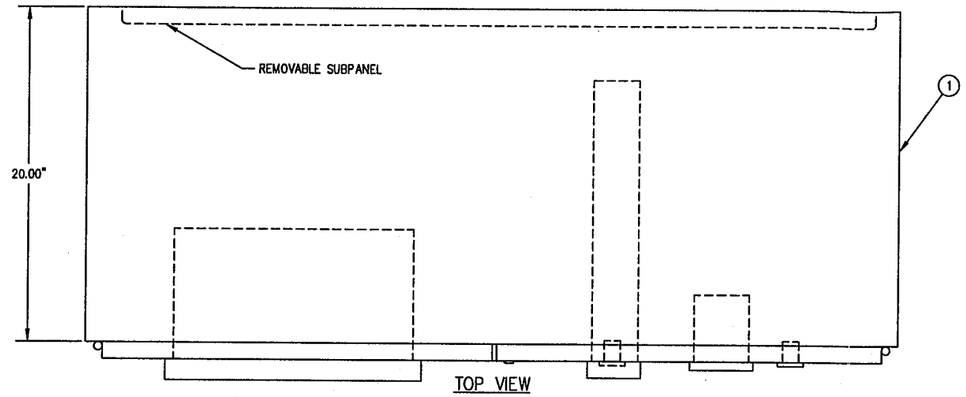
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
ELECTRICAL SCHEMATIC DIAGRAM
CENTRAL INSTRUMENT CONTROL PANEL MODIFICATIONS
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

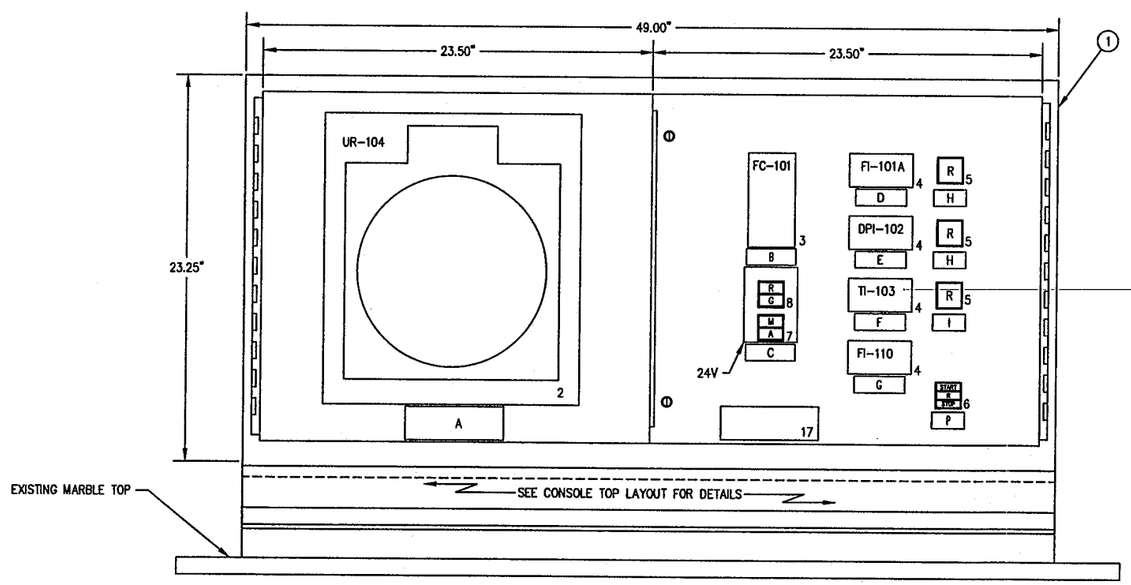
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	DESCRIPTION	BY
		REVISION	

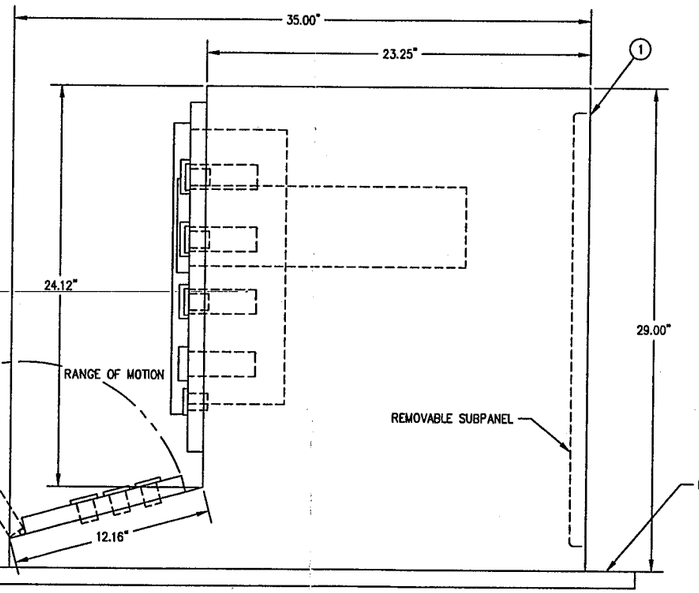
DRAWN BY: D.C.F. DATE: 04-18-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238A 4/4



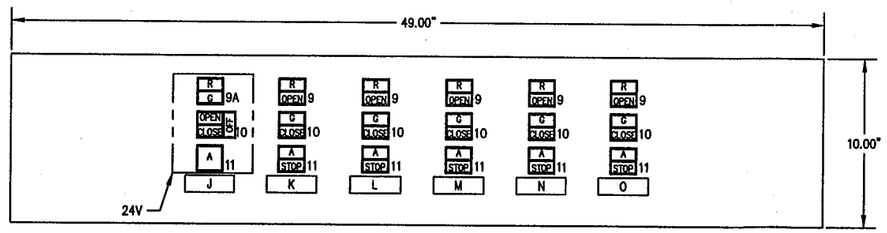
TOP VIEW



FRONT VIEW



SIDE VIEW



CONSOLE TOP LAYOUT

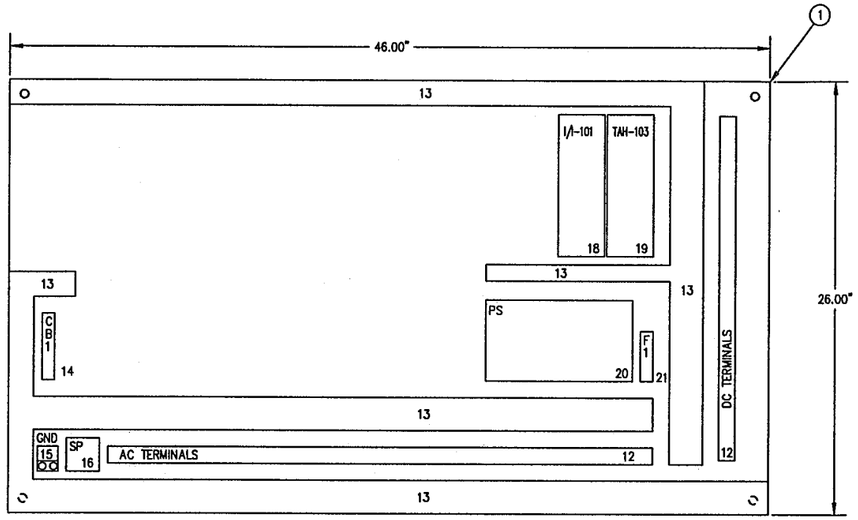
NO.	DATE	REVISION	BY
1	04-18-97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 1
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238B 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-238B	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-238B	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-238B	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HCI10E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSED
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-101
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-106
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-108
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-105
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-107
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-109
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

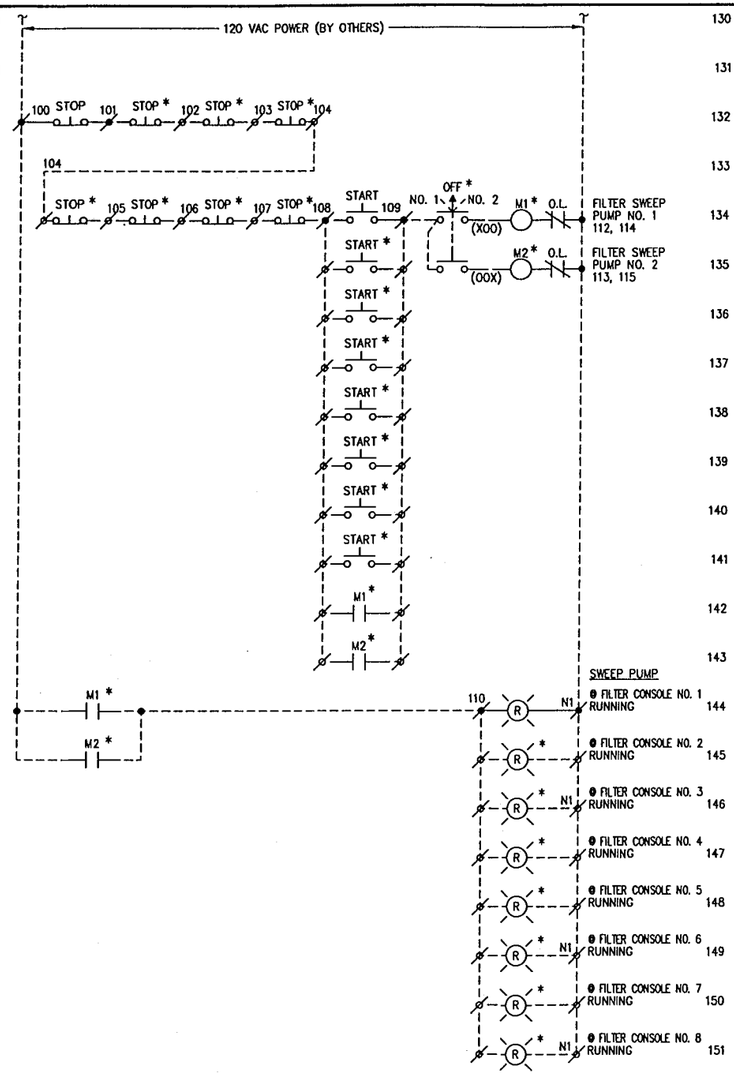
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

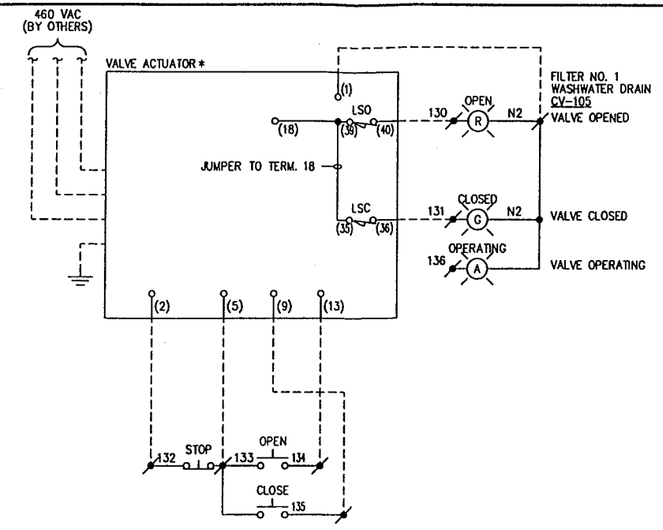
SUBJECT:
SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 1
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

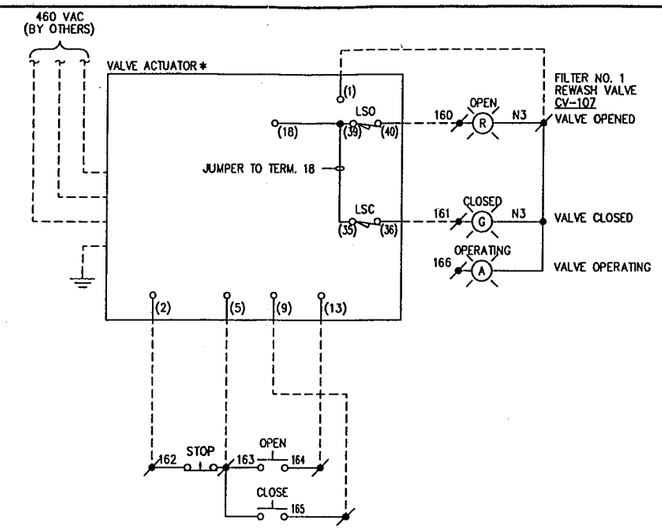
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	DESCRIPTION / REVISION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238B 2/4







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LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- DENOTES A REMOTE TERMINAL BLOCK POINT

NO.	DATE	DESCRIPTION	BY
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

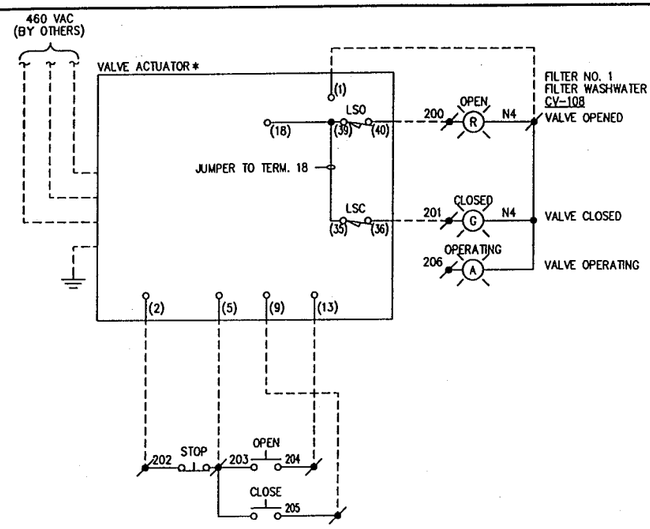
REVISION

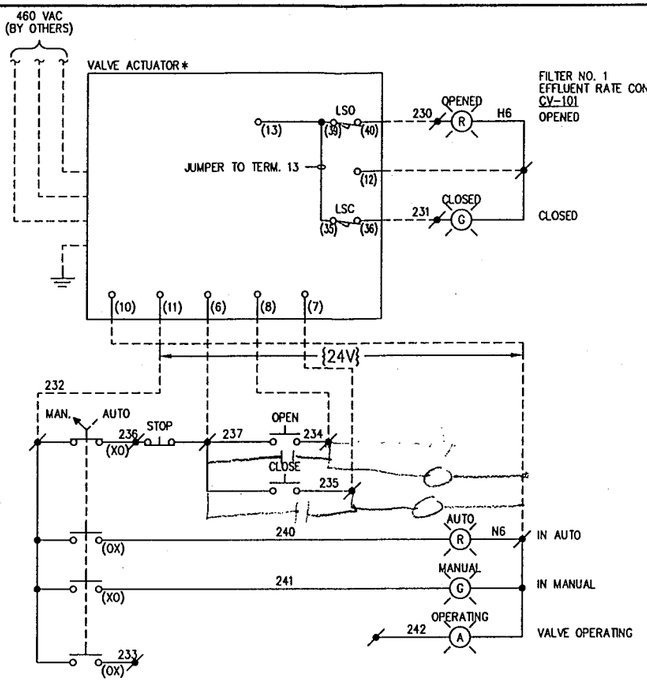
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

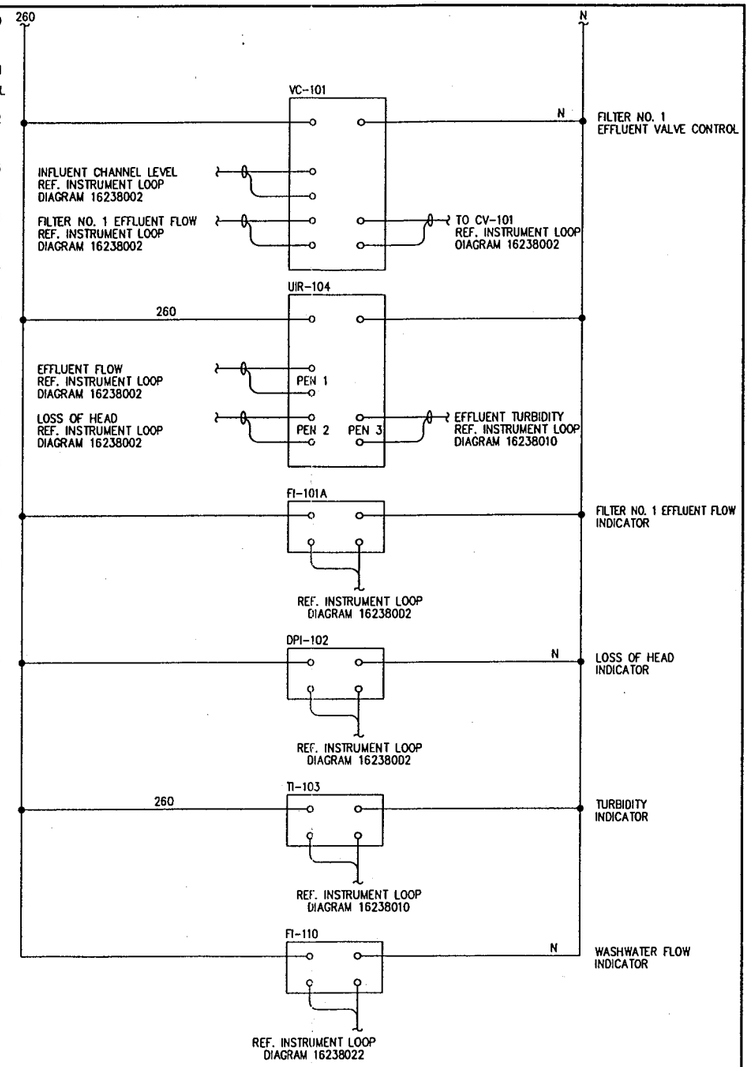
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 1 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

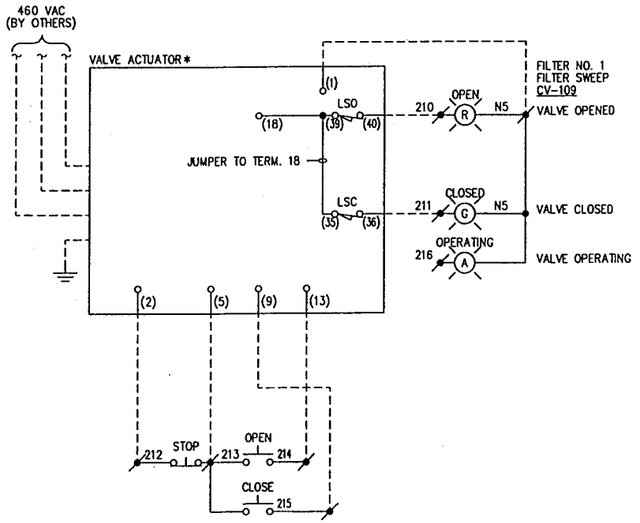
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

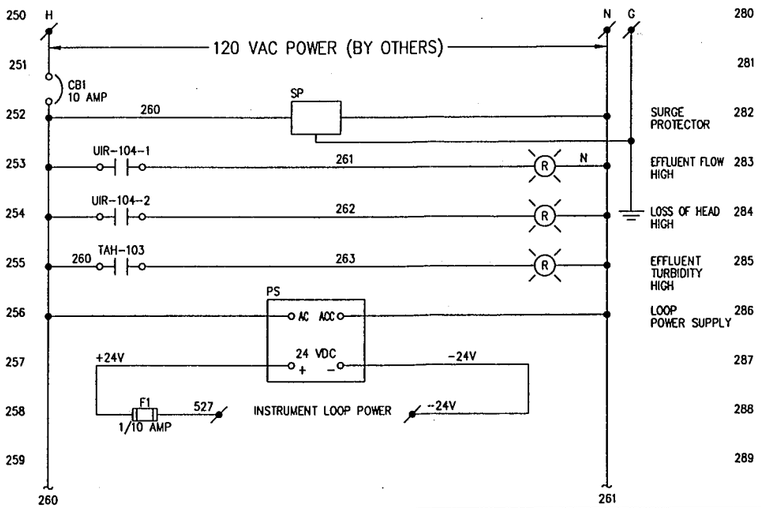
DRAWN BY: D.C.F. DATE: 04-22-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238B 3/4











LEGEND:
- / DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

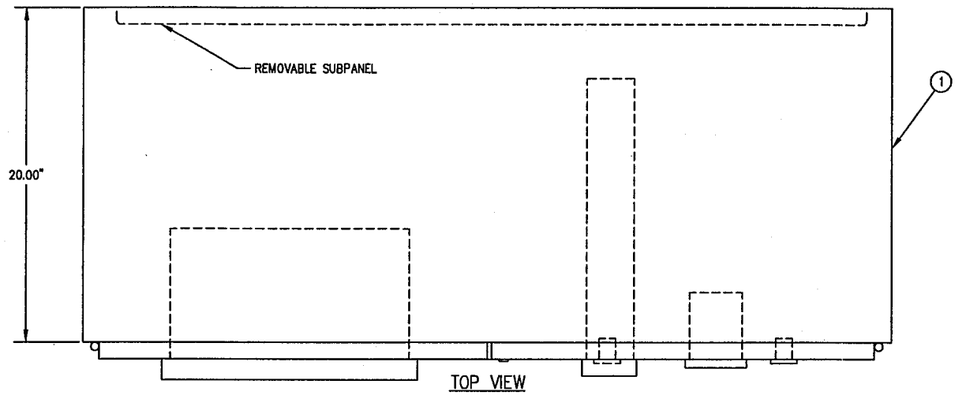
NO.	DATE	DESCRIPTION	BY
		REVISION	
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

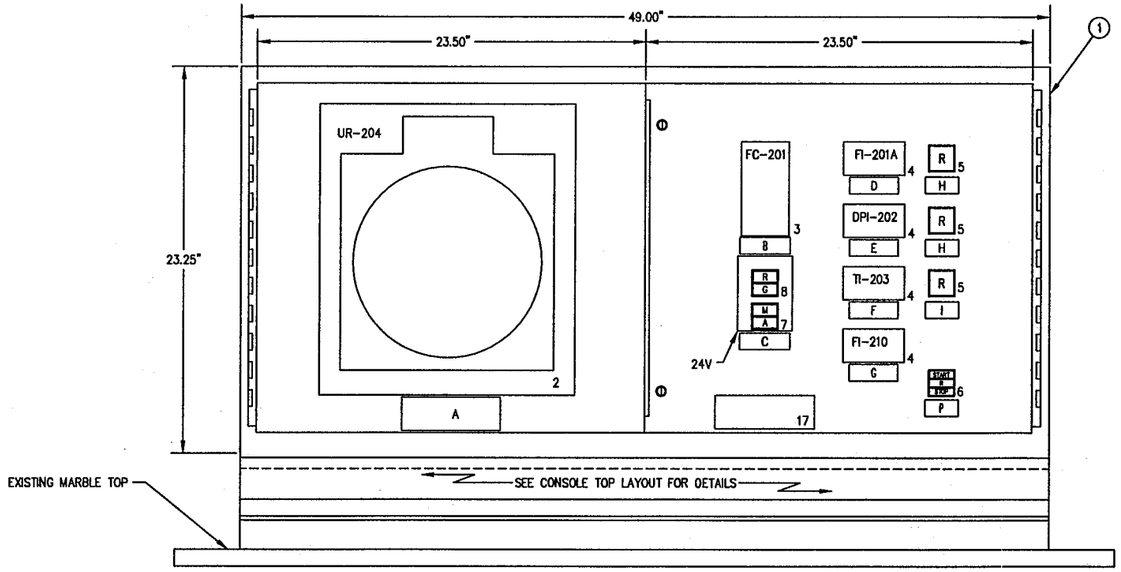
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 1 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

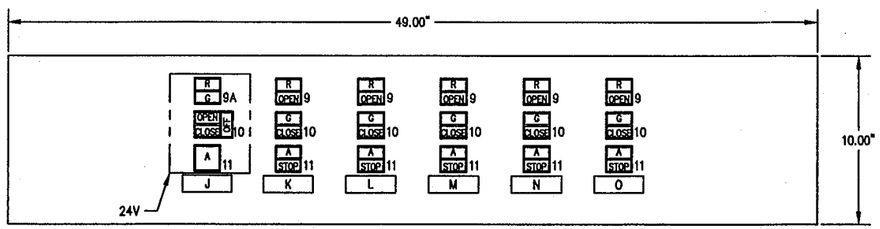
DRAWN BY: D.C.F. | DATE: 04-22-96
CHECKED: W.A.H. | SCALE: NONE
JOB NO. | DWG. NO. 16-238B 4/4



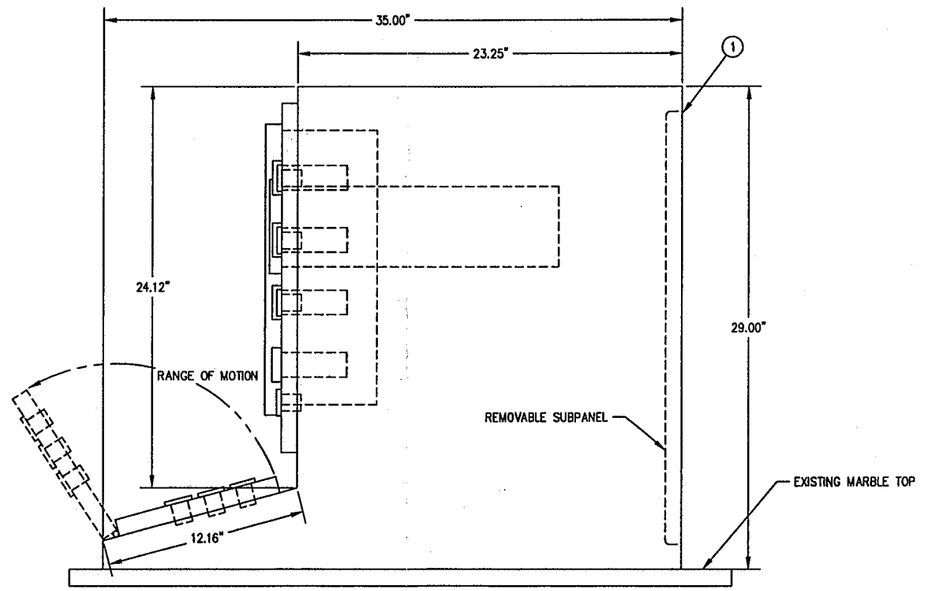
TOP VIEW



FRONT VIEW



CONSOLE TOP LAYOUT



SIDE VIEW

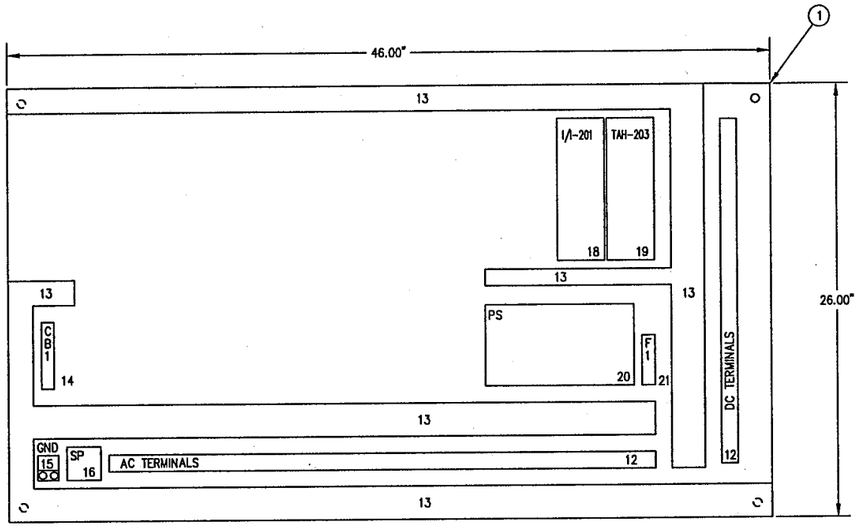
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 2
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238C 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-2388	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-2388	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-2388	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HCI0E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSED
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-201
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-206
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-208
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-205
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-207
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-209
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

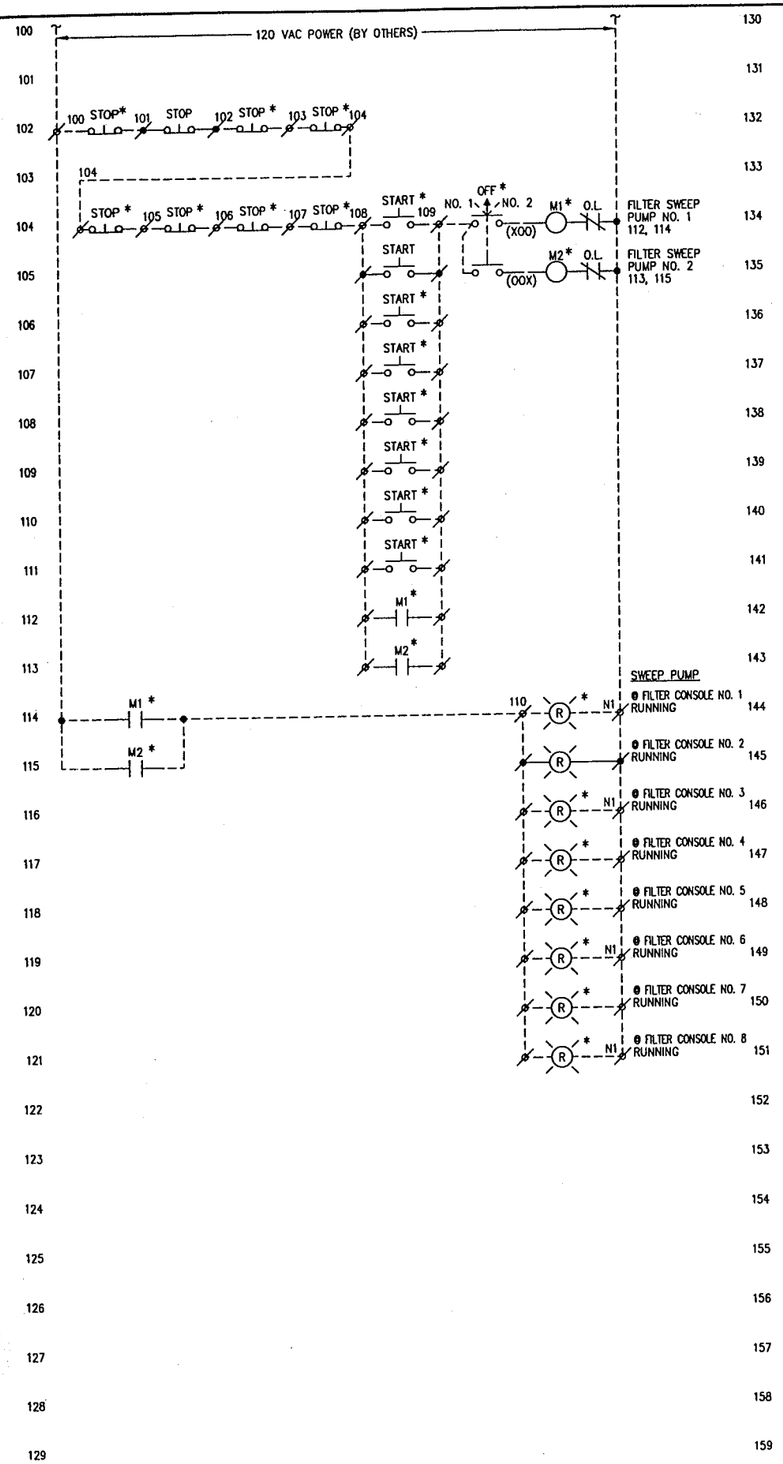
NO.	DATE	DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.
		REVISION	

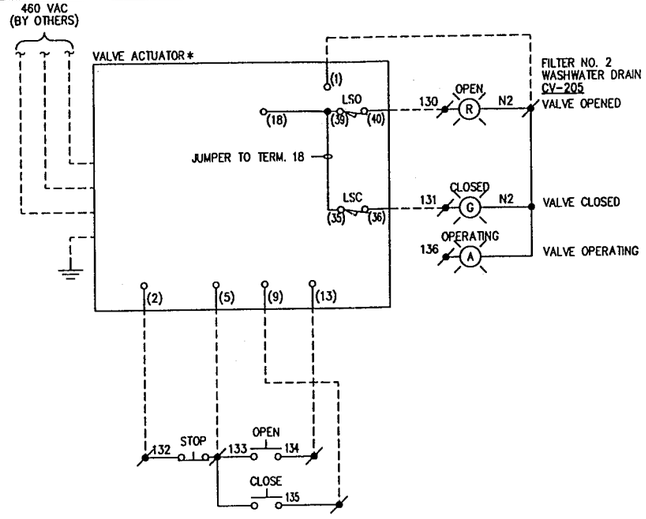
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

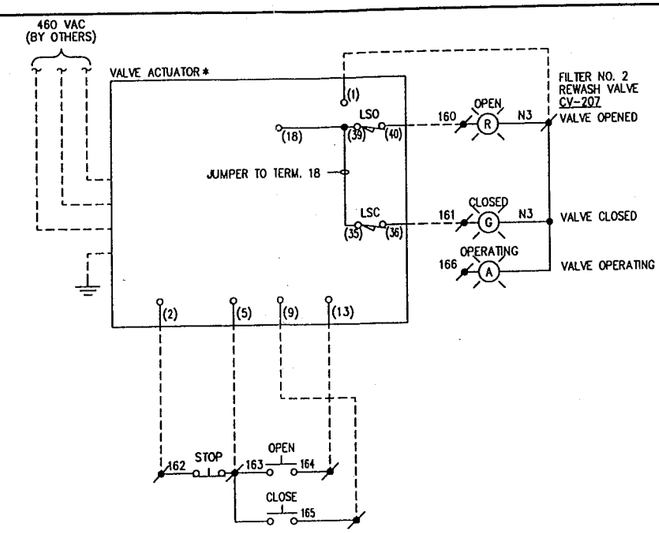
SUBJECT:
SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 2
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

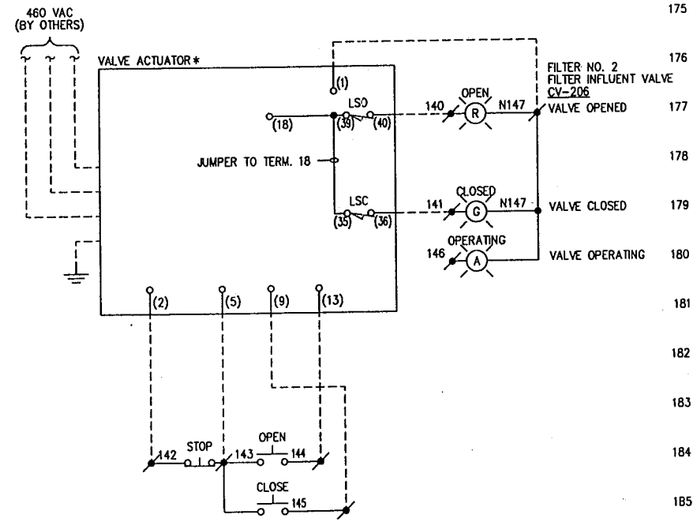
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238C 2/4









LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- DENOTES A REMOTE TERMINAL BLOCK POINT

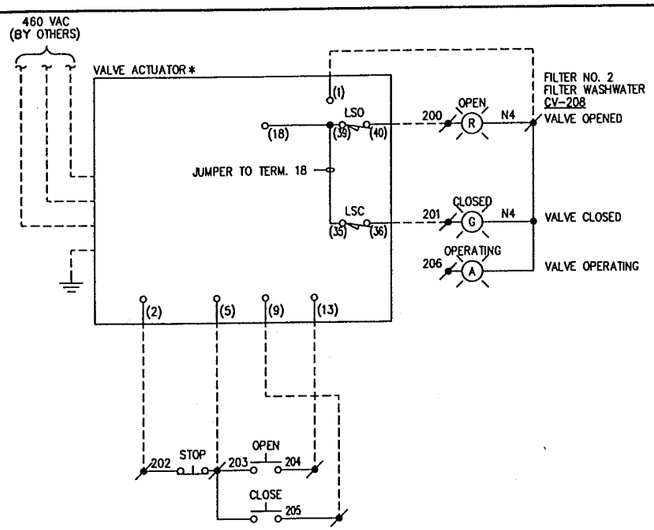
NO.	DATE	DESCRIPTION	BY
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.
		REVISION	

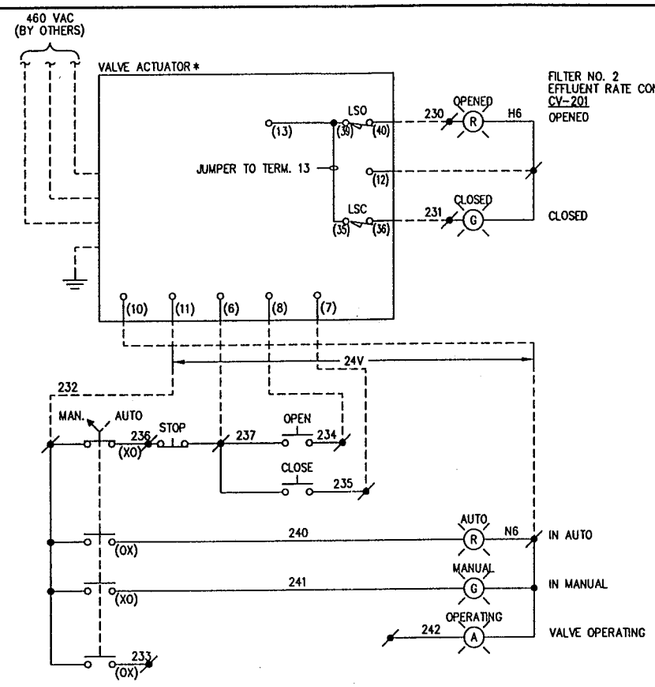
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

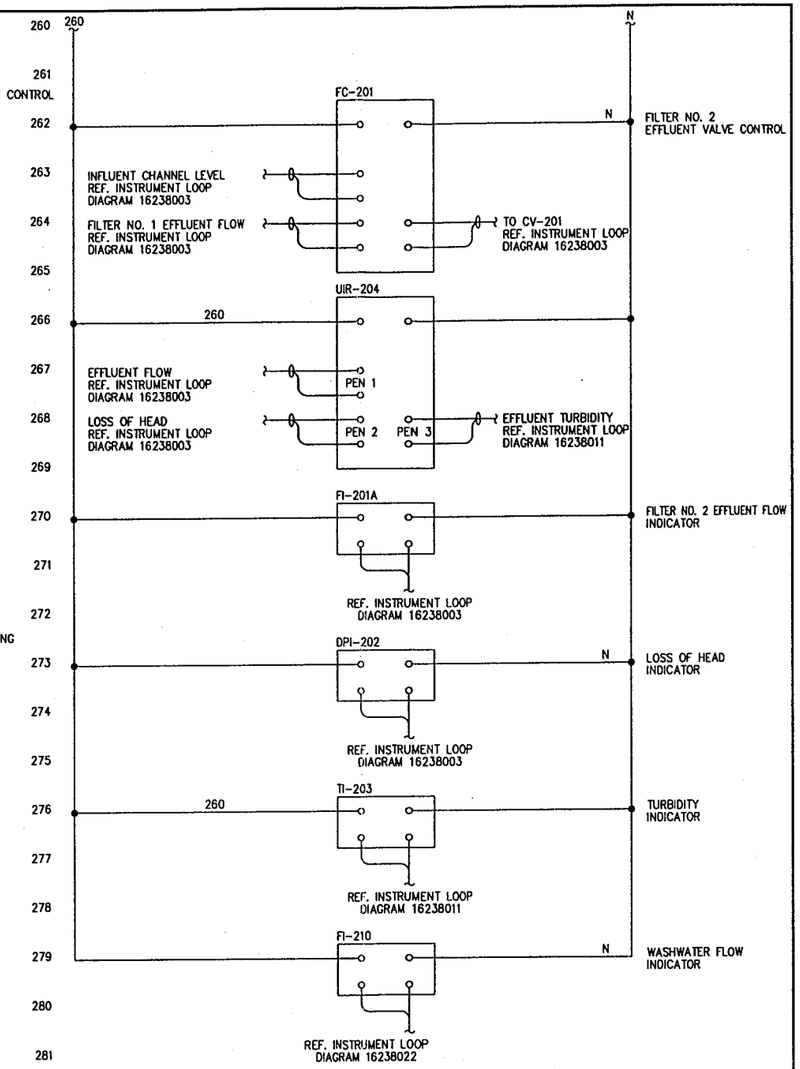
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 2 CONSOLE
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

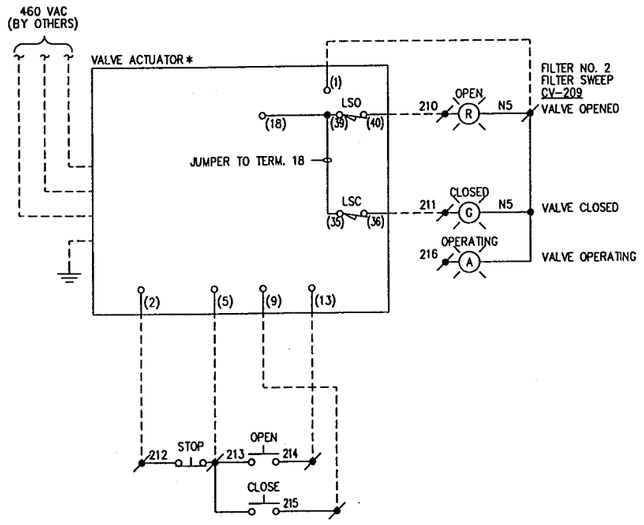
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

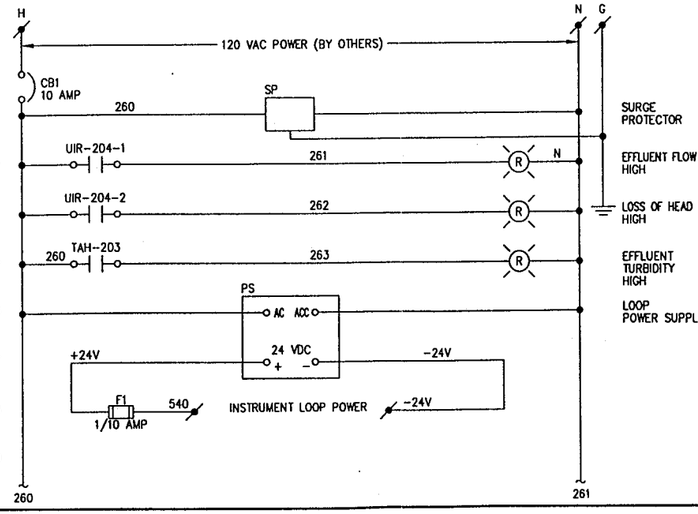
DRAWN BY: D.C.F. DATE: 04-22-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238C 3/4











LEGEND:
- ⌀ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

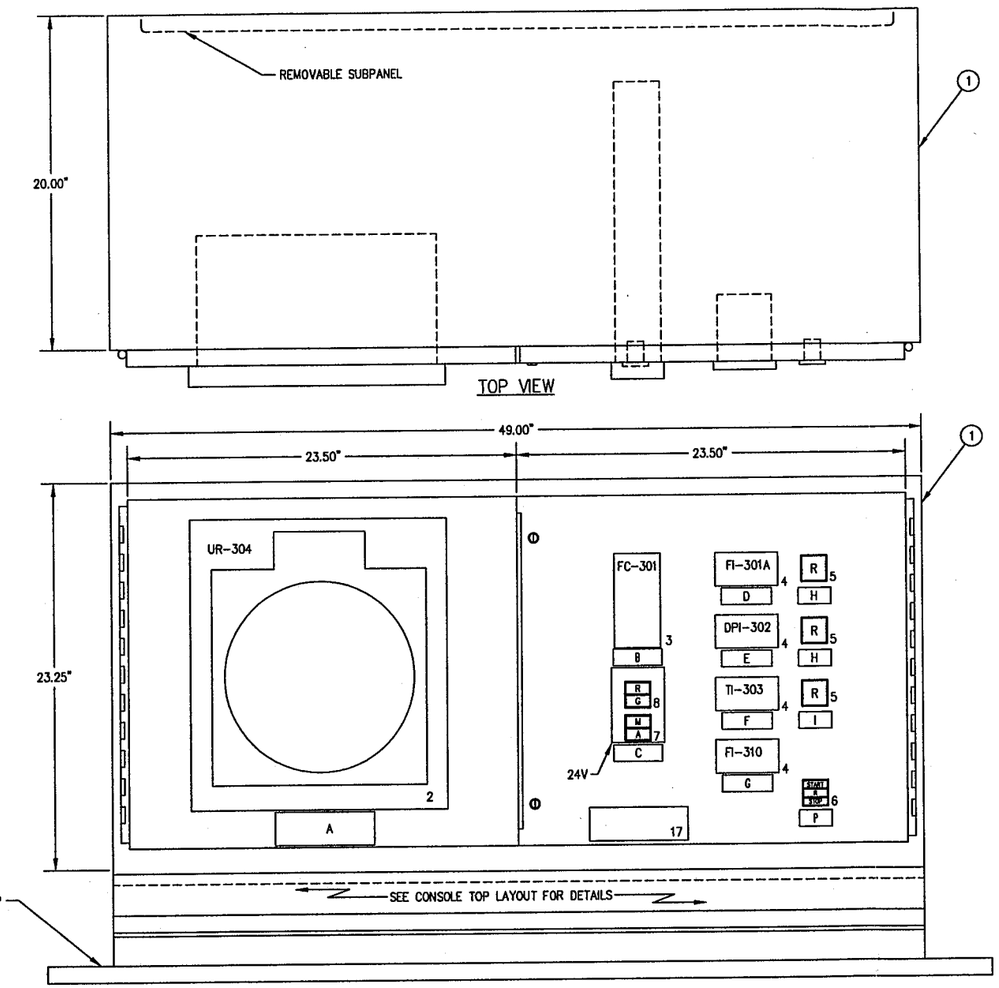
NO.	DATE	DESCRIPTION	BY
		REVISION	
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

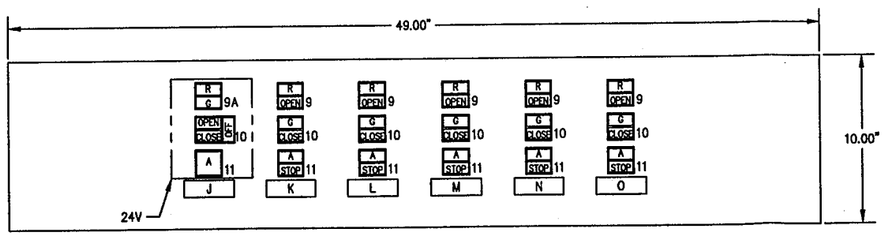
SUBJECT:
ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 2 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

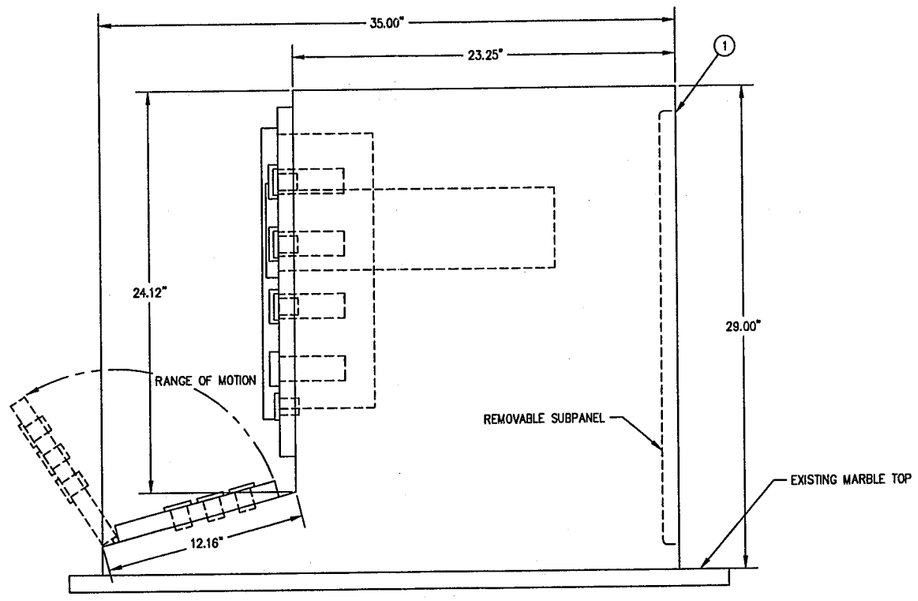
DRAWN BY: D.C.F.	DATE: 04-22-96
CHECKED: W.A.H.	SCALE: NONE
JOB NO.	DWG. NO. 16-238C 4/4



FRONT VIEW



CONSOLE TOP LAYOUT



SIDE VIEW

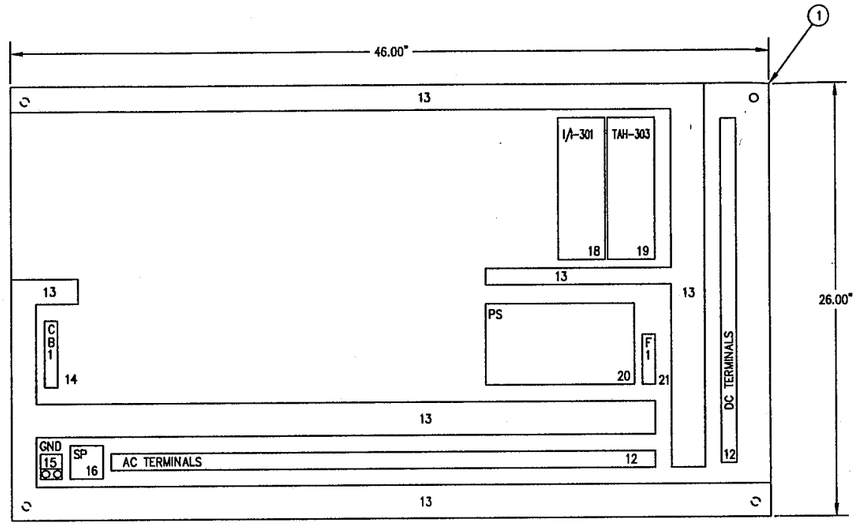
NO.	DATE	REVISION DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	01-01-96	REVISED VALVE ACTUATORS	G.D.D.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 3
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238D 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-238B	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-238B	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-238B	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HC10E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSE
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-301
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-306
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-308
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-305
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-307
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-309
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

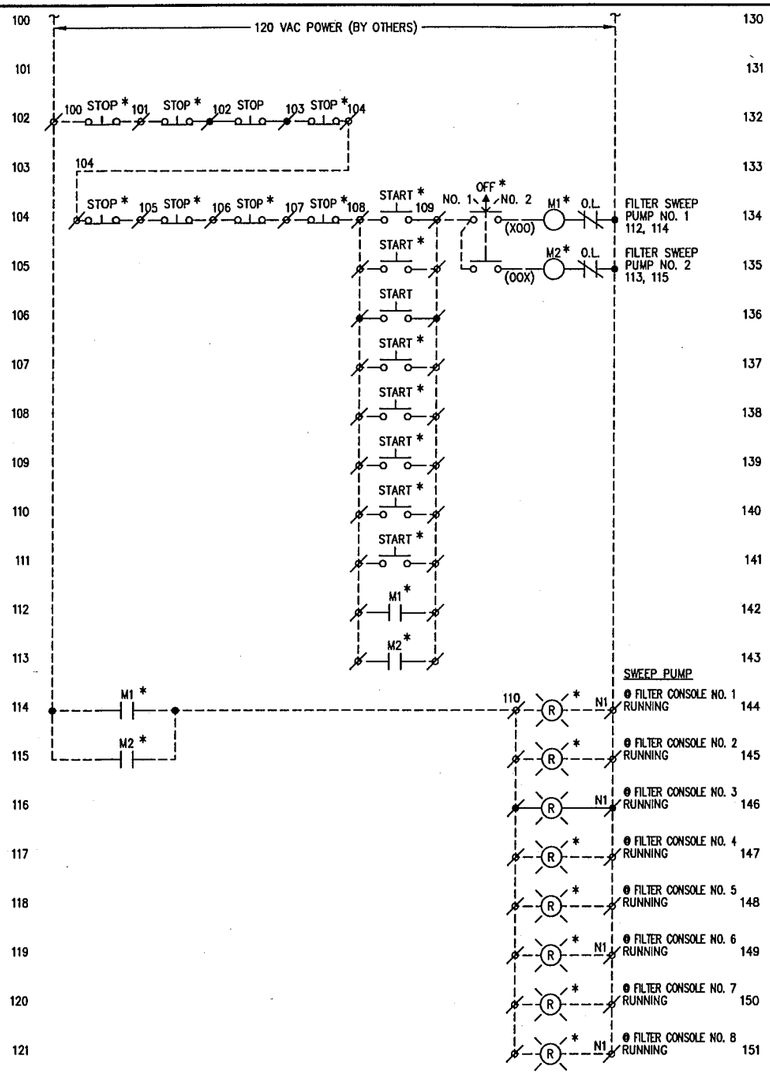
NO.	DATE	REVISION DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

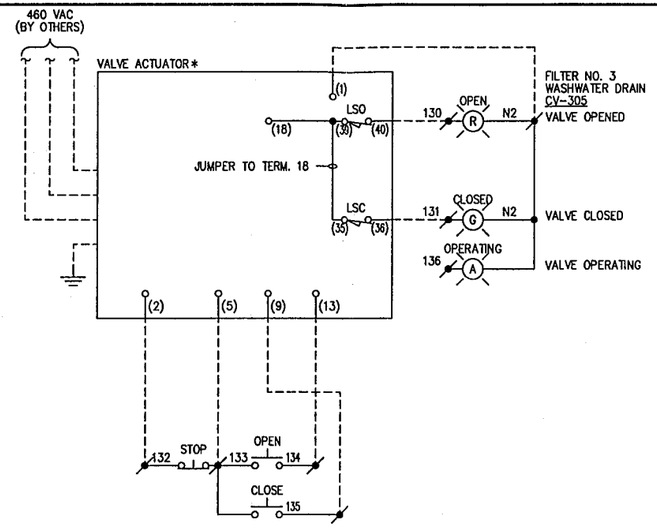
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

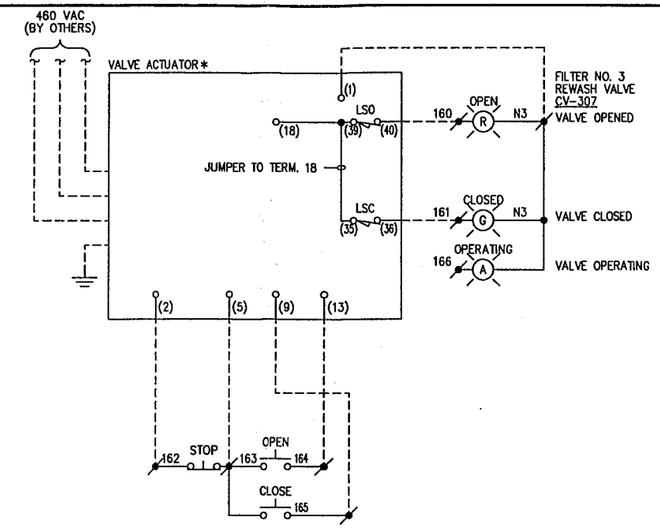
SUBJECT: SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 3
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: DATE: 04-15-96
CHECKED: SCALE: 1/4
JOB NO. DWG. NO. 16-238D 2/4







LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- DENOTES A REMOTE TERMINAL BLOCK POINT

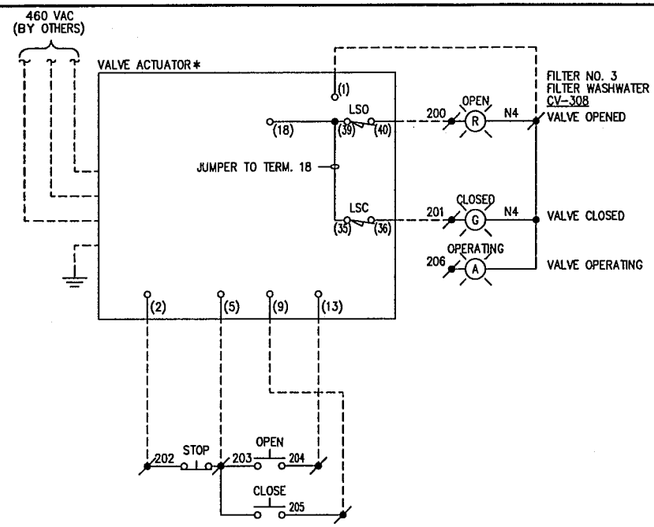
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

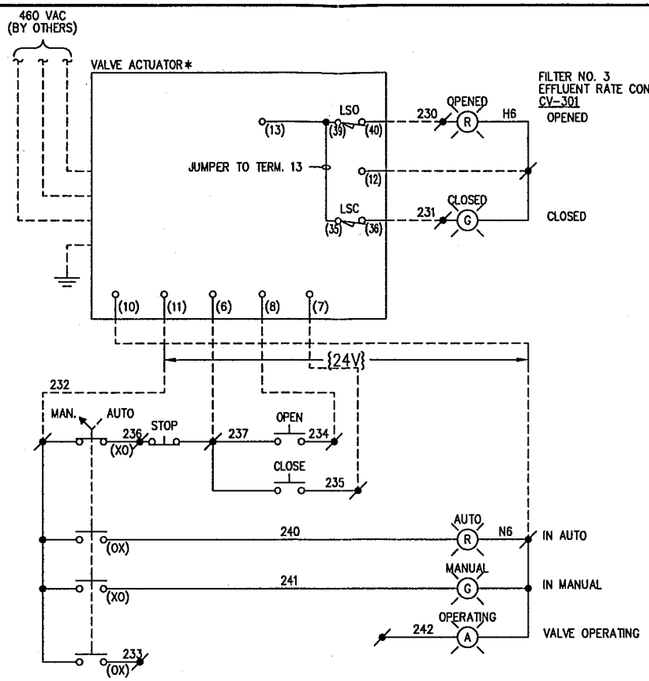
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 3 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

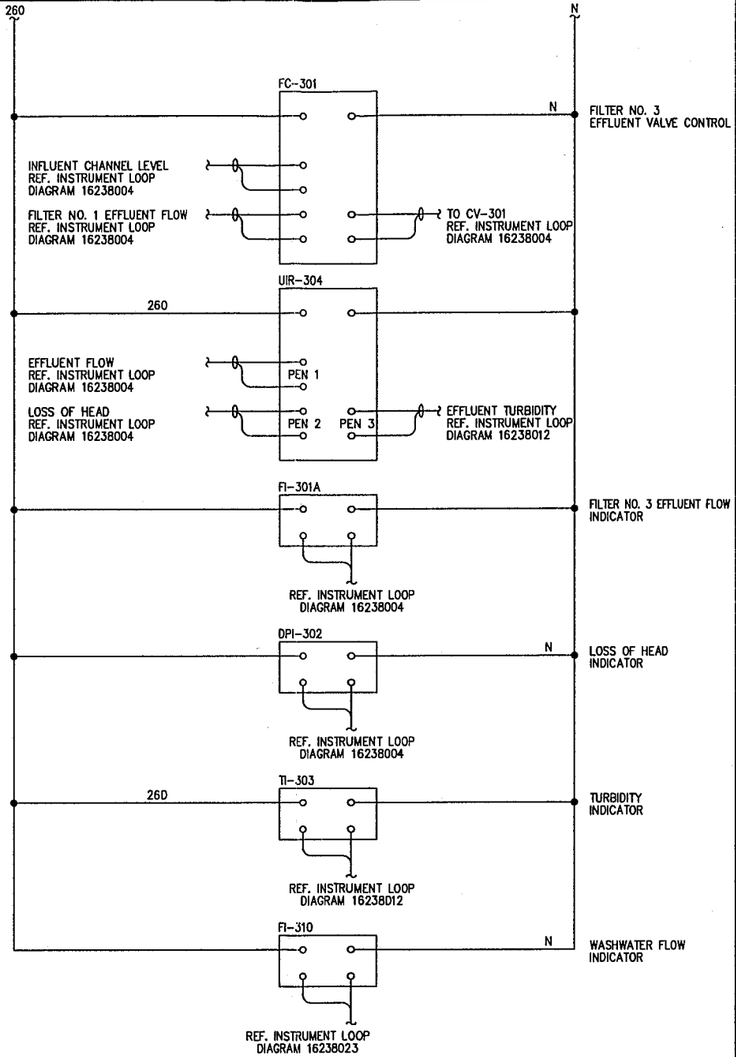
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

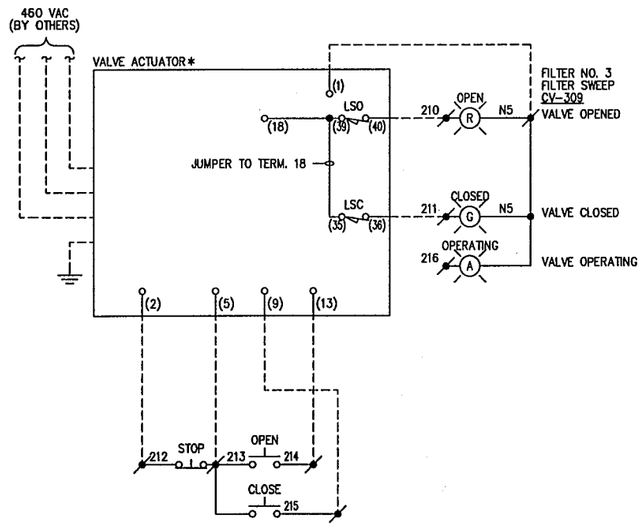
NO.	DATE	REVISION	BY
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

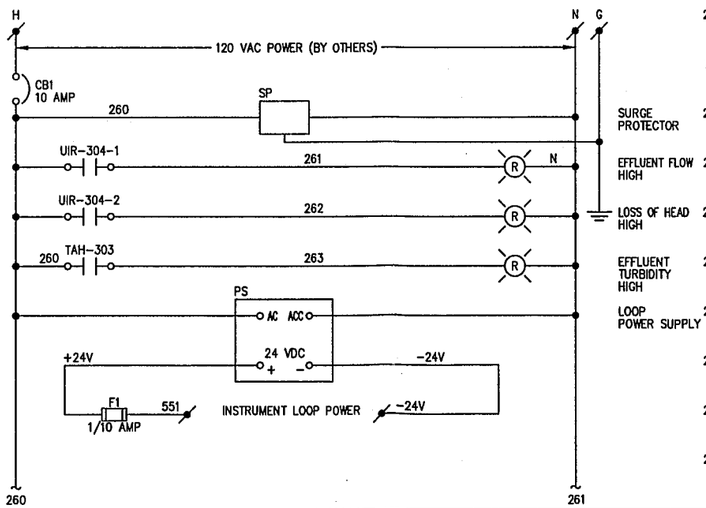
DRAWN BY: D.C.F. DATE: 04-22-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238D 3/4











LEGEND:
- ⁄ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

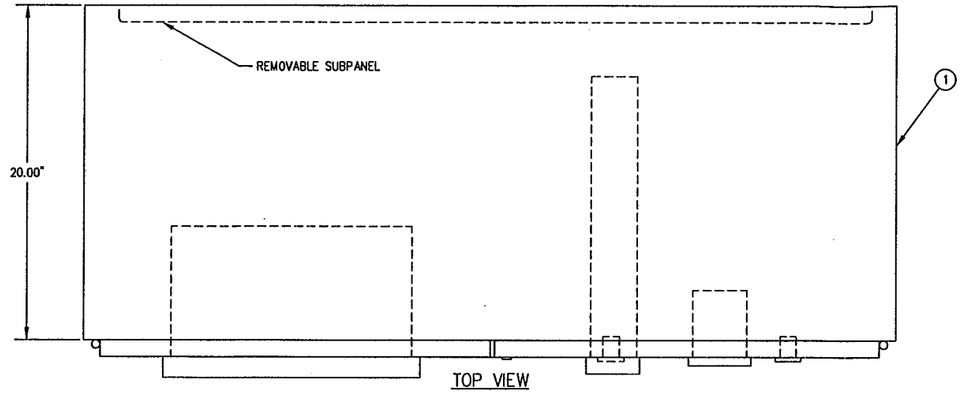
NO.	DATE	DESCRIPTION	BY
		REVISION	
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

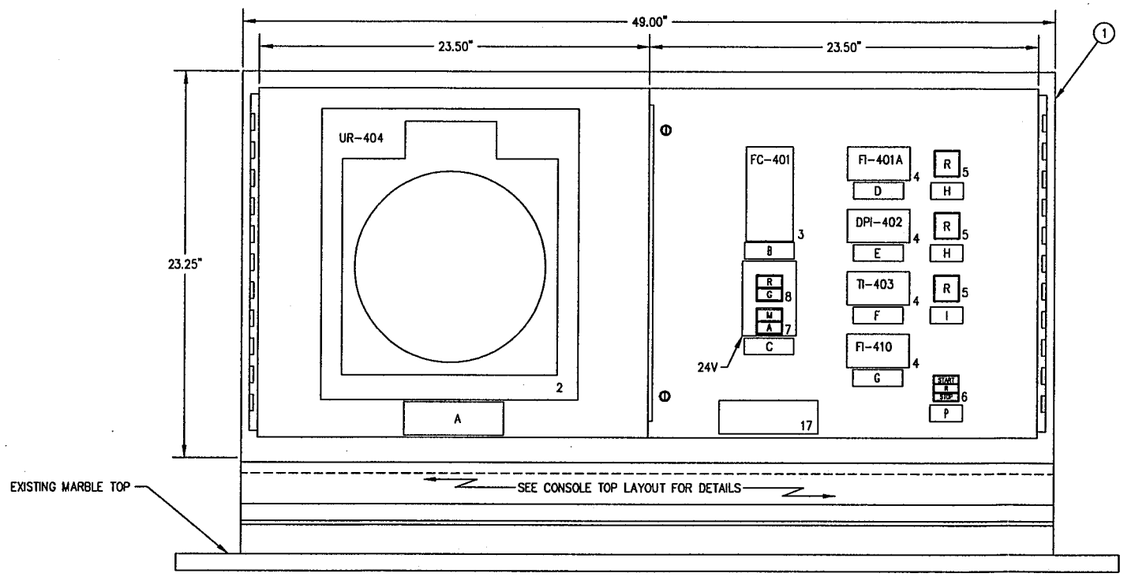
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 3 CONSOLE
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

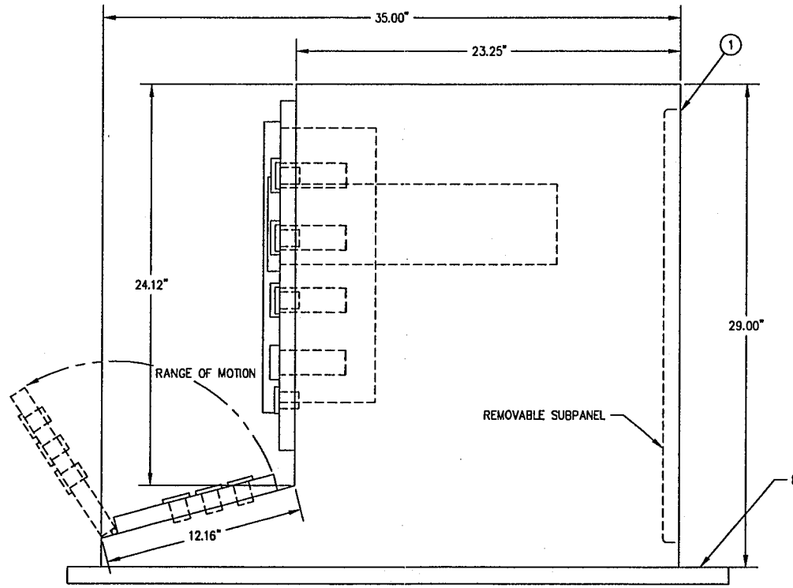
DRAWN BY: D.C.F.	DATE: 04-22-96
CHECKED: W.A.H.	SCALE: NONE
JOB NO.	DWG. NO. 16-238D 4/4



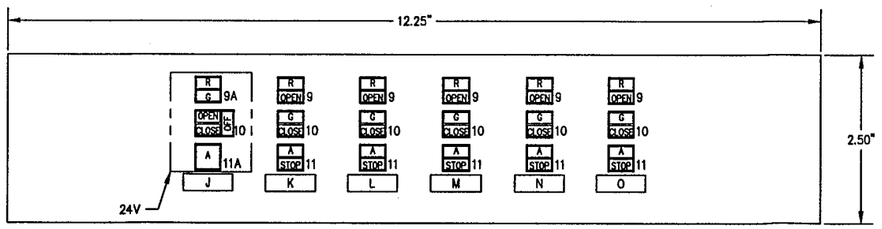
TOP VIEW



FRONT VIEW



SIDE VIEW



CONSOLE TOP LAYOUT

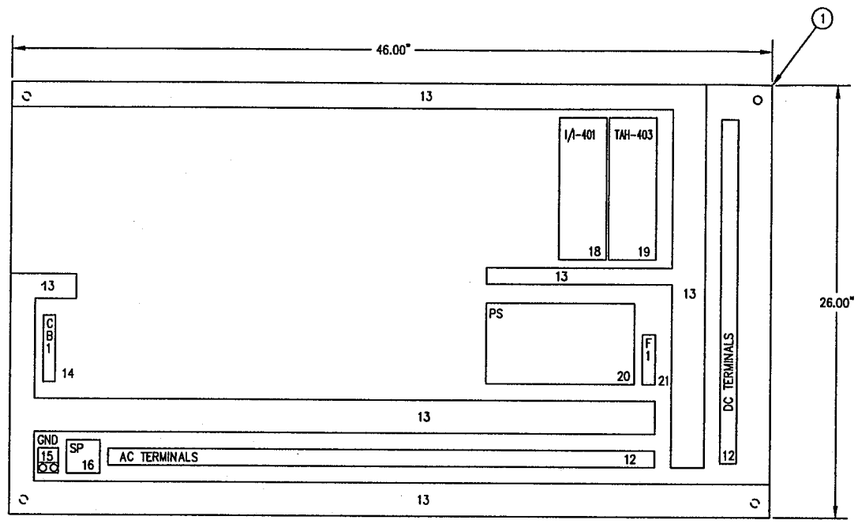
NO.	DATE	REVISION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 4
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238E 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-238B	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-238B	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-238B	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HCI10E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSED
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-401
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-406
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-408
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-405
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-407
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-409
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

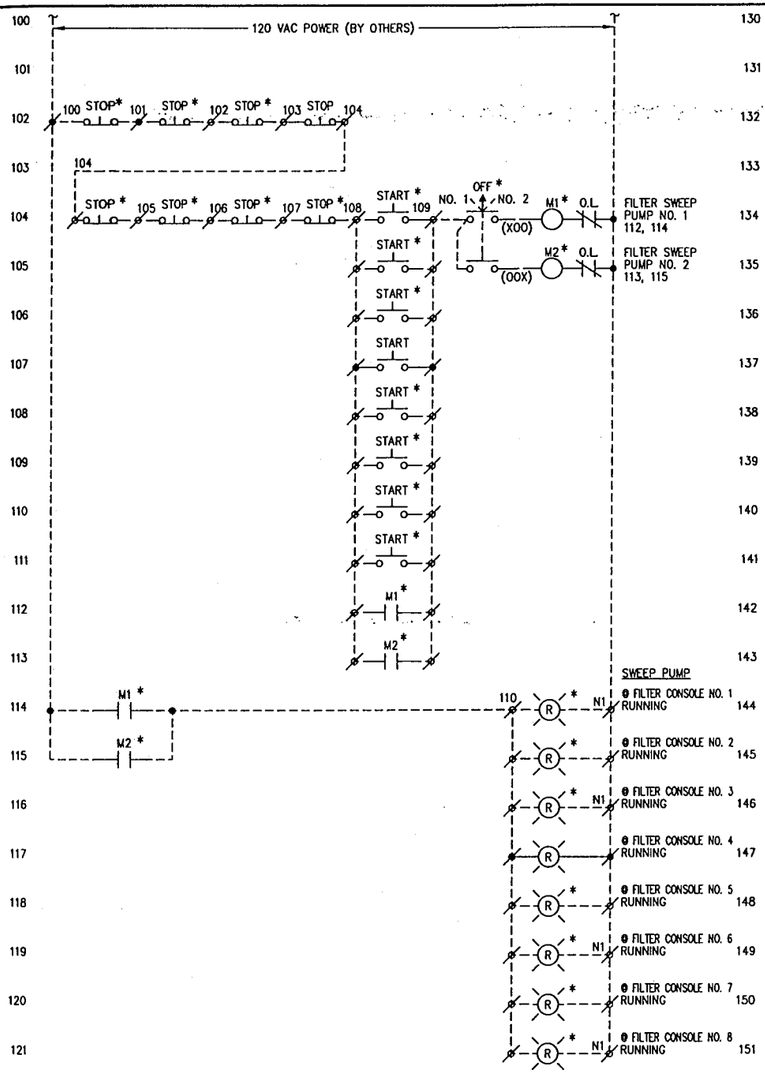
NO.	DATE	DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.
		REVISION	

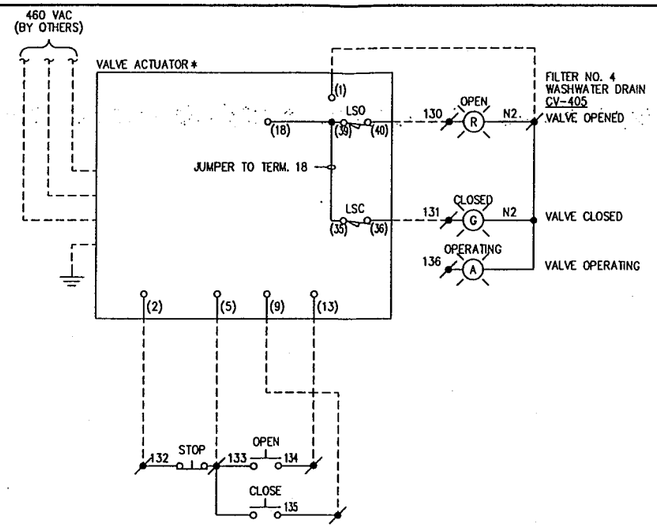
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

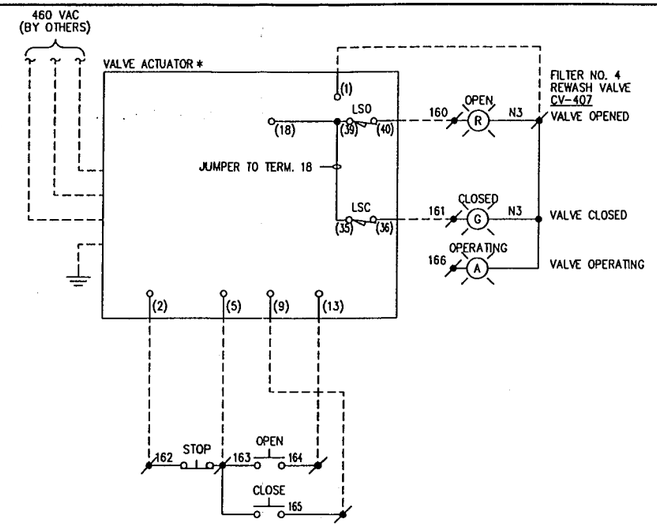
SUBJECT:
SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 4
FILTER PLANT IMPROVEMENTS -- ROME, GEORGIA

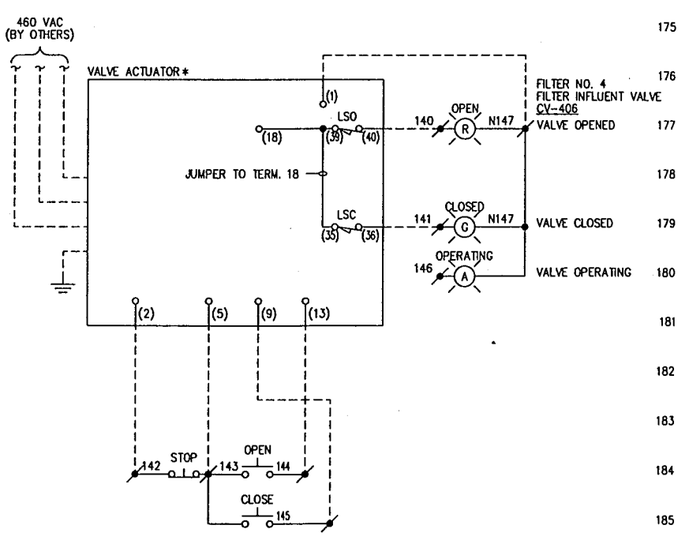
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	DATE: 04-15-96
CHECKED: W.A.H.	SCALE: 1/4
JOB NO.	DWG. NO. 16-238E 2/4









LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- DENOTES A REMOTE TERMINAL BLOCK POINT

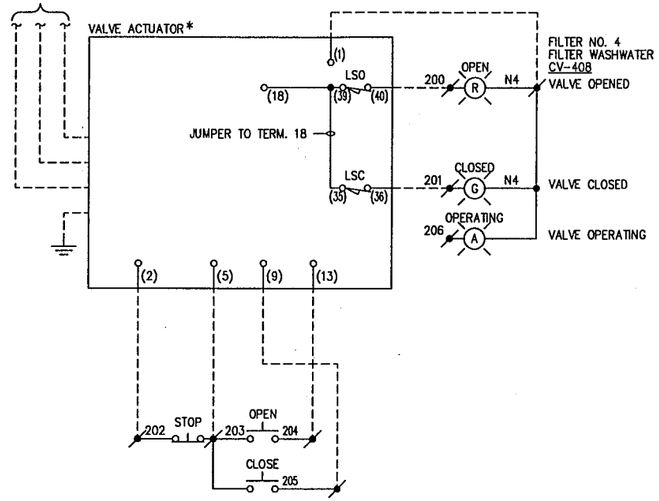
NO.	DATE	DESCRIPTION	BY
		REVISION	
1	01-01-96	REVISED VALVE ACTUATORS	G.D.D.

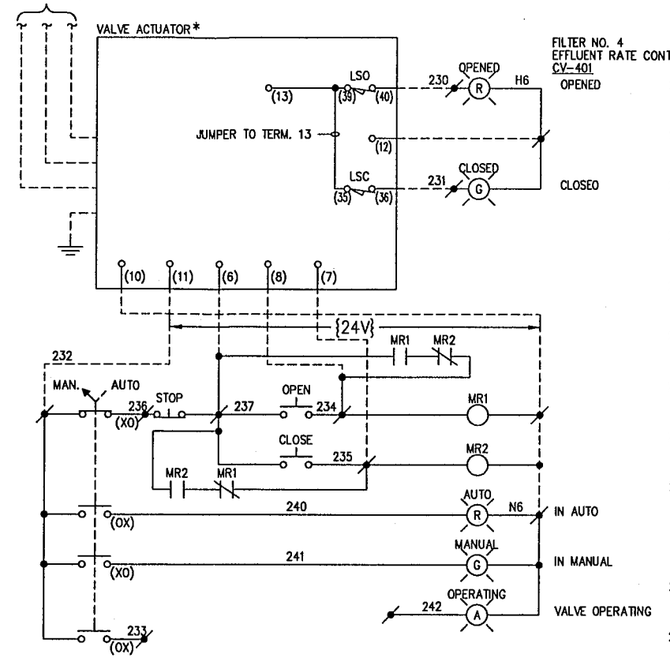
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

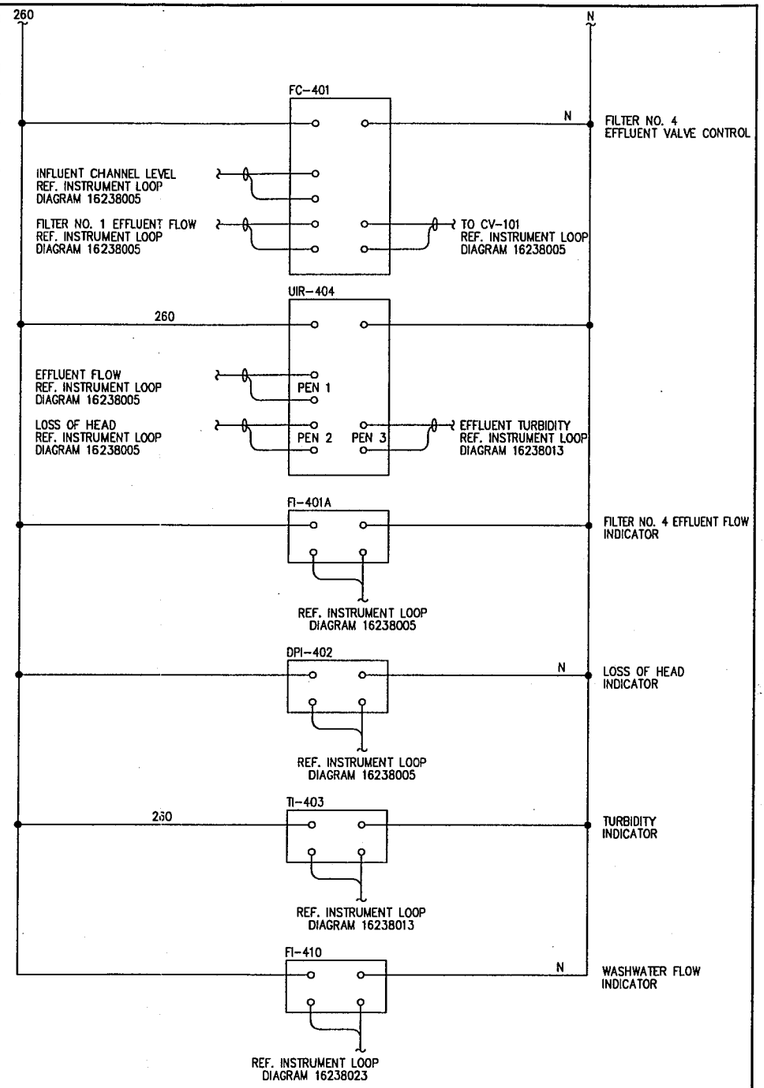
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 4 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

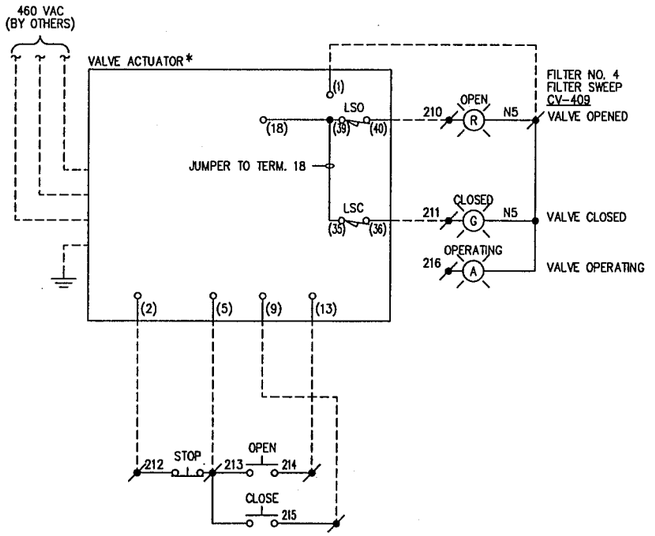
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

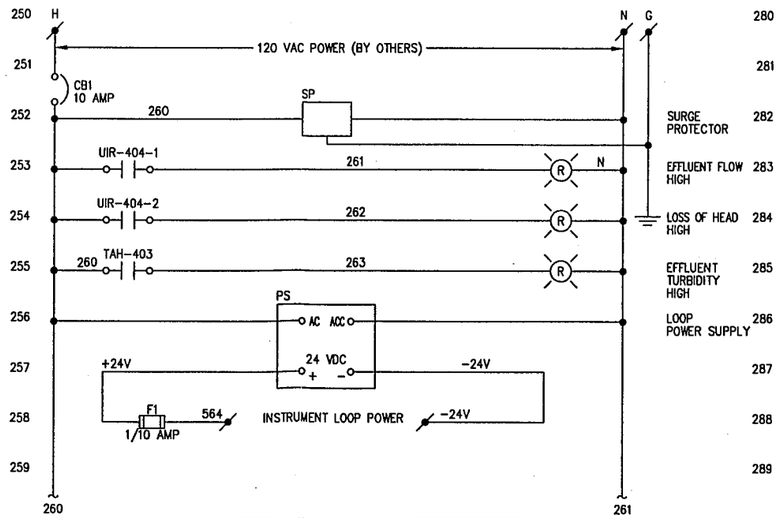
DRAWN BY: D.C.F. DATE: 04-22-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238E 3/4











LEGEND:
- ⌐ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

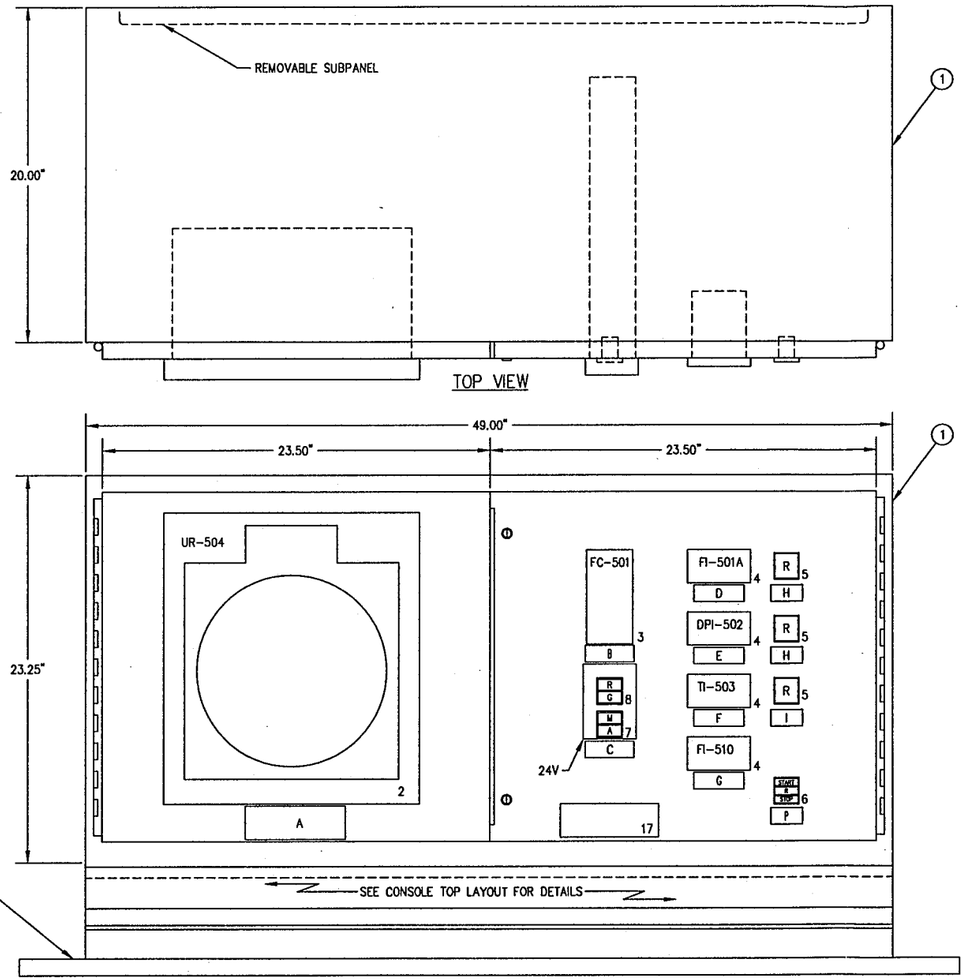
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 4 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-22-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238E 4/4



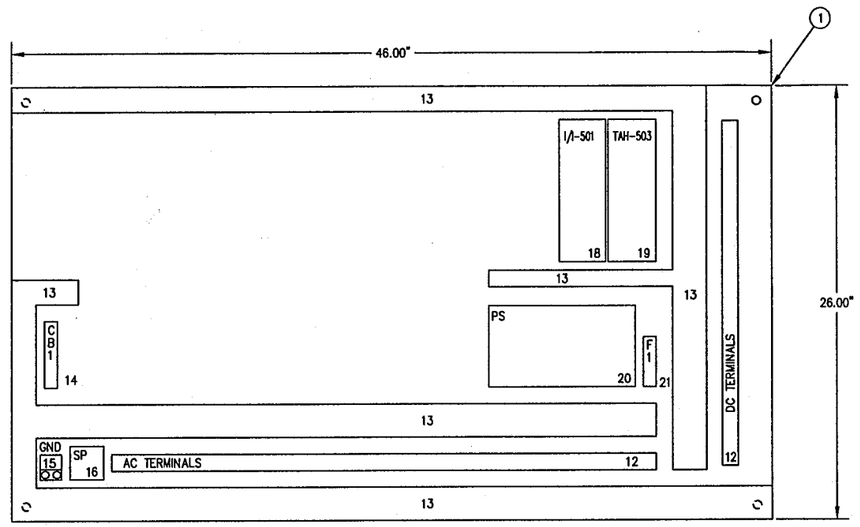
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 5
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	01-01-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238F 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-2388	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-2388	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-2388	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HCI10E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSE
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-501
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-506
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-508
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-505
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-507
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-509
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

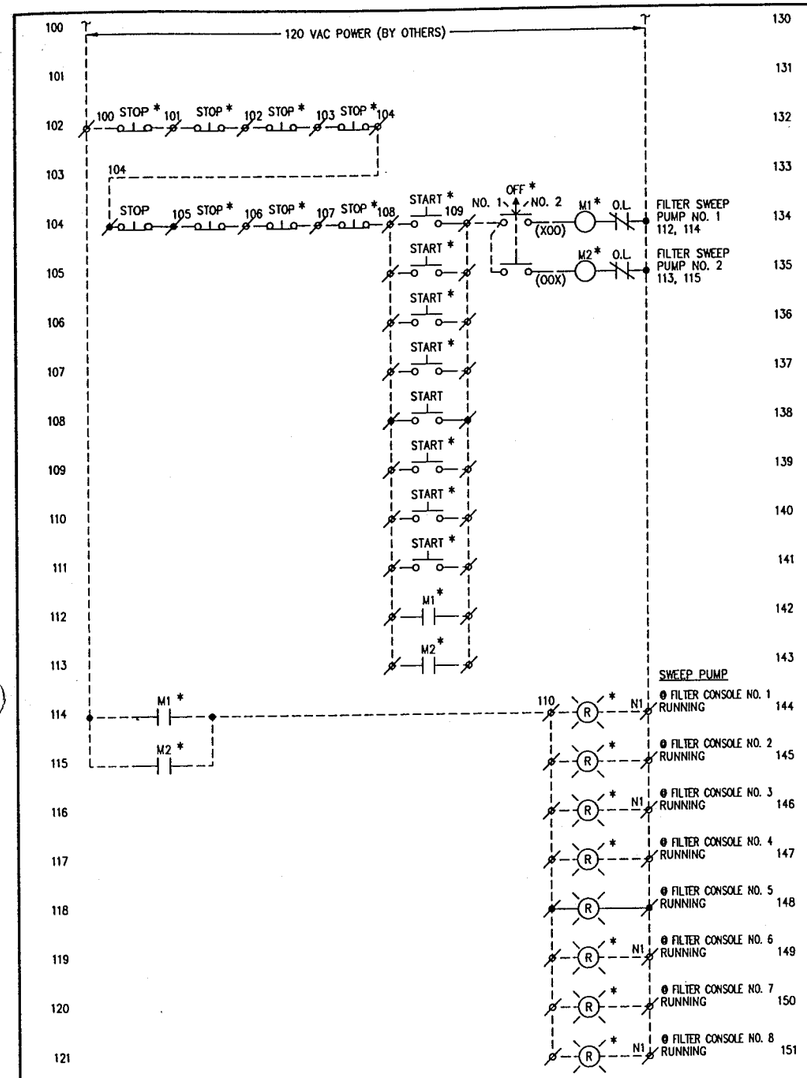
NO.	DATE	DESCRIPTION REVISION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

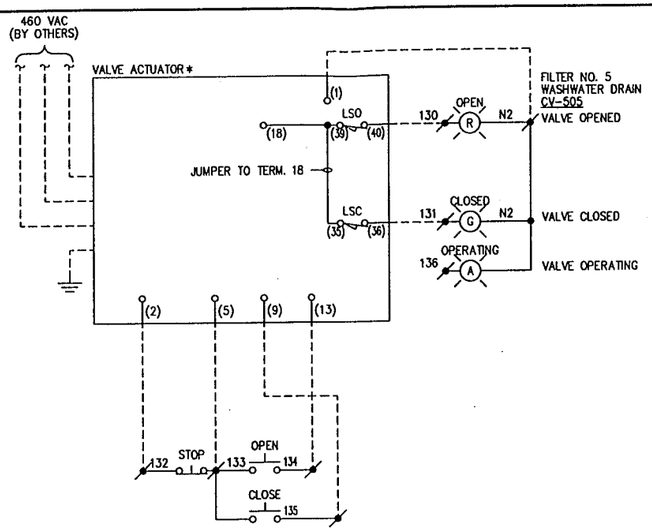
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

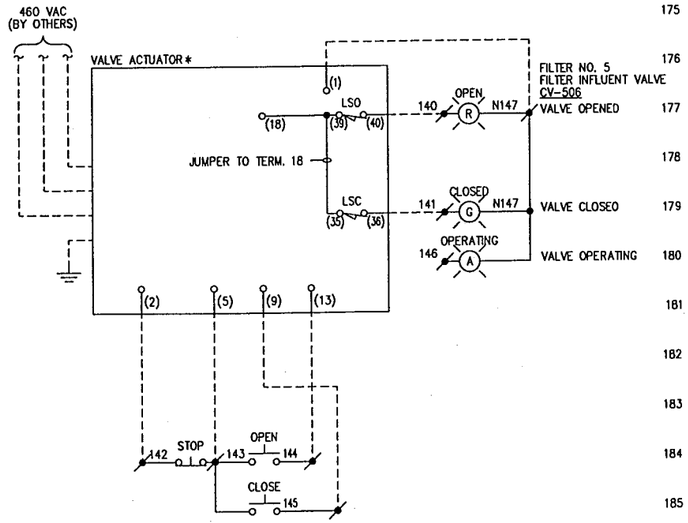
SUBJECT: SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 5
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

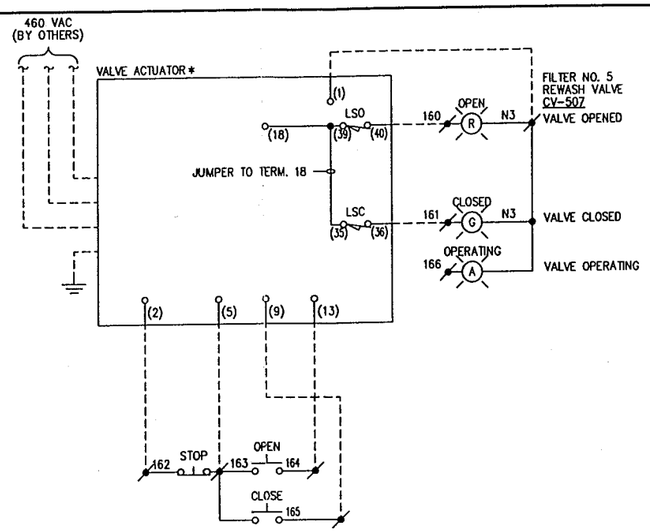
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238F 2/4









LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- DENOTES A REMOTE TERMINAL BLOCK POINT

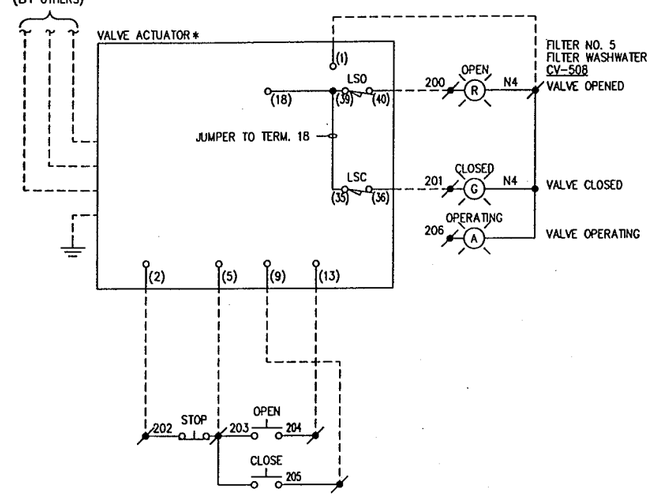
NO.	DATE	DESCRIPTION	BY
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.
		REVISION	

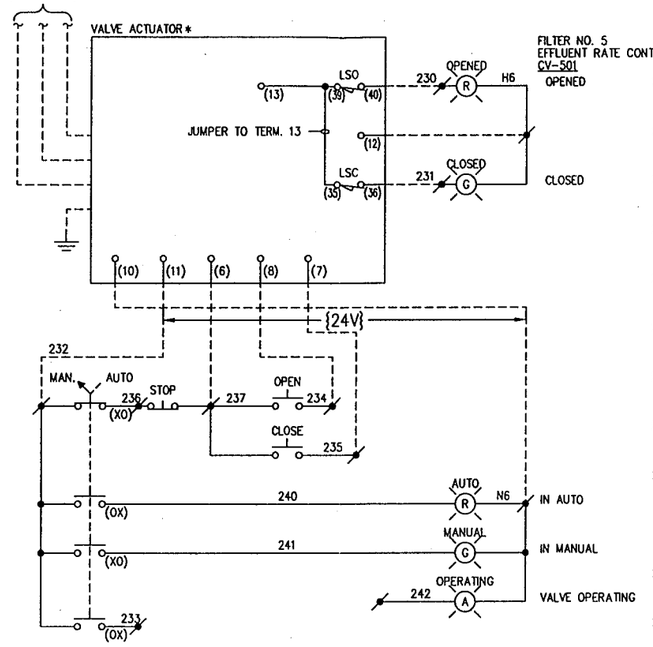
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

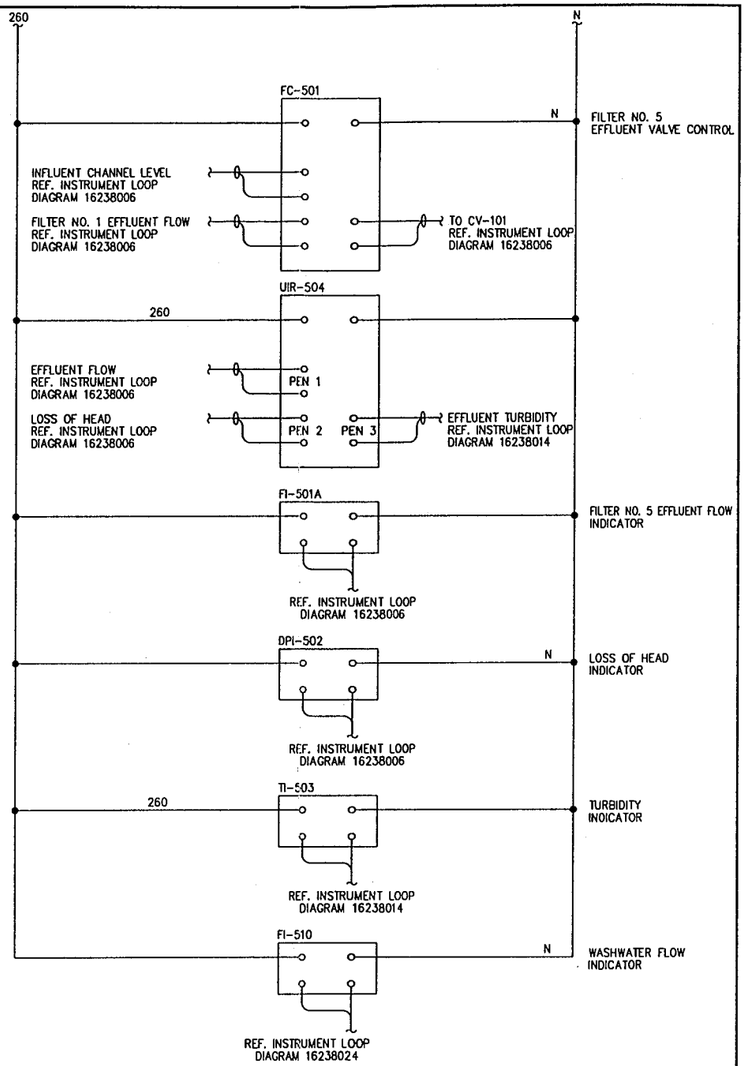
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 5 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

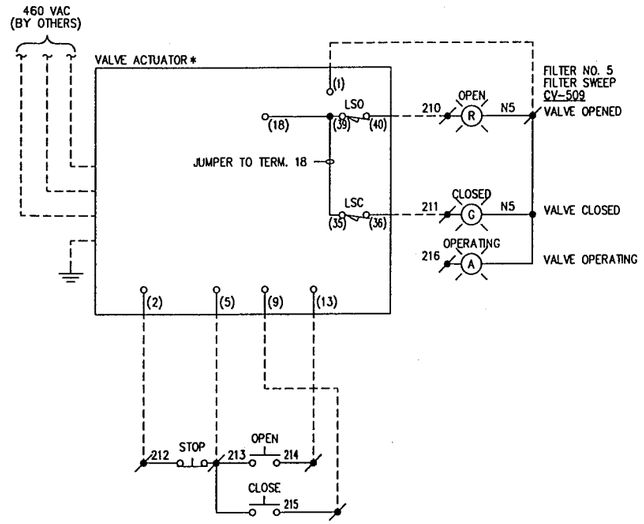
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

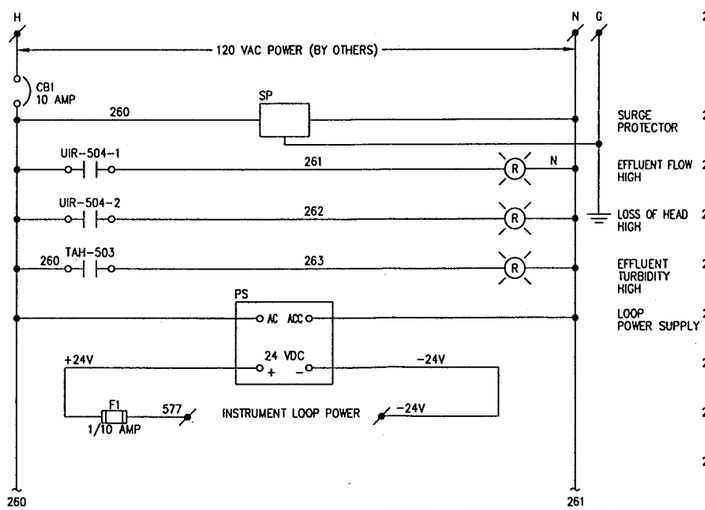
DRAWN BY: D.C.F. DATE: 04-22-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238F 3/4











LEGEND:
- ⁄ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

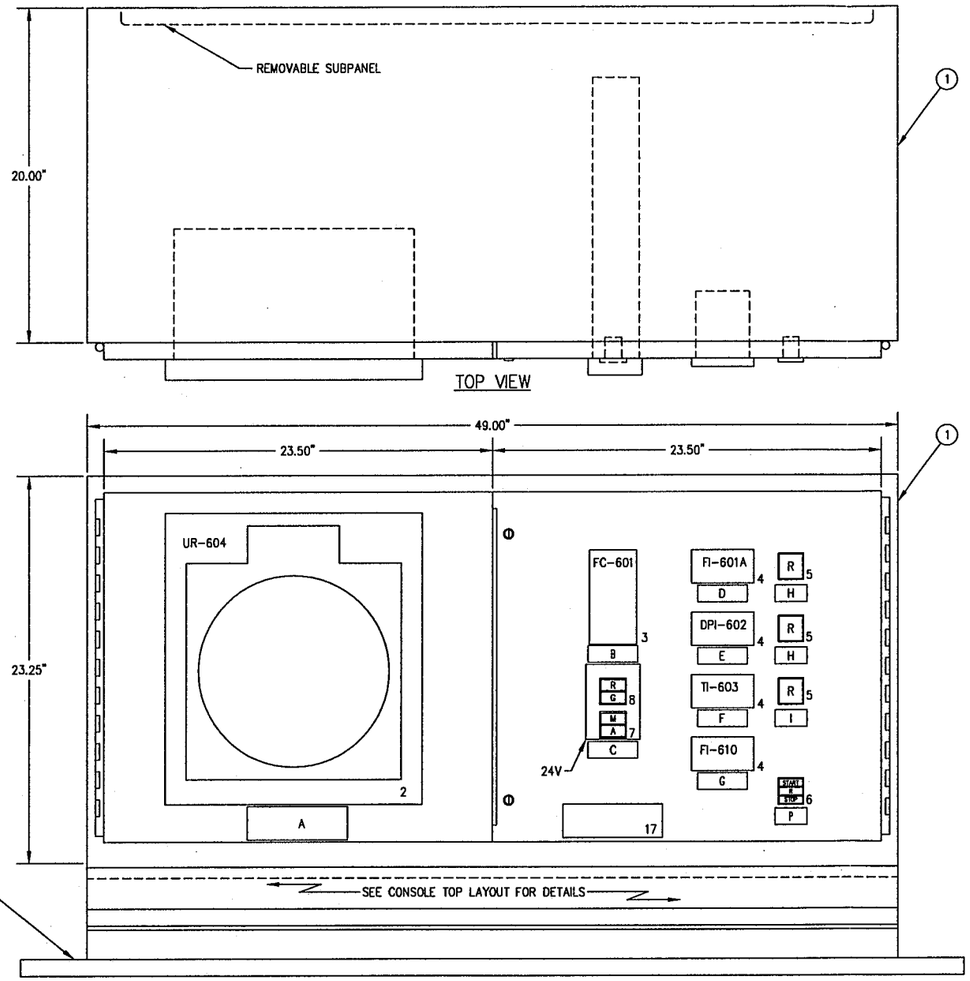
NO.	DATE	DESCRIPTION	BY
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.
		REVISION	

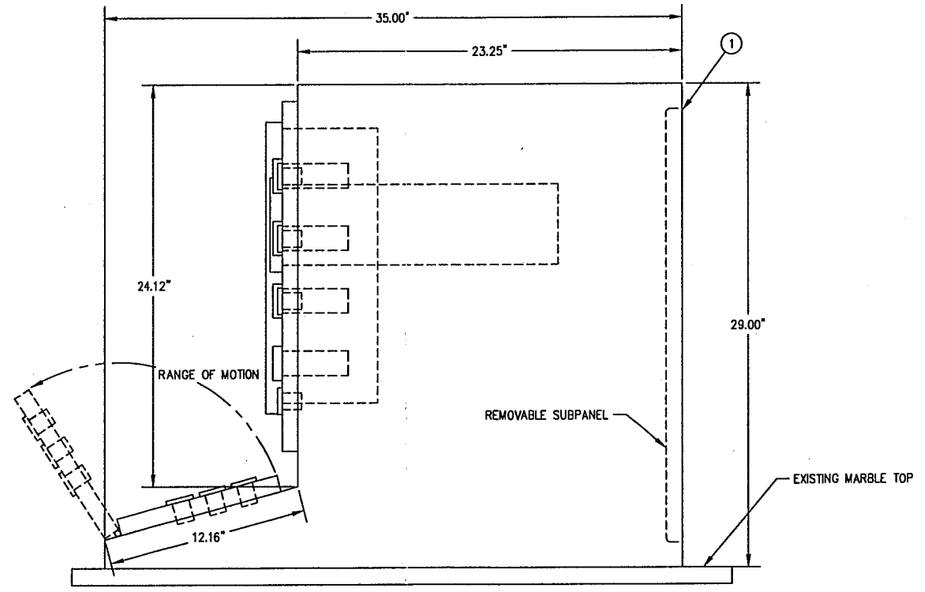
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 5 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. | DATE: 04-22-96
CHECKED: W.A.H. | SCALE: NONE
JOB NO. | DWG. NO. 16-238F 4/4





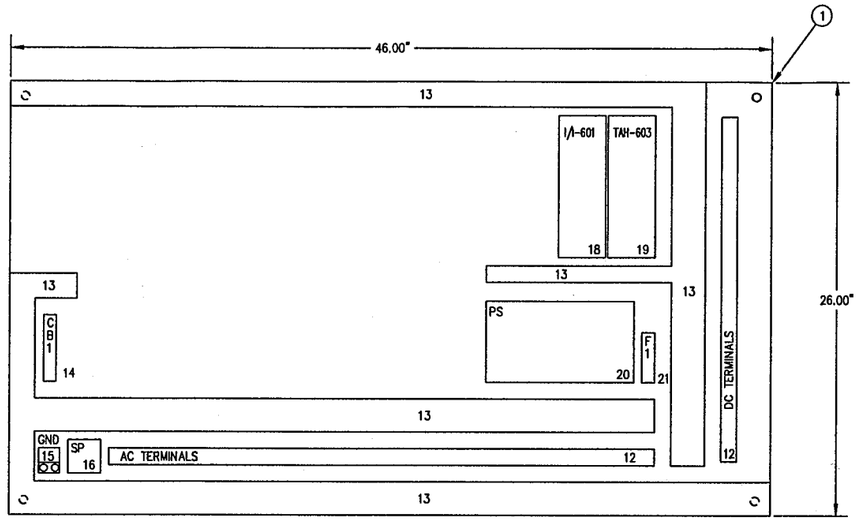
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 6
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238G 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-238B	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-238B	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-238B	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HCI10E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSED
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-601
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-606
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-608
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-605
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-607
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-609
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

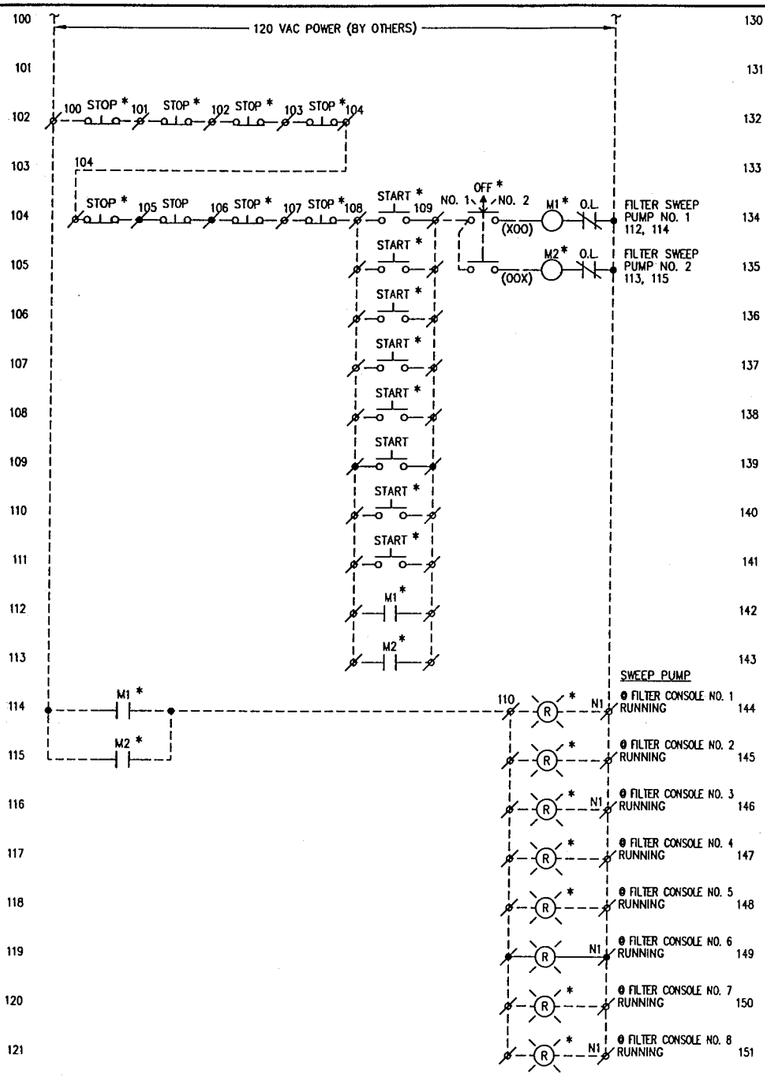
NO.	DATE	DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	01-01-96	REVISED VALVE ACTUATORS	G.D.D.
		REVISION	

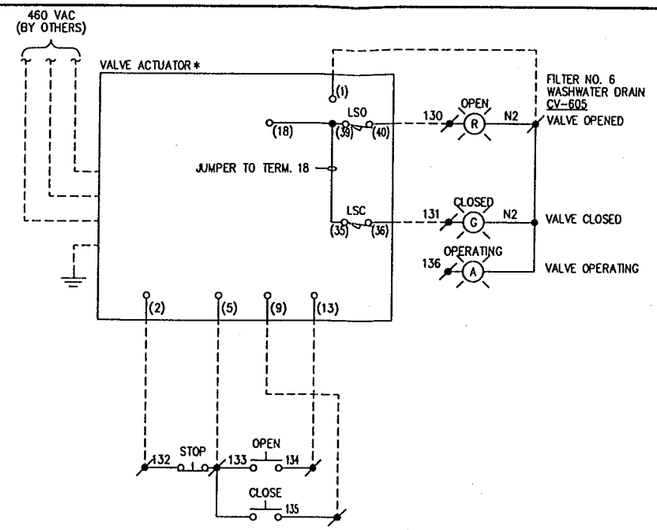
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

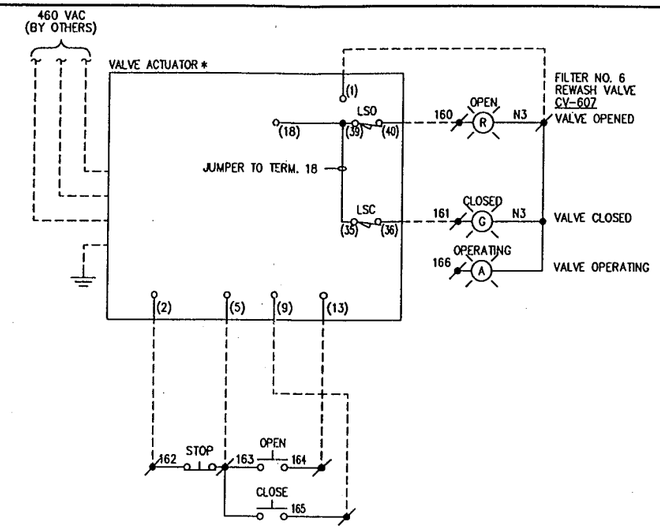
SUBJECT:
SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 6
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

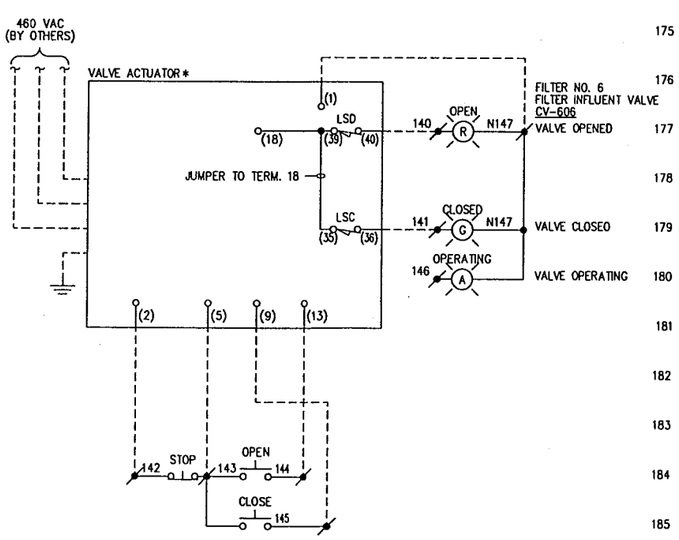
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238G 2/4









LEGEND:
- ⌀ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- ⌀ DENOTES A REMOTE TERMINAL BLOCK POINT

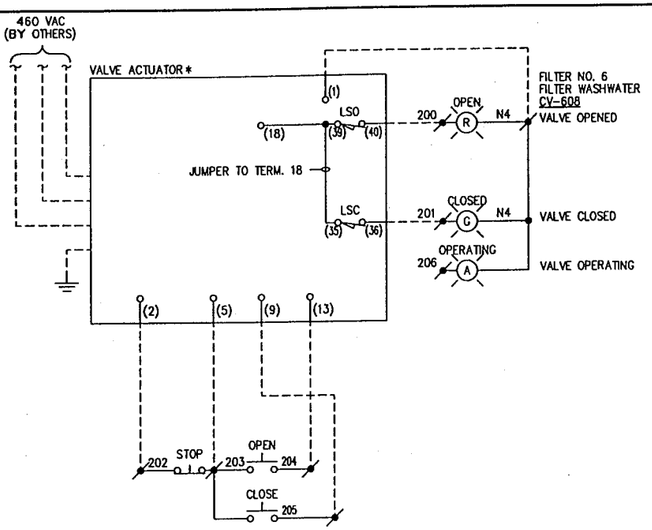
NO.	DATE	DESCRIPTION / REVISION	BY
1	11-01-96	REVISED VALVE ACTUATORS	C.O.D.

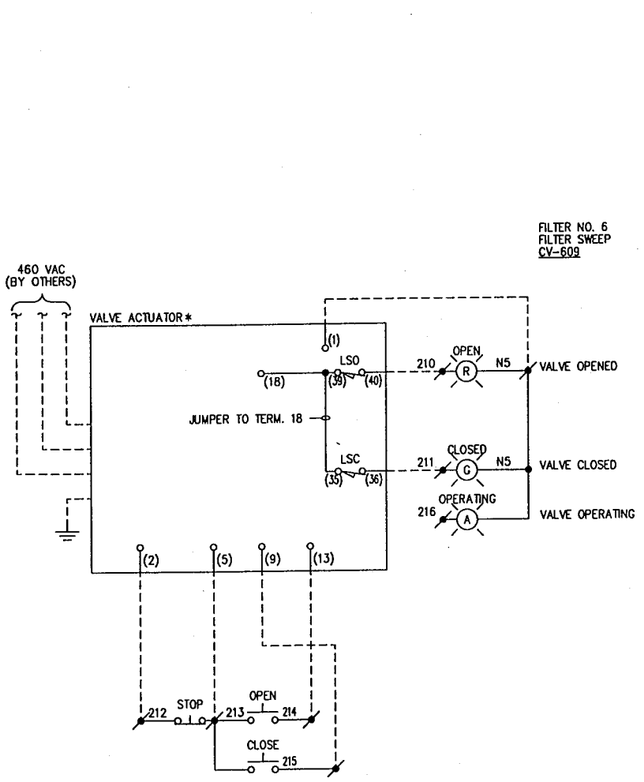
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

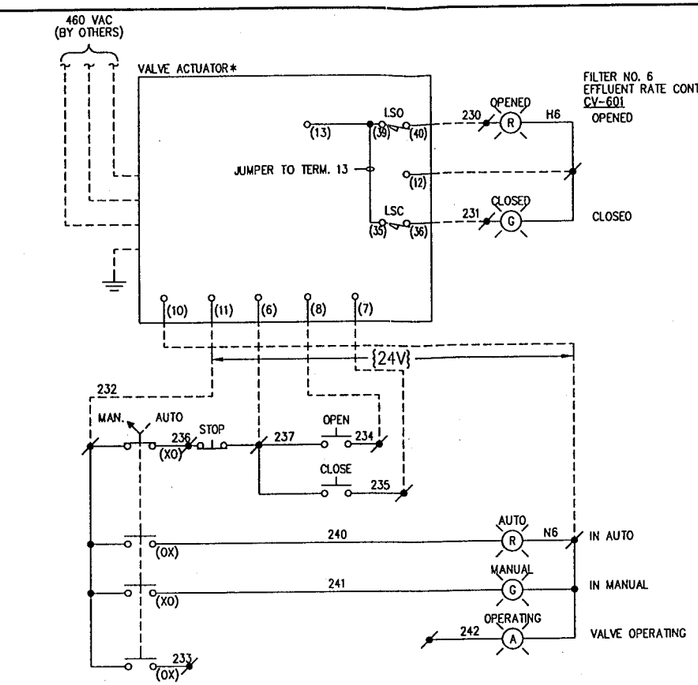
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 6 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

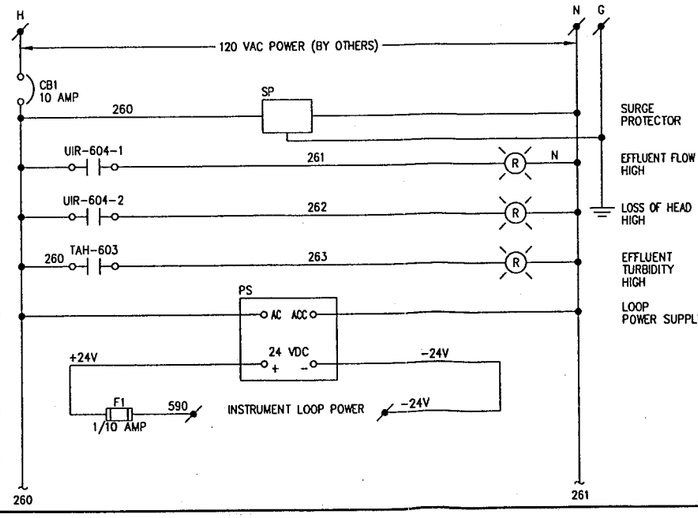
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

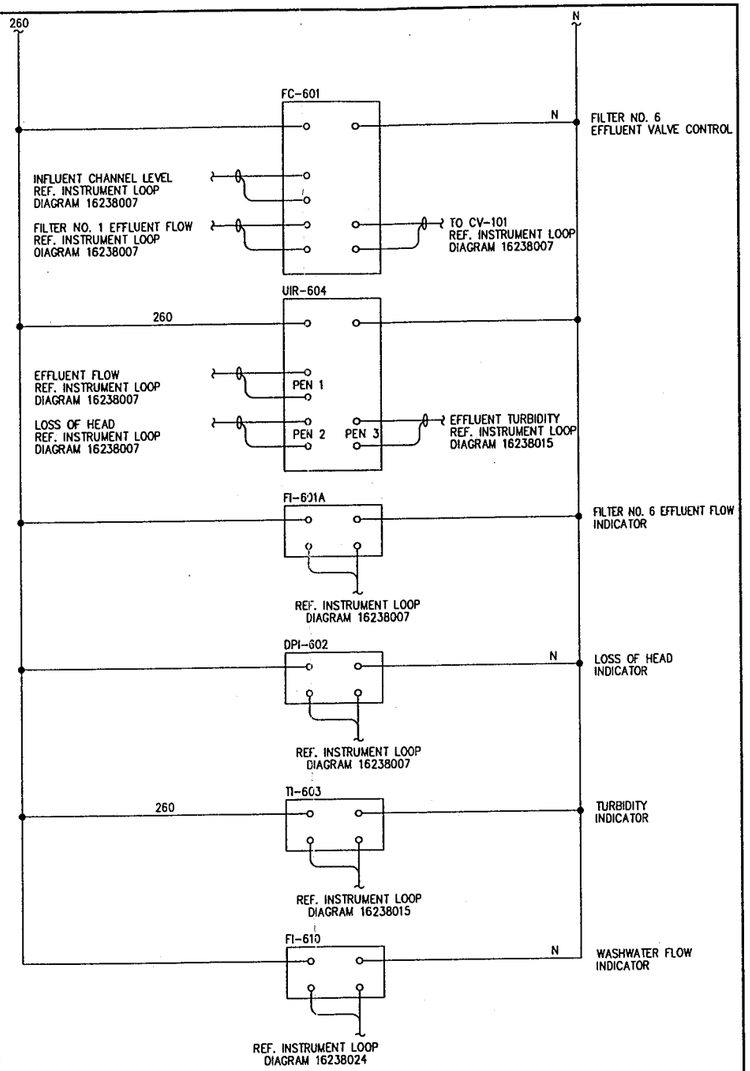
DRAWN BY: D.C.F. | DATE: 04-22-96
CHECKED: W.A.H. | SCALE: NONE
JOB NO. | DWG. NO. 16-238G 3/4











LEGEND:
- ⌀ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

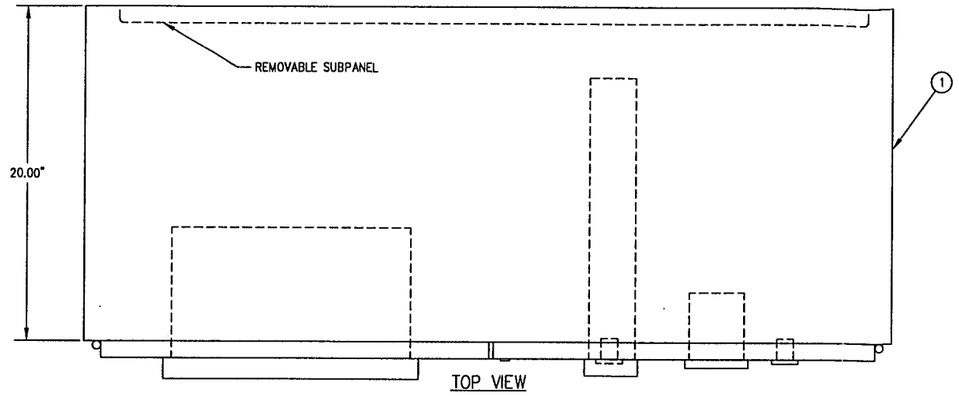
NO.	DATE	DESCRIPTION	BY
		REVISION	
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

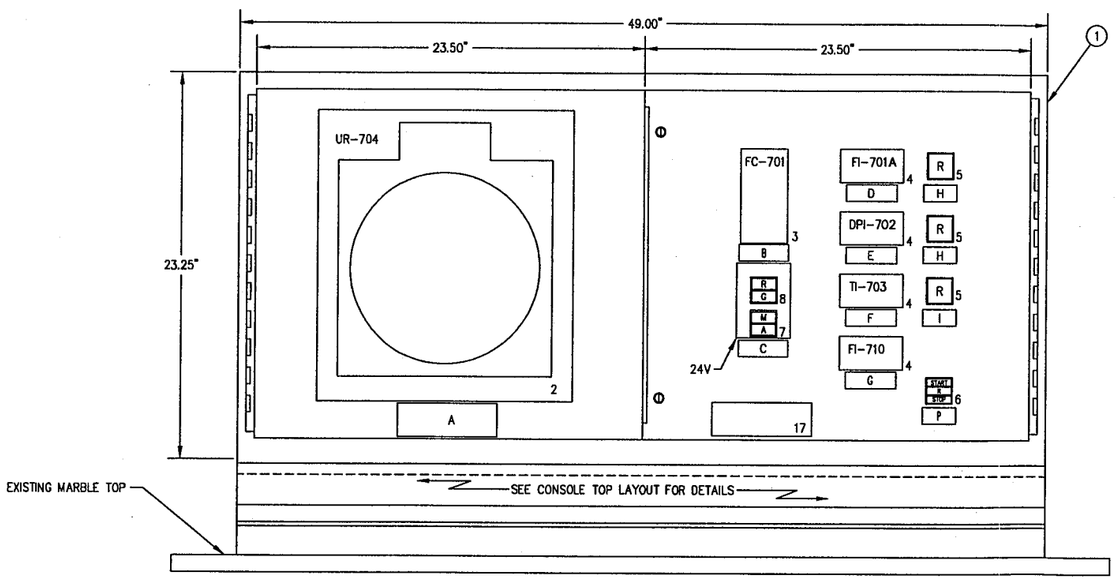
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 6 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

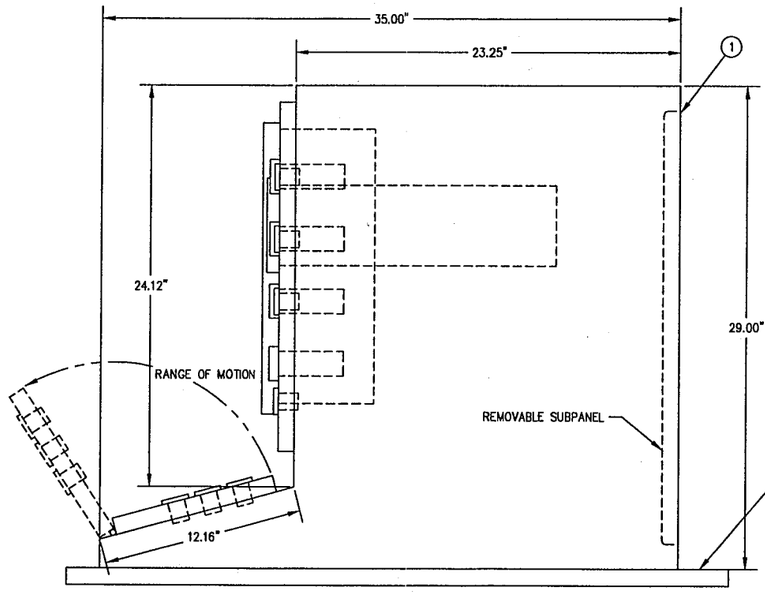
DRAWN BY: D.C.F. | DATE: 04-22-96
CHECKED: W.A.H. | SCALE: NONE
JOB NO. | DWG. NO. 16-238G 4/4



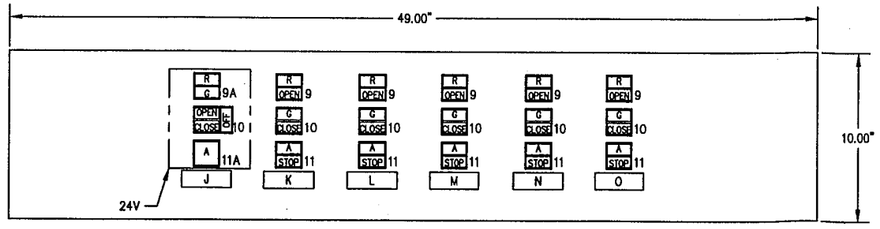
TOP VIEW



FRONT VIEW



SIDE VIEW



CONSOLE TOP LAYOUT

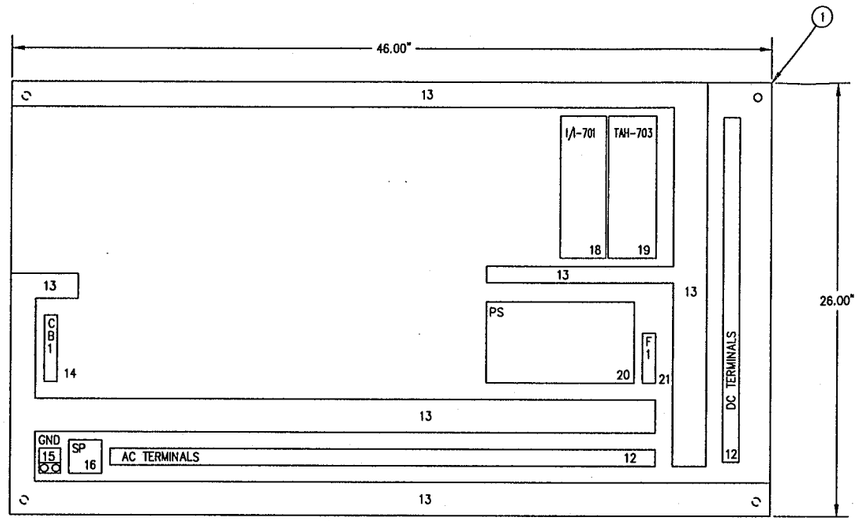
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 7
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	01-01-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238H 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-238B	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-238B	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-238B	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HCI10E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSED
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-701
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-706
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-708
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-705
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-707
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-709
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

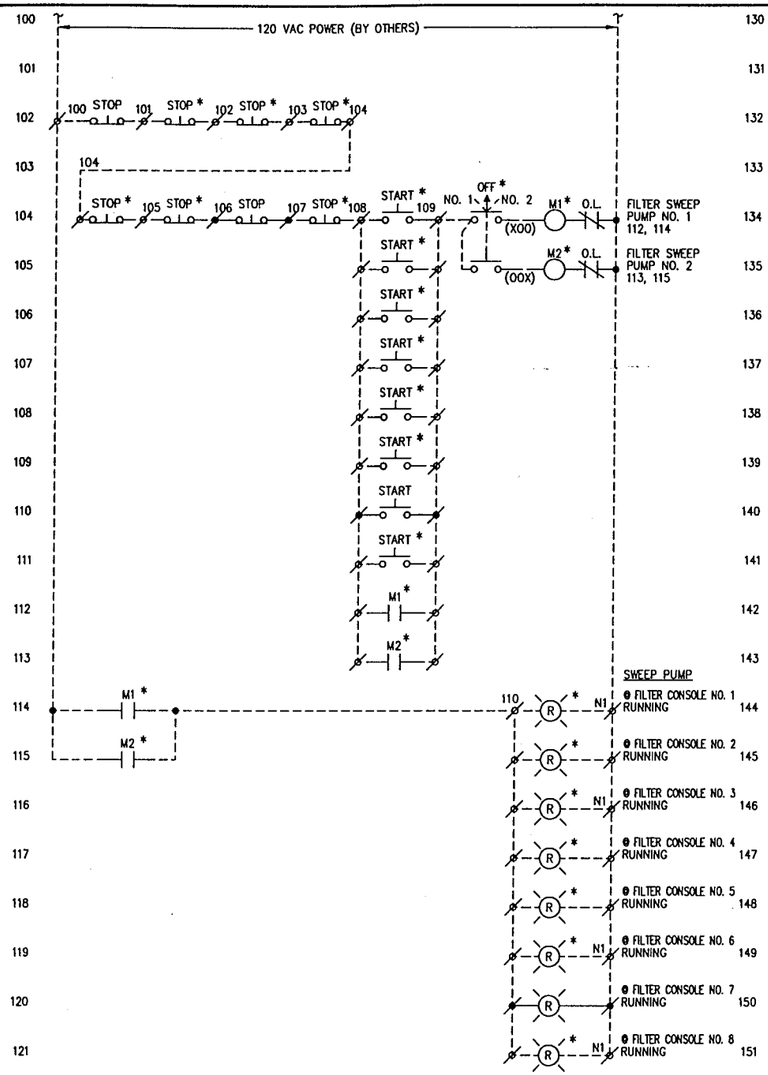
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM,ALABAMA 35216

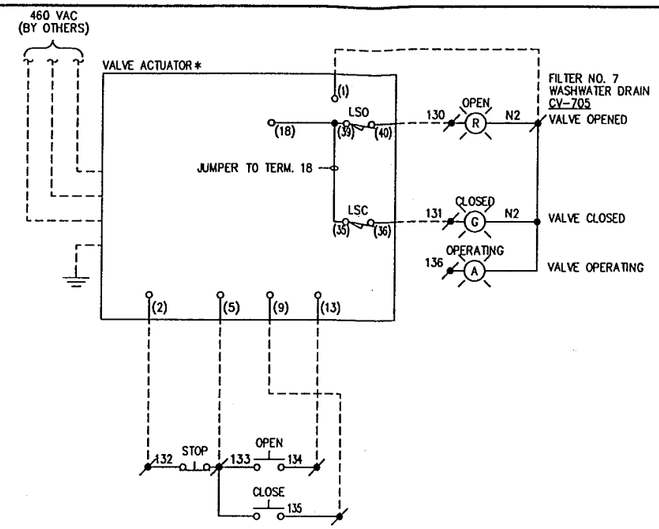
SUBJECT:
SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 7
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

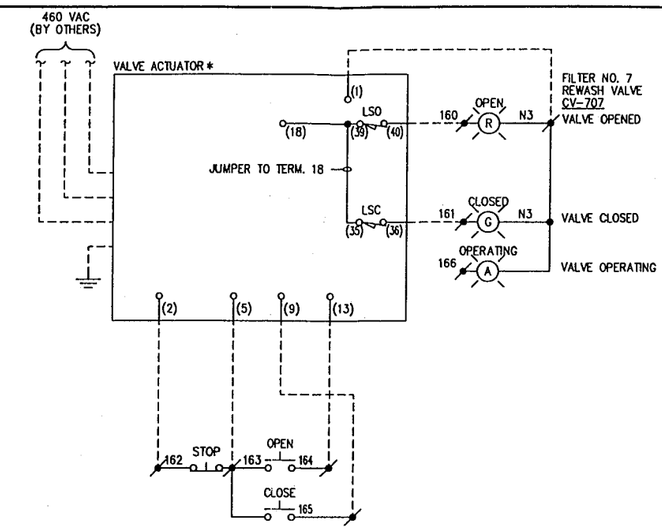
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

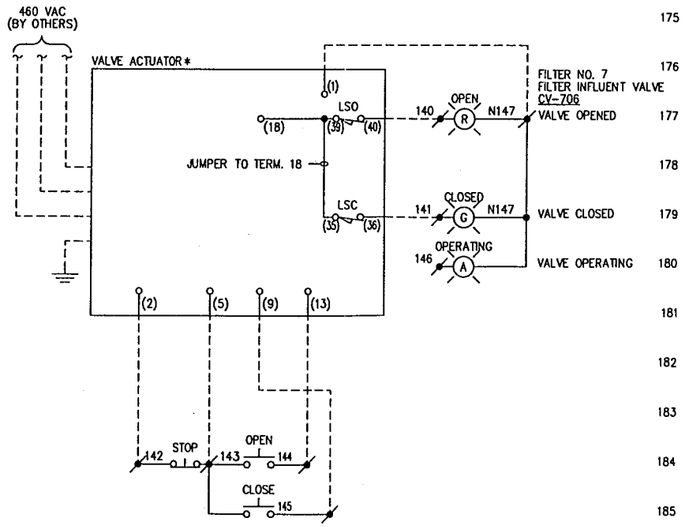
NO.	DATE	REVISION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238H 2/4









LEGEND:
- ⌀ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- ⌀ DENOTES A REMOTE TERMINAL BLOCK POINT

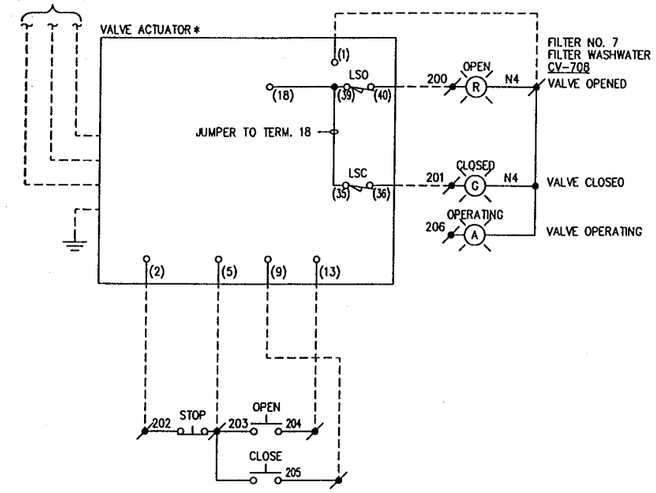
REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35215

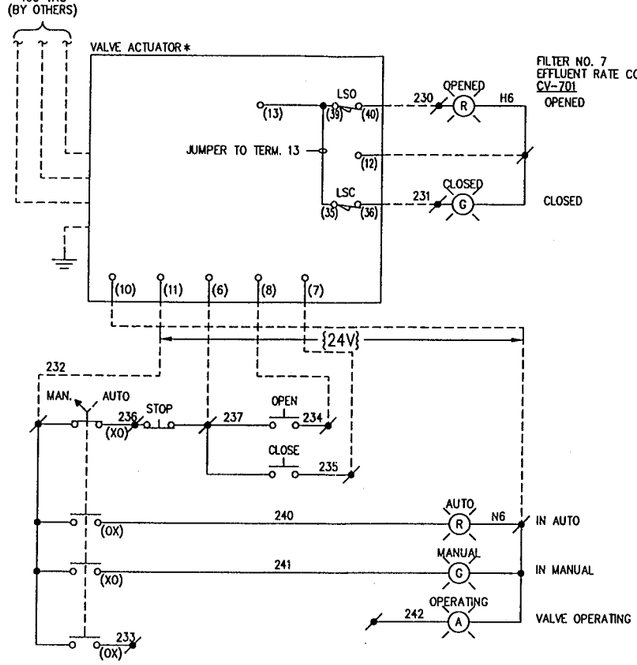
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 7 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

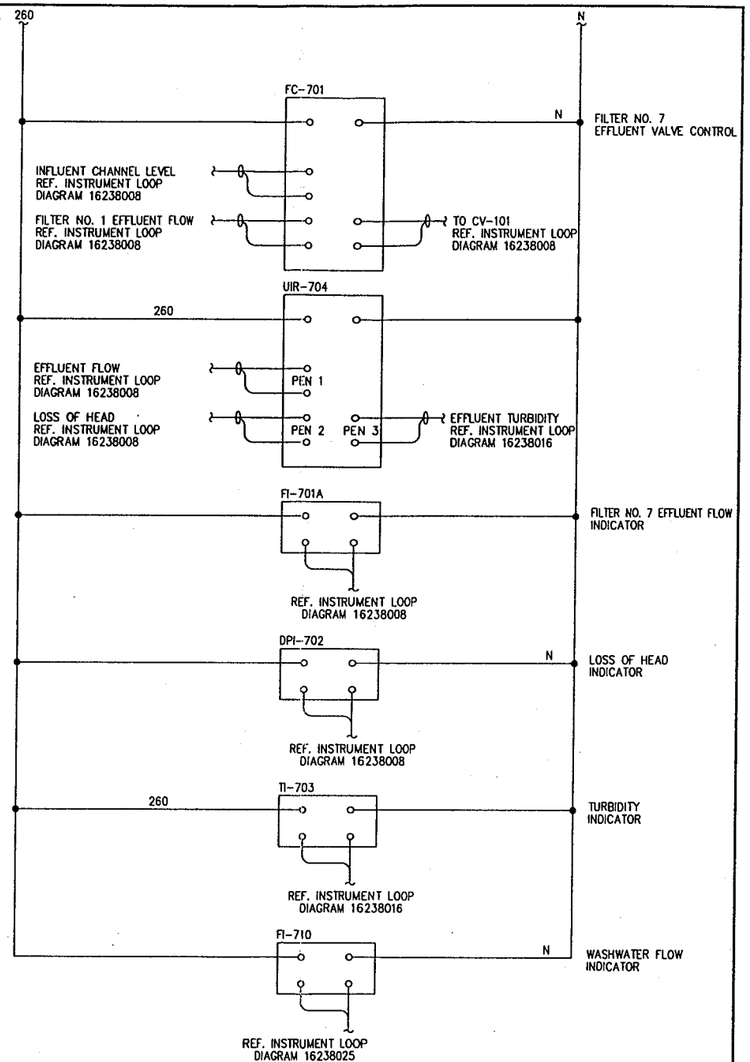
CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

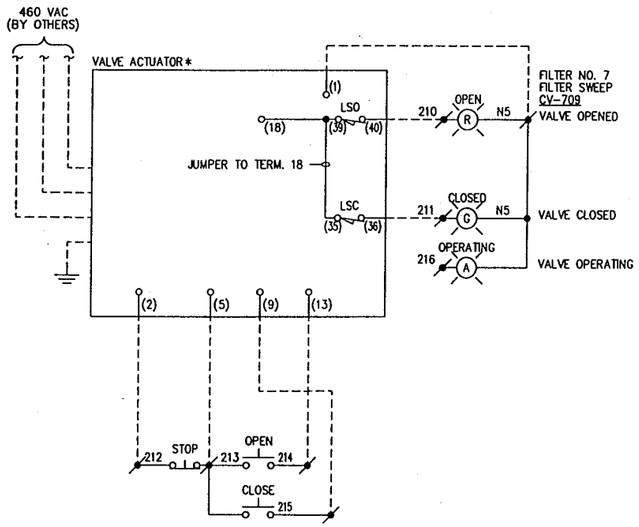
NO.	DATE	DESCRIPTION (REVISION)	BY
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

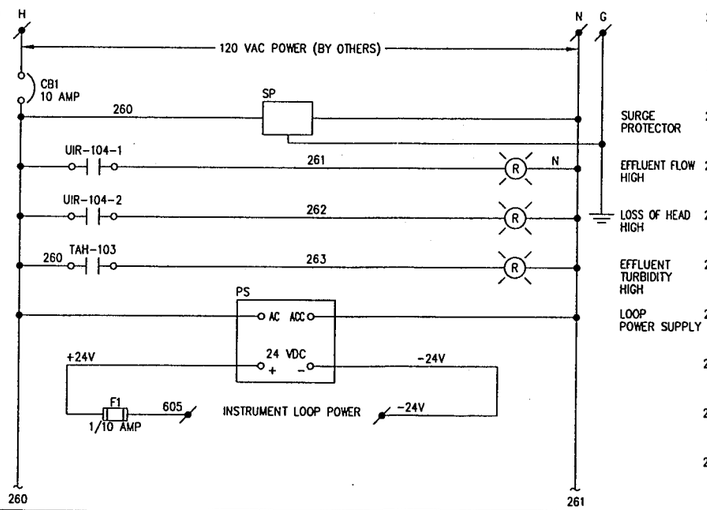
DRAWN BY: D.C.F. DATE: 04-22-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238H 3/4











LEGEND:
- ⌀ DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

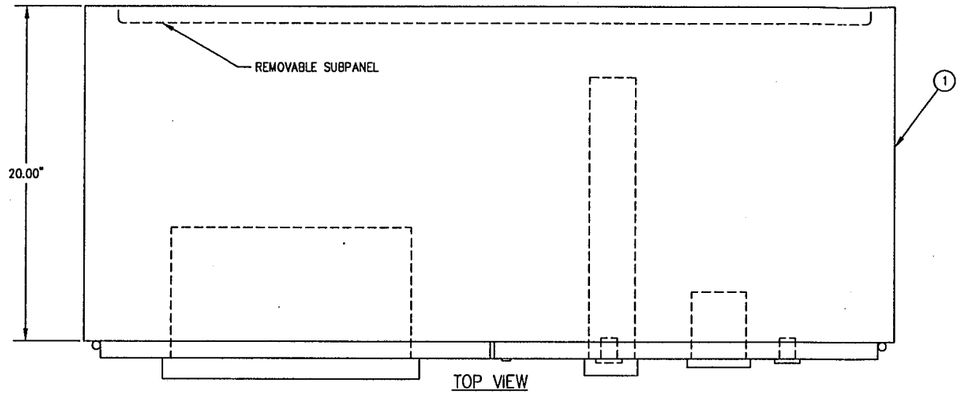
NO.	DATE	DESCRIPTION	BY
		REVISION	
1	10-31-96	REVISED VALVE ACTUATORS	G.D.D.

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

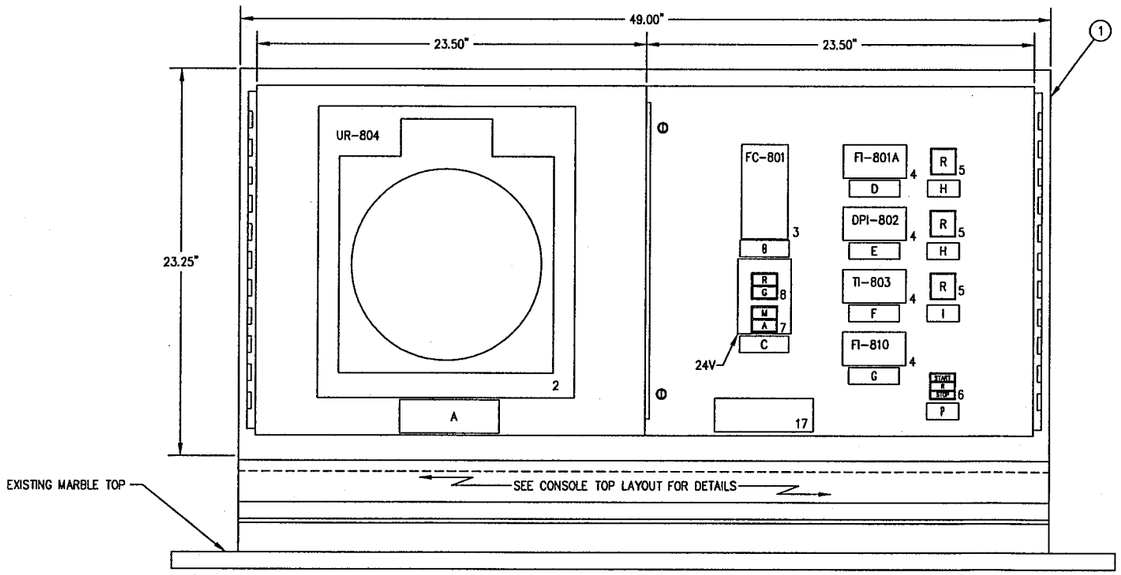
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 7 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

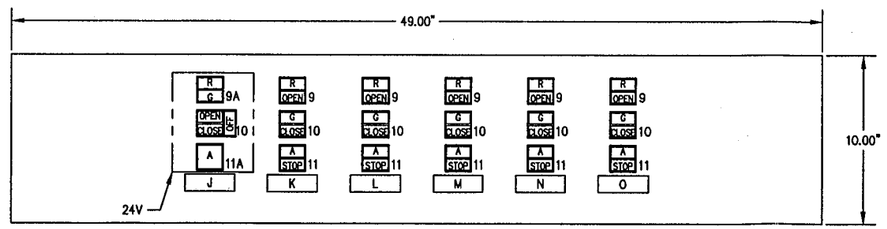
DRAWN BY: D.C.F. | DATE: 04-22-96
CHECKED: W.A.H. | SCALE: NONE
JOB NO. | DWG. NO. 16-238H 4/4



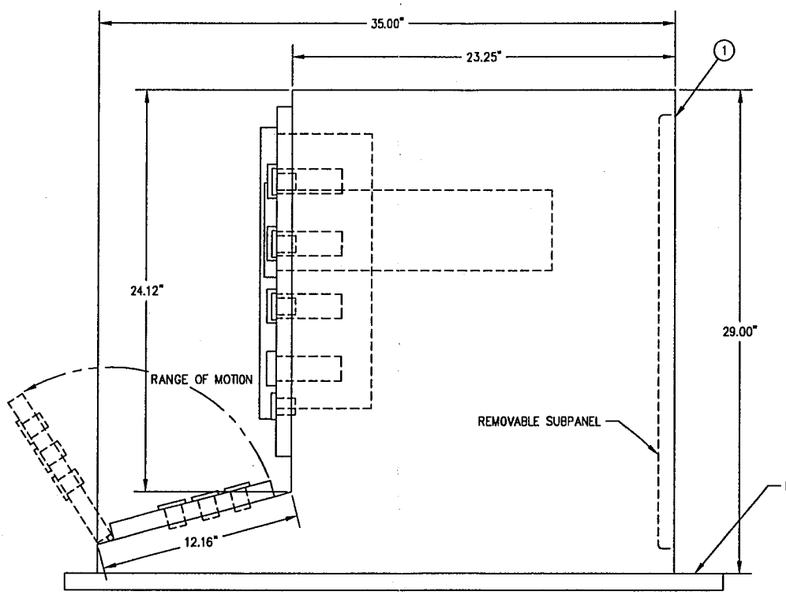
TOP VIEW



FRONT VIEW



CONSOLE TOP LAYOUT



SIDE VIEW

REVERE CONTROL SYSTEMS

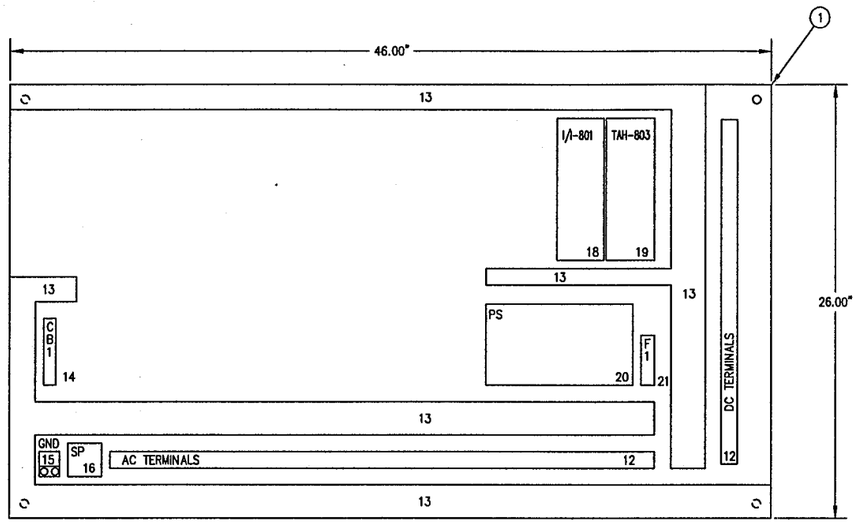
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT:
PANEL LAYOUT
FILTER CONSOLE NO. 8
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION DESCRIPTION	BY
2	04-18-97	FIELD REVISIONS	R.F.A.
1	10-17-96	REVISED VALVE ACTUATORS	G.D.D.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-2381 1/4



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	REVERE	SK 16-238B	CONSOLE, 29"H x 49"W x 35"W, NEMA 4, STAINLESS STEEL
	1	REVERE	SK 16-238B	SUBPANEL, 26"H x 46"W
	1	REVERE	SK 16-238B	ALUMINUM DOORS TO REPLACE EXISTING ACCESS PANELS
	1	HOFFMAN	A-HCI10E	CORROSION INHIBITOR
2	1	FOXBORO	740RA-A3330-Q	CIRCULAR CHART RECORDER, 120 VAC POWER, 3 CHANNEL, 4-20mA INPUT, 2 RELAY OUTPUTS
3	1	MOORE	352BA11NNN	SINGLE LOOP CONTROLLER, 120 VAC POWER, ANALOG AND DIGITAL DISPLAY
4	4	NEWPORT	202A-P	DIGITAL INDICATOR, 120 VAC POWER, 4-20mA INPUT
5	3	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	3	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
6	1	CUTLER HAMMER	E30 EA	DUAL PUSHBUTTON WITH ONE LIGHT SEGMENT, TRANSFORMER TYPE, MOMENTARY CONTACTS
	2	CUTLER HAMMER	E30 KLA3	CONTACT BLOCK, 1 N.O. AND 1 N.C. CONTACT
	1	CUTLER HAMMER	E30 KJ10	RED LENS, TYPE J, ENGRAVED "MOTOR RUN"
	1	CUTLER HAMMER	E30 KE130	BUTTON, TYPE E, ENGRAVED "START"
	1	CUTLER HAMMER	E30 KE231	BUTTON, TYPE E, ENGRAVED "STOP"
7	1	CUTLER HAMMER	E30 AD	TWO BUTTON OPERATOR
	1	CUTLER HAMMER	E30 KB101	BUTTON, TYPE B, ENGRAVED "AUTO"
	1	CUTLER HAMMER	E30 KB117	BUTTON, TYPE B, ENGRAVED "MAN"
	1	CUTLER HAMMER	E30 KLA4	CONTACT BLOCK, 2 N.O.
	2	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
8	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
9	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
9A	1	CUTLER HAMMER	E30 CJ	DUAL INDICATING LIGHT, FULL VOLTAGE, 24VAC/24VDC
	1	CUTLER HAMMER	E30 KG10	RED LENS, TYPE G, OPEN
	1	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G, CLOSED
10	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	6	CUTLER HAMMER	E30 KG20	GREEN LENS, TYPE G
	6	CUTLER HAMMER	E30 KB102	BUTTON, TYPE B, ENGRAVED "CLOSE"
	6	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
11	5	CUTLER HAMMER	E30 DA	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 DX3	SINGLE BUTTON OPERATOR WITH INDICATING LIGHT,
	5	CUTLER HAMMER	E30 KG30	AMBER LENS, TYPE G
	5	CUTLER HAMMER	E30 KB231	RED BUTTON, TYPE B, ENGRAVED "STOP"
	5	CUTLER HAMMER	E30 KLA2	CONTACT BLOCK, 1 N.C. CONTACT
11A	1	CUTLER HAMMER	E30 BJ	INDICATING LIGHT
12	139	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #12-#22 AWG WIRE, BOX TYPE LUGS
13	A/R	PANDUIT	TYPE E	WIRE DUCT, RIGID GRAY TYPE WITH NON SLIP COVER
14	1	SQUARE D	QOU 110	CIRCUIT BREAKER, SINGLE POLE, 10 AMP, 120 VAC
15	1	ANDERSON	DU 20	GROUND LUG
16	1	SQUARE D	SDSA 1175	SURGE ARRESTOR, 175 VAC TO GROUND MAX.
17	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
18	1	AGM	PTA 4000-5	CURRENT TRANSMITTER, 4-20mA INPUT, 4-20mA OUTPUT
19	1	AGM	PTA 4034-17	SINGLE ALARM MODULE, HIGH, 4-20mA INPUT
20	1	POWER ONE	HD24-4.8-A	POWER SUPPLY, 24 VDC, 4.8 AMP, 120 VAC INPUT
21	1	LITTELFUSE	L60030M-1PQ	FUSE BLOCK, 30 AMP, 600 VOLT, 1 POLE
	1	LITTELFUSE	KLK 1/10	FUSE, 1/10 AMP, FAST ACTING

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 6"	BLACK	WHITE	PEN 1: FILTER EFFLUENT FLOW \ PEN 2: FILTER LOSS OF HEAD \ PEN 3: FILTER EFFLUENT TURBIDITY
B	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CONTROLLER
C	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE
D	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ FLOW
E	1	N P	1" x 3"	BLACK	WHITE	FILTER LOSS OF HEAD
F	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ TURBIDITY
G	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ FLOW
H	2	N P	1" x 3"	BLACK	WHITE	HIGH
I	1	N P	1" x 3"	BLACK	WHITE	HIGH \ TURBIDITY
J	1	N P	1" x 3"	BLACK	WHITE	FILTER EFFLUENT \ VALVE CV-801
K	1	N P	1" x 3"	BLACK	WHITE	FILTER INFLUENT \ VALVE CV-806
L	1	N P	1" x 3"	BLACK	WHITE	WASHWATER \ VALVE CV-808
M	1	N P	1" x 3"	BLACK	WHITE	WASHWATER DRAIN \ VALVE CV-805
N	1	N P	1" x 3"	BLACK	WHITE	FILTER REWASH \ VALVE CV-807
O	1	N P	1" x 3"	BLACK	WHITE	SWEEP \ VALVE CV-809
P	1	N P	1" x 3"	BLACK	WHITE	SWEEP PUMP

REVERE CONTROL SYSTEMS

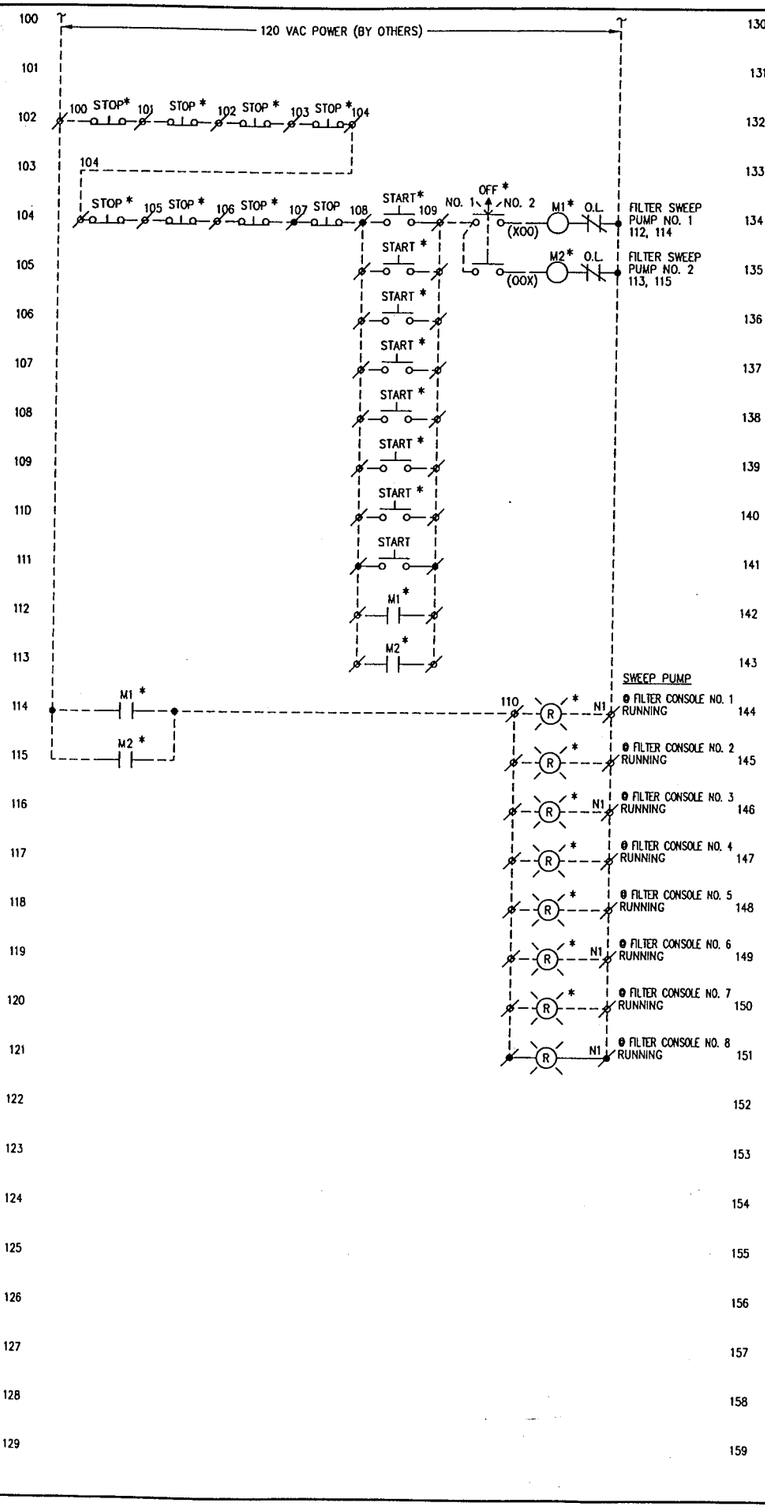
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

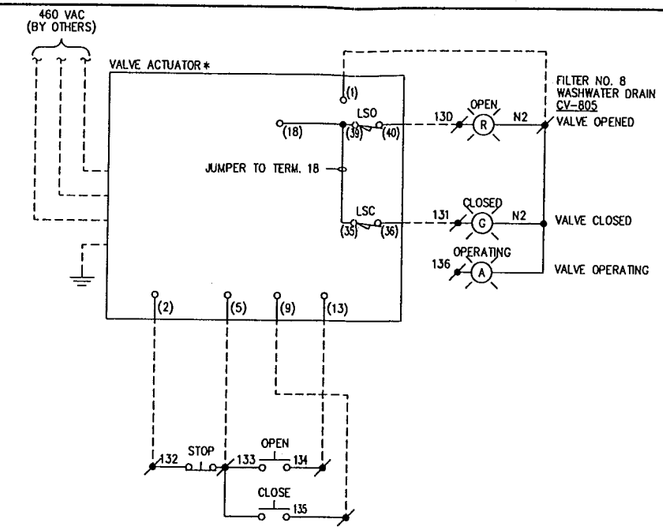
SUBJECT:
SUBPANEL LAYOUT, BILL OF MATERIAL AND ENGRAVING SCHEDULE
FILTER CONSOLE NO. 8
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

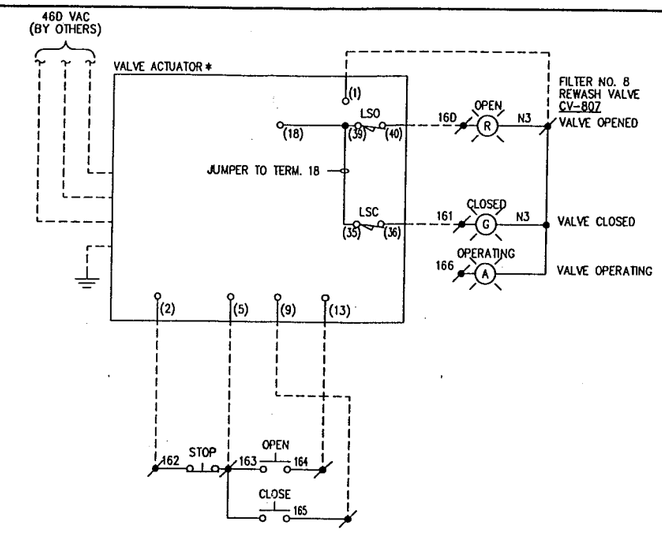
NO.	DATE	DESCRIPTION	BY
		REVISION	
2	04-18-97	FIELD REVISIONS	R.F.A.
1	10-17-96	REVISED VALVE ACTUATORS	G.D.D.

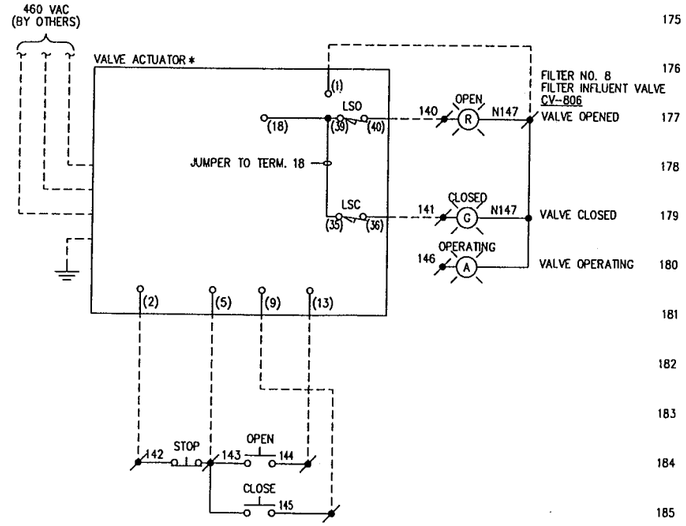
CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-15-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-2381 2/4









LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL
- DENOTES A REMOTE TERMINAL BLOCK POINT

NO.	DATE	DESCRIPTION	BY
1	11-01-96	REVISED VALVE ACTUATORS	G.D.D.

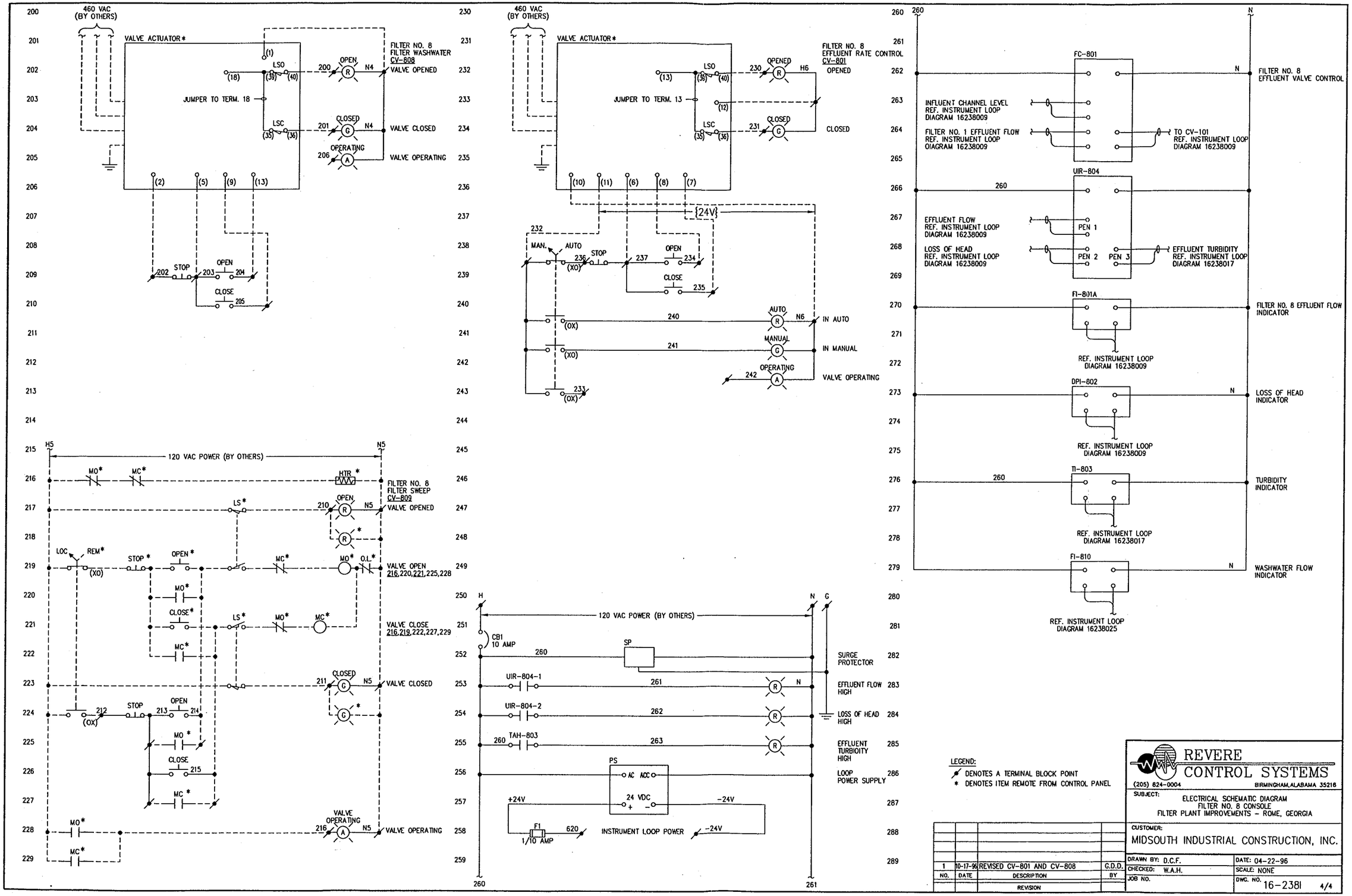
REVISION

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 8 CONSOLE
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. | DATE: 04-22-96
CHECKED: W.A.H. | SCALE: NONE
JOB NO. | DWG. NO. 16-2381 3/4



LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

NO.	DATE	DESCRIPTION	BY
1	10-17-96	REVISED CV-801 AND CV-808	C.D.D.

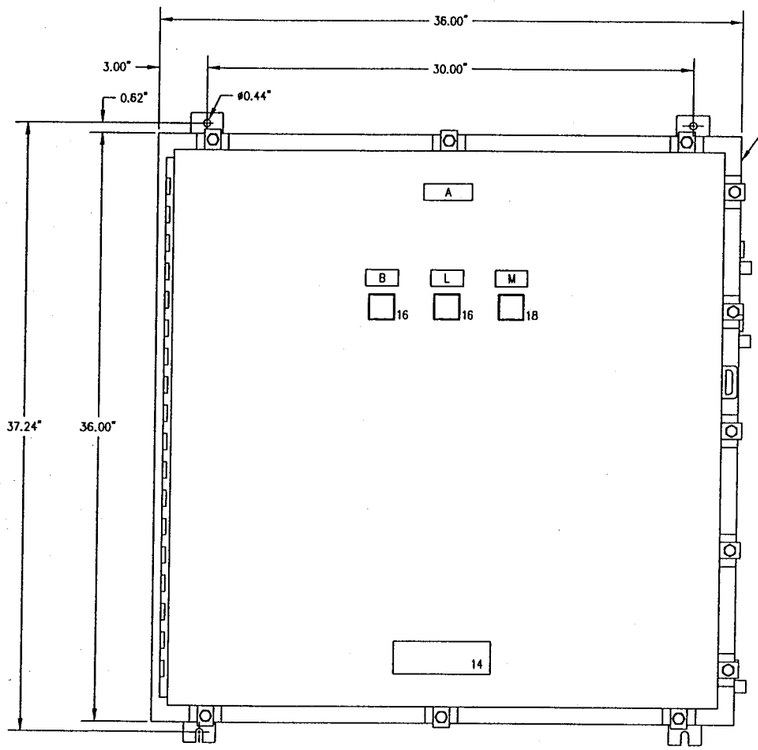
REVISION

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35218

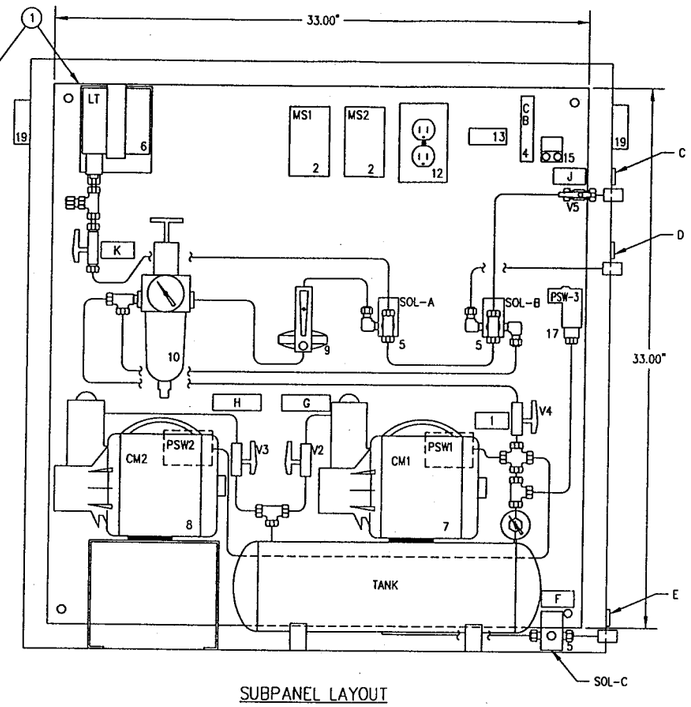
SUBJECT: ELECTRICAL SCHEMATIC DIAGRAM
FILTER NO. 8 CONSOLE
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. | DATE: 04-22-96
CHECKED: W.A.H. | SCALE: NONE
JOB NO. | DWG. NO. 16-2381 4/4



FRONT VIEW
(12" DEEP)



SUBPANEL LAYOUT

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	HOFFMAN	A-36H3612SSLP	ENCLOSURE, NEMA 4X, STAINLESS STEEL, 36"H x 36"W X 12"D
	1	HOFFMAN	A-36P36	SUBPANEL, 33"H x 33"W
	1	HOFFMAN	A-HCI10E	CORROSION INHIBITOR
2	2	SQUARE D	2510-FG1	MANUAL STARTER, NEMA 1 ENCLOSURE, 1 POLE, MELTING ALLOY TYPE THERMAL OVERLOAD RELAY
	2	SQUARE D	A2.15	THERMAL OVERLOAD UNIT, MELTING ALLOY TYPE
3	1	ITT PNEUMOTIVE	S61880	PRESSURE SWITCH
4	1	SQUARE D	QOU 115	CIRCUIT BREAKER, 15 AMP, 120 VAC, SINGLE POLE
5	3	MAC	111B-111BA	SOLENOID VALVE, 3-WAY, 1/8" NPT CONNECTIONS, 120 VAC COIL
6	1	FOXBORO	IGP10-I22C1F	INTELLIGENT DIRECT CONN. GAUGE PRESSURE TRANSMITTER, 316 S.S. PROCESS CONECTION MATERIAL, 316 S.S. SENSOR, SILICONE FILL FLUID, 1/2" NPT PROCESS CONNECTION, EXPLOSIONPROOF, NEMA 4X ENCLOSURE
7	1	ITT PNEUMOTIVE	LGH-106-HO2	AIR COMPRESSOR, OIL-LESS, 1/12 HP, 2 GALLON TANK, W/ AUTO CYCLE PRESSURE SWITCH AND TANK PRESSURE GAUGE
8	1	ITT PNEUMOTIVE	LGH-106	AIR COMPRESSOR, OIL-LESS, 1/2 HP
9	1	DWYER	VFA-2-SSV/RKA	FLOWMETER, VISI-FLOAT, 0.2 - 2.0 SCFH, 1/4" NPT CONNECTIONS W/ GUAGE AND MOUNTING BRACKET
10	1	SPEEDAIRE	7Z553	FILTER/REGULATOR, PIGGY BACK TYPE, 1/4" NPT CONNECTIONS W/ GAUGE AND MOUNTING BRACKET
11	LOT	SWAGELOK,NUPRO, WHITEY		TUBE FITTINGS, VALVES, BULKHEAD UNIONS AND COPPER TUBING
12	1	HUBBELL	CR15	DUPLEX RECEPTACLE, 15 AMP
	1	SIERRA	S-8	COVERPLATE FOR DUPLEX RECEPTACLE
	1	PERFECTLINE	T11	SINGLE GANG RECEPTACLE BOX
13	4	BUCHANAN	0625	TERMINAL BLOCKS, 300 VOLT, #10-#22 AWG WIRE
14	1	REVERE	CUSTOM	REVERE CONTROL SYSTEMS, INC. NAMEPLATE
15	1	ANDERSON	DU-20	GROUND LUG
16	2	CUTLER HAMMER	E30 AA	SINGLE BUTTON OPERATOR
	2	CUTLER HAMMER	E30 KA100	BUTTON, TYPE A
	2	CUTLER HAMMER	E30 KLA1	CONTACT BLOCK, 1 N.O. CONTACT
17	1	ASCO	HB36A218	PRESSURE SWITCH, 1/8" NPT CONNECTION, 8-25 PSIG ADJUSTABLE RANGE, 1.6 PSI DEADBAND
18	1	CUTLER HAMMER	E30 BA	SINGLE PILOT LIGHT, TRANSFORMER TYPE, 120 VAC
	1	CUTLER HAMMER	E30 KF10	RED LENS, TYPE F
19	2	HOFFMAN	A-NMV6	VENTILATOR

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	1" X 3"	WHITE	BLACK	BUBBLER SYSTEM
B	1	L P	1" x 2"	WHITE	BLACK	MANUAL \ BLOWDOWN
C	1	N P	1" X 2"	WHITE	BLACK	BLEED
D	1	N P	1" X 2"	WHITE	BLACK	BUBBLER
E	1	N P	1" X 2"	WHITE	BLACK	DRAIN
F	1	N P	1" X 2"	WHITE	BLACK	DRAIN \ VALVE
G	1	N P	1" X 3"	WHITE	BLACK	COMPRESSOR NO. 1 \ VALVE
H	1	N P	1" X 3"	WHITE	BLACK	COMPRESSOR NO. 2 \ VALVE
I	1	N P	1" X 2"	WHITE	BLACK	TANK VALVE
J	1	N P	1" X 2"	WHITE	BLACK	BLEED VALVE
K	1	N P	1" X 2"	WHITE	BLACK	TRANSMITTER \ VALVE
L	1	N P	1" X 2"	WHITE	BLACK	DRAIN
M	1	N P	1" X 2"	WHITE	BLACK	COMPRESSOR \ LOW PRESSURE

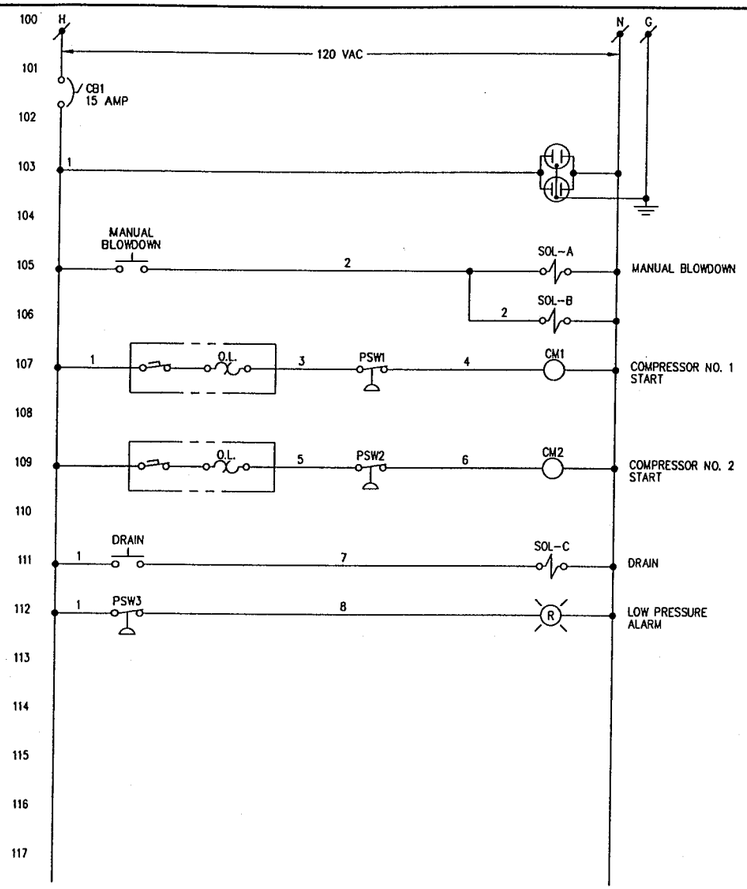
NO.	DATE	DESCRIPTION	BY
1	11-18-96	RECORD DRAWING	V.M.D.
		REVISION	

REVERE
CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM,ALABAMA 35216

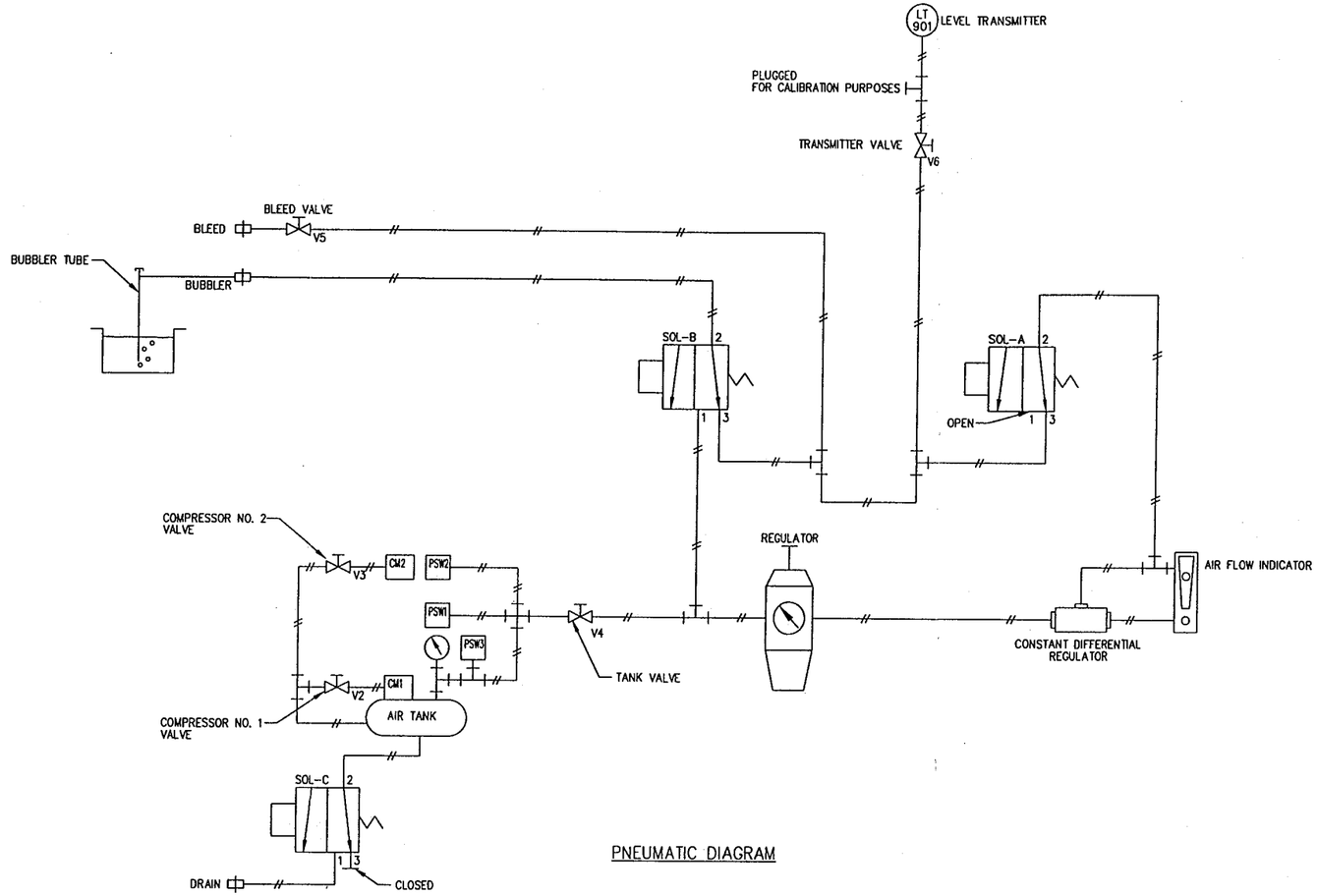
SUBJECT:
PANEL LAYOUT, ENGRAVING SCHEDULE AND BILL OF MATERIAL
FILTER INFLUENT CHANNEL BUBBLER PANEL
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-23-96
CHECKED: W.A.H. SCALE: 1/4
JOB NO. DWG. NO. 16-238J 1/2



ELECTRICAL SCHEMATIC DIAGRAM



PNEUMATIC DIAGRAM

LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

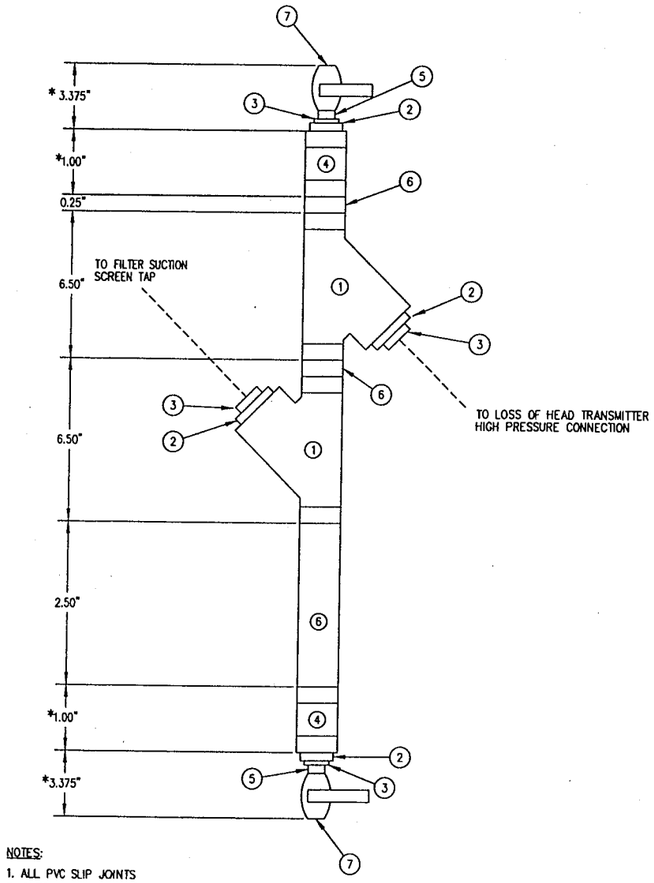
NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE CONTROL SYSTEMS
(205) 824-0004
BIRMINGHAM, ALABAMA 35216

SUBJECT:
ELECTRICAL SCHEMATIC DIAGRAM AND PNEUMATIC DIAGRAM
FILTER INFLUENT CHANNEL BUBBLER PANEL
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

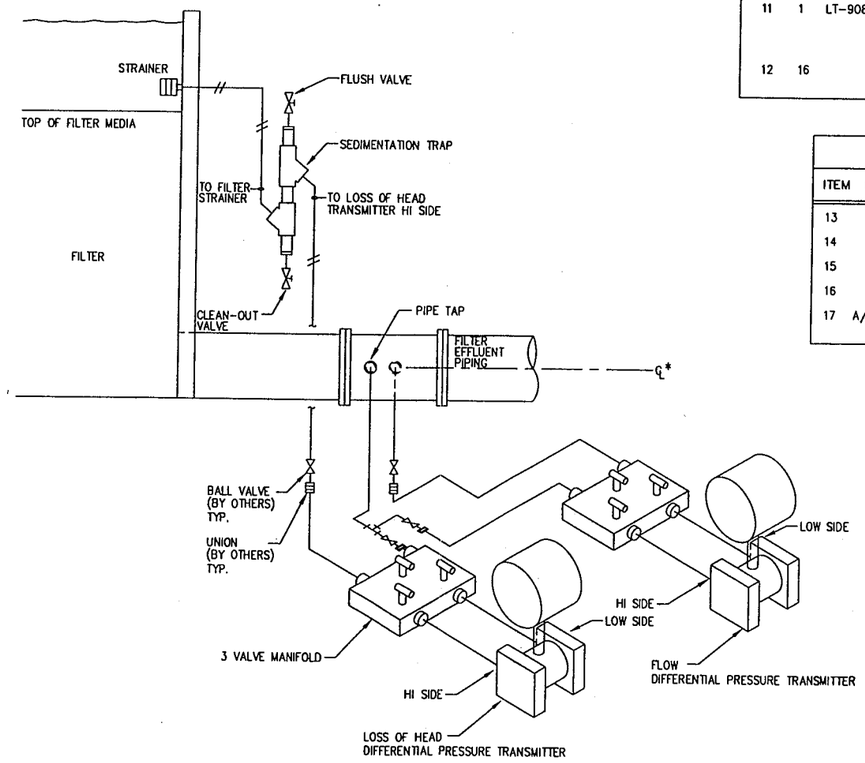
DRAWN BY: D.C.F.
CHECKED: W.A.H.
JOB NO.
DATE: 04-23-96
SCALE: NONE
DWG. NO. 16-238J 2/2



NOTES:

1. ALL PVC SLIP JOINTS
2. OVERALL LENGTH 46" MIN. - 50" MAX.
3. * INDICATES DIMENSIONS THAT MAY VARY DEPENDING ON MANUFACTURER USED.

SEDIMENT TRAP
(NO SCALE)
TYPICAL FOR EIGHT



FILTER LOSS OF HEAD AND FLOW TRANSMITTER - TYPICAL INSTALLATION

*NOTE: CENTERLINE OF TRANSMITTERS SHOULD BE LOWER THAN CENTERLINE OF FILTER EFFLUENT PIPING

FIELD EQUIPMENT BILL OF MATERIAL

QUANTITY LISTED IS TO CONSTRUCT 8 SEDIMENT TRAPS

ITEM	QTY.	TAG	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	16		COMMERCIAL		WYE - PVC DRAIN, WASTE, VENT FITTING, 2"
2	32		COMMERCIAL		REDUCER BUSHING SLIP x SLIP PVC, 2" x 1-1/4", STYLE 1
3	32		COMMERCIAL		REDUCER BUSHING SLIP x FNPT PVC, 1-1/4" x 1/2", STYLE 2
4	16		COMMERCIAL		COUPLING SLIP PVC 2"
5	16		COMMERCIAL		PIPE NIPPLE, BRONZE, 1/2" x 2" SCH. 40
6	A/R		LASCO INDUSTRIES		PIPE, PVC 2" SCHEDULE 40
7	16		SPEEDAIRE #5X715		BALL VALVE, 1/2" BRONZE
8	8		REVERE		SUCTION SCREEN, 1" PIPE
9	16	FIT-101,201,301, FIT-401,501,601, FIT-701,801 DPT-102,202,302, DPT-402,502,602, DPT-702,802	FOXBORO	IDP10-I12B21F	INTELLIGENT d/p CELL TRANSMITTER, 4-20mA OUTPUT, STEEL PROCESS COVER, 316 S.S. SENSOR, SILICONE FILL FLUID, 1/2" NPT PROCESS CONNECTION, EXPLOSIONPROOF, NEMA 4X ENCLOSURE
	16		ANDERSON, GREENWOOD	M4AMS	3 VALVE MANIFOLD, 316 STAINLESS STEEL, 1/2" NPT CONNECTIONS
10	8	FE-101,201,301, FE-401,501,601, FE-701,801	PRIMARY FLOW SIGNAL	12" B HVT-CI	12" CAST IRON VENTURI FLOW TUBE, PER ASTM A-126, GRADE B, 150# ANSI FLANGED ENDS, 304 STAINLESS STEEL THROAT AND TAPS, COATING PER ANSI/NSF-61
	8		PRIMARY FLOW SIGNAL		10" x 12" ADAPTER PLATES
11	1	LT-908	FOXBORO	IGP10-I22C1F	INTELLIGENT DIRECT CONN. GAUGE PRESSURE TRANSMITTER, 316 S.S. PROCESS CONECTION MATERIAL, 316 S.S. SENSOR, SILICONE FILL FLUID, 1/2" NPT PROCESS CONNECTION, EXPLOSIONPROOF, NEMA 4X ENCLOSURE
12	16		EDCO	SS64-036-1	SURGE PROTECTOR, SIGNAL TYPE

SPARE PARTS BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
13	3	FOXBORO		BOX OF CHARTS
14	3	FOXBORO	L0122AR	RED REPLACEMENT PEN, PACKET OF 2
15	2	FOXBORO	L0122BP	VIOLET REPLACEMENT PEN, PACKET OF 2
16	1	FOXBORO	L0122CG	GREEN REPLACEMENT PEN, PACKET OF 2
17	A/R	HOFFMAN	A-HCI10E	CORROSION INHIBITOR, 2 YEAR SUPPLY

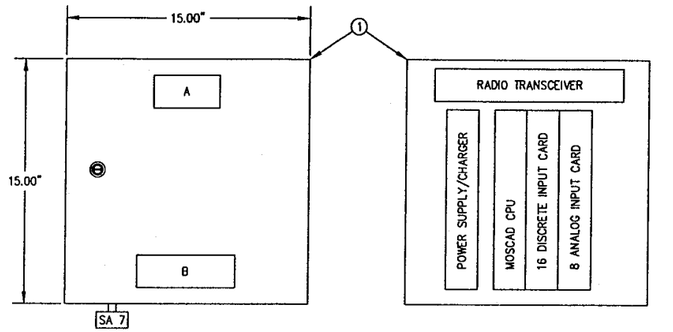
NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE CONTROL SYSTEMS
(205) 824-0004 BIRMINGHAM, ALABAMA 35216

SUBJECT: SEDIMENT TRAP DETAIL, FIELD EQUIPMENT AND SPARE PARTS BILL OF MATERIAL AND FILTER LOH AND FLOW TRANSMITTER INSTALLATION DIAGRAM FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. DATE: 04-30-96
CHECKED: W.A.H. SCALE: NONE
JOB NO. DWG. NO. 16-238K 1/1



FRONT VIEW
(1/4" SCALE)

INSIDE VIEW
(SHOWN WITHOUT DOOR AND MOUNTING BRACKETS)

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER AND CATALOG NUMBER		DESCRIPTION
1	1	MOTOROLA	F6985	MOSCAD REMOTE TERMINAL UNIT WITH SERIES 300 CPU, NEMA 4 ENCLOSURE, TRUNKED, 800MHz MAX TRAC, 15 WATTS, FSK
	1	MOTOROLA	V214	REPLACE 6 SLOT CHASSIS WITH 3 SLOT
	1	MOTOROLA	V436	MIXED I/O CARD 4EE, 2A1, 8D1
2	1	POLYPHASER	ISB50LN-CI-ME	LINE SURGE ARRESTOR
3	1	SQUARE D	SDSA 1175	POWER SURGE ARRESTOR
4	A/R	DECIBEL PRODUCTS	11316	VAPOR WRAP TAPE
5	1	CUSHCRAFT	PC-804N	806-902MHz, 6 dB GAIN, YAGI ANTENNA
6	1	POLYPHASER	ISB50HN-C2-ME	LINE SURGE ARRESTOR
7	70 FT.	ANDREWS	LDF4-50A	1/2" FOAM HELIAX CABLE
8	2	ANDREWS	L4PNM	HELIAX CONNECTOR, MALE
9	2	ANDREWS	L4PNF	HELIAX CONNECTOR, FEMALE

NOTE:
ALL EQUIPMENT TO BE SUPPLIED LOOSE FOR FIELD INSTALLATION BY OTHERS

ENGRAVING SCHEDULE

ID NO.	QTY.	TYPE	SIZE	PLATE COLOR	LETTER COLOR	FIRST LINE \ SECOND LINE, ETC.
A	1	N P	2" x 4"	BLACK	WHITE	HIGH SERVICE PUMP STATION \ RTU \ REVERE CONTROL SYSTEMS \ JOB #16-238
B	1	N P	CUSTOM			REVERE CONTROL SYSTEMS, INC.

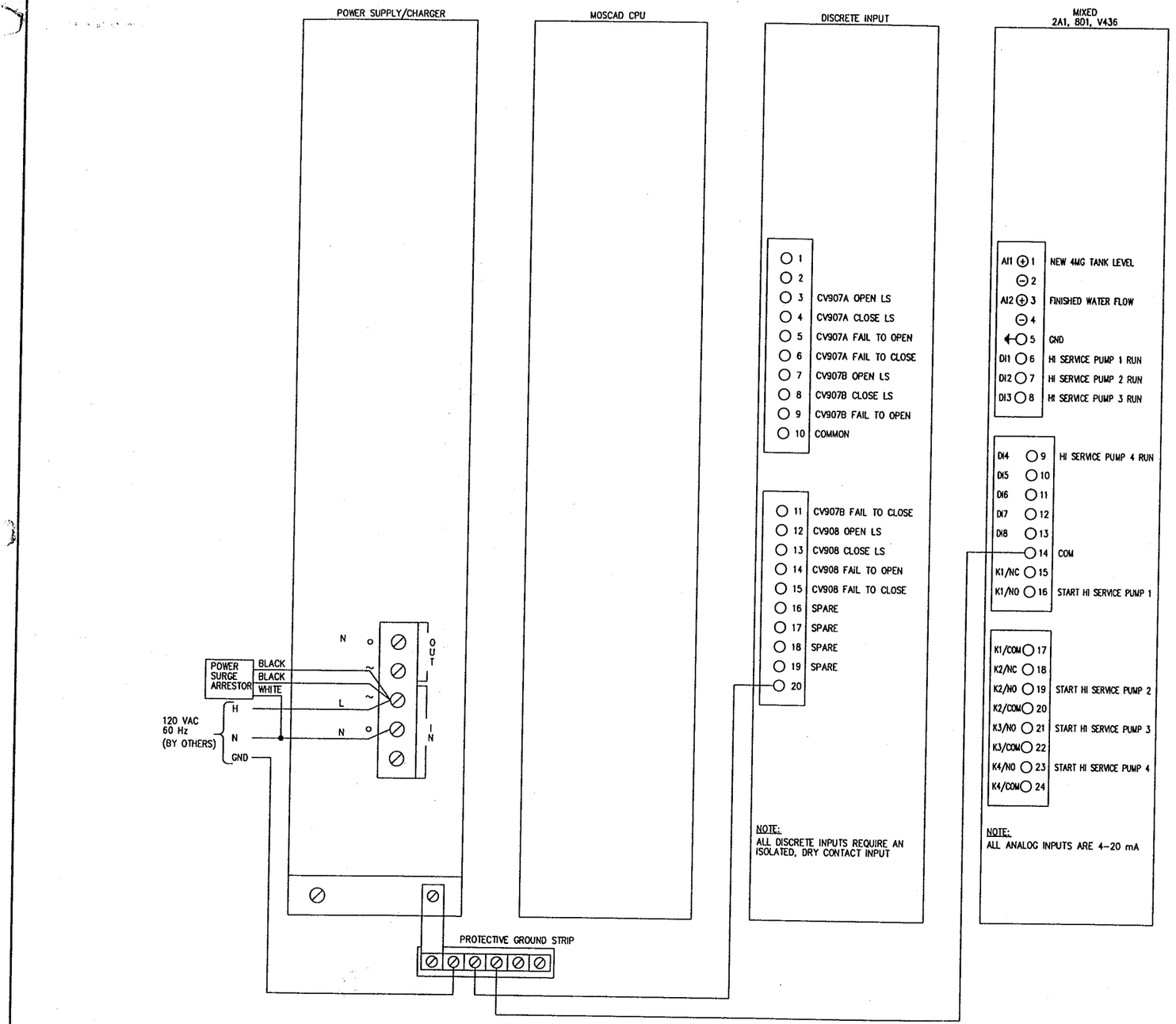
NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE
CONTROL SYSTEMS
(205) 824-0004
BIRMINGHAM, ALABAMA 35216

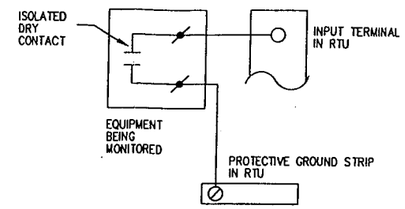
SUBJECT:
PANEL LAYOUT, ENGRAVING SCHEDULE AND BILL OF MATERIAL
HIGH SERVICE PUMP STATION, RTU
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

CUSTOMER:
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

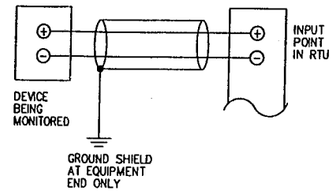
DRAWN BY: W.S.D.	DATE: 11-12-96
CHECKED: D.M.P.	SCALE: 1/4
JOB NO.	DWG. NO. 16-238L 1/2



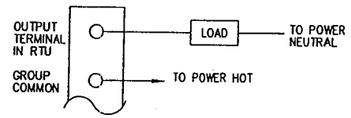
TYPICAL DISCRETE INPUT WIRING



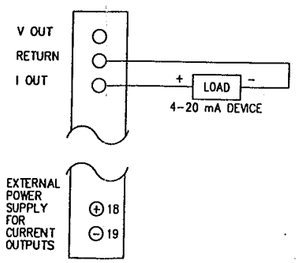
TYPICAL ANALOG INPUT WIRING



TYPICAL DISCRETE OUTPUT WIRING



TYPICAL ANALOG OUTPUT WIRING



LEGEND:
- DENOTES A TERMINAL BLOCK POINT
- * DENOTES ITEM REMOTE FROM CONTROL PANEL

NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE CONTROL SYSTEMS
(205) 824–0004 BIRMINGHAM, ALABAMA 35216

SUBJECT: RTU I/O LAYOUT, TERMINAL LOCATIONS AND TYPICAL WIRING DIAGRAM FOR HIGH SERVICE PUMP STATION FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

CUSTOMER: MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: W.S.D.	DATE: 11–12–96
CHECKED: D.M.P.	SCALE: NONE
JOB NO.	DWG. NO. 16–238L 2/2

OPERATION AND MAINTENANCE MANUAL

TO: REVERE CONTROL SYSTEMS, INC.
2701 4TH AVENUE SOUTH
BIRMINGHAM, AL 35233

PERTAINING TO: PURCHASE ORDER NO.: 0162381
PROJECT: ROME, GEORGIA

(8) 12" B HVT-CI SERIAL NOS.: 3514-1 TO 3514-8 TAG: FE-101 TO FE-801

(8) 10" x 12" ADAPTER PLATES

REVISION A: THIS REVISION REFLECTS A THICKER INLET FLANGE TO BETTER ACCOMODATE THE HIGH PRESSURE TAP; CUSTOMER PURCHASE ORDER NUMBER HAS BEEN ADDED.

CERTIFIED BY:

D. Wyatt

D. WYATT, ENGINEERING
DATE: 3/18/96
REV.A: 4/30/96

PFS QUOTE NO.: 605-94

☐ ____ Submittals
☒ 11 Operation & Maintenance Manuals

Corr4:Master

PFS Primary Flow Signal, Inc.
6 Blackstone Valley Place, Suite 402
Lincoln, Rhode Island 02865-1145
Tel 401 334 7710
Fax 401 334 7713

SHOP ORDER AND FLOW METERING PERFORMANCE SUMMARY

CUSTOMER

Project: ROME, GEORGIA

Customer P.O. No.: 0162381

Date Order Received: 3/18/96

Order Ship Date: 10 WEEKS AFTER APPROVAL

Customer Name: REVERE CONTROL SYSTEMS, INC.

Customer Address: 2701 4TH AVENUE SOUTH
BIRMINGHAM, AL 35233

PRODUCTS ORDERED

METERS

Quantity: 8

Model: 12" B HVT-CI

Serial No.: 3514-1 TO 3514-8

Drawing No.: I-12-B-3514
See Drawing for Design, Material, and Dimensional Information

Tag No.: FE-101 TO FE-801

Inlet Diameter: 12.00" Throat Diameter: 7.00" Beta Ratio: 0.5833

OTHER

(8) 10" x 12" ADAPTER PLATES

FLOW MEASUREMENT DATA

Pipe Inside Diameter: Upstream 12.00" Downstream 10" B.F.V.

NOTE: Pipe inside diameter must be verified. Incorrect pipe inside diameter can result in flow measurement error and may prevent installation of insert-type meters into pipeline.

Line Fluid: WATER

Max. Flow Rate: 3.00 MGD Line Pressure: 2.0 PSIG Line Temperature: 60°F

Flow Rate	Differential (h_w)	Headloss	$R_D \times 10^{-3}$	
3.00 MGD	50.78" wc	10.5" wc	490	
2.25	28.56			
2.00	22.57			
1.50	12.69			

Accuracy Expressed in Percent of C with Normal Flow Pattern
(See attached PFS Technical Literature Pages B10, E9, and E10)

Bench Calibrated: ± 0.50 % Flow Calibrated: ± N/A % Reliability: FULL

Simplified Flow (Q) and Differential Pressure (h_w) Calculation
(For detailed calculation, see ■ Eq.1 ☐ Eq. 2 ☐ Eq. 3 on Page B1)

Find the differential (h_{wA}) for any flow rate (Q_A):

$$h_{wA} = \text{Max } h_w \times \left(\frac{Q_A}{\text{Max } Q}\right)^2$$

Find the flow rate (Q_A) for any differential (h_{wA}):

$$Q_A = \text{Max } Q \times \sqrt{\frac{h_{wA}}{\text{Max } h_w}}$$

C: 0.9900 ρ_i: 62.3464 lb/ft³ μ: 1.12 cP

F_a: 1.00 ρ_s: - lb/ft³ Y: 1.00

(For Explanation of Symbols, see attached PFS Technical Literature Page B1)

Certified by: D. Wyatt
D. Wyatt — Engineering

Date: 3/18/96
REV.A: 4/30/96

PFS Quote No.: 605-94

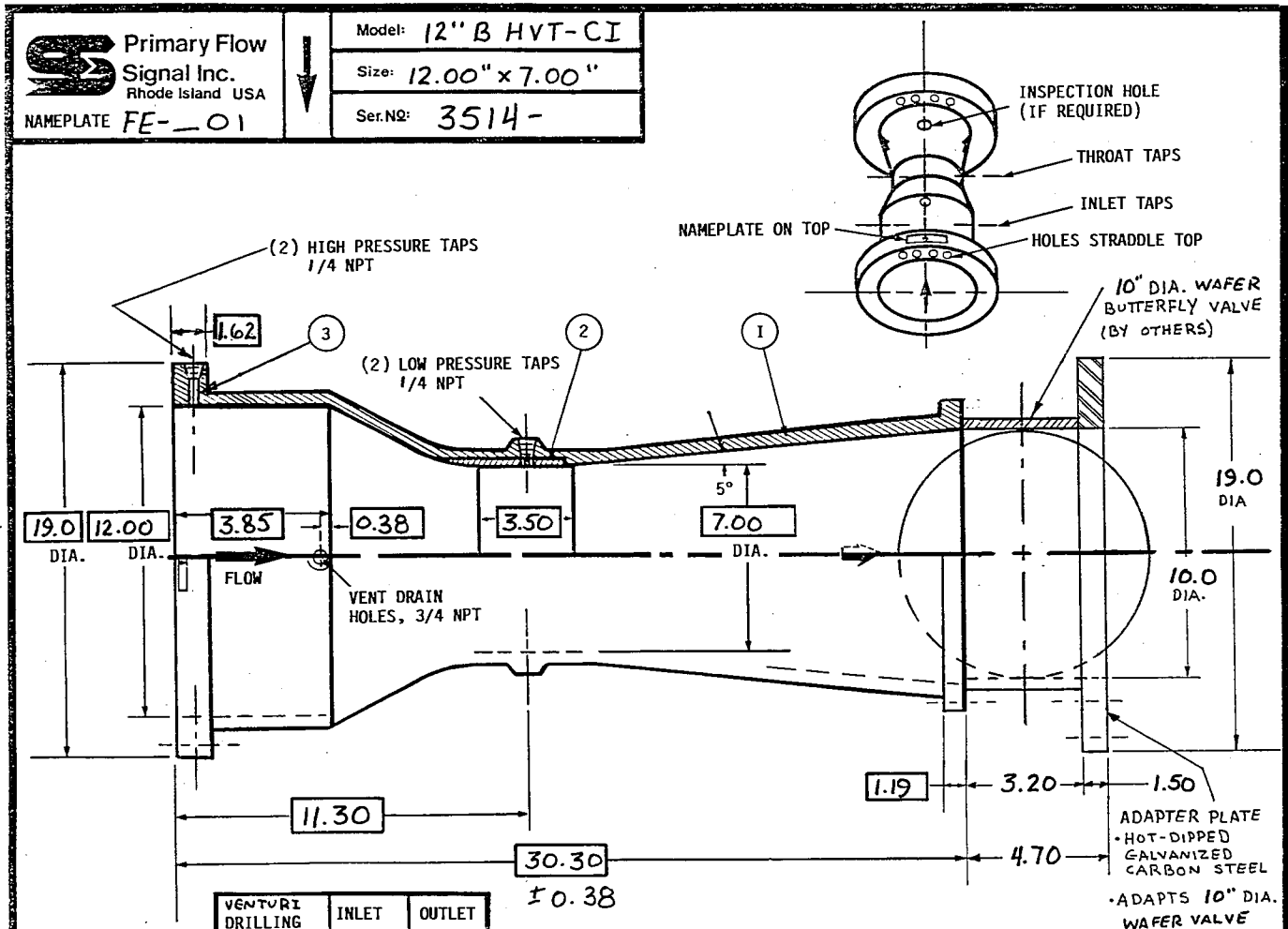
PFS Form - 4/95

Primary Flow Signal, Inc.
6 Blackstone Valley Place, Suite 402
Lincoln, Rhode Island 02865-1145
Tel 401 334 7710
Fax 401 334 7713

Primary Flow Signal Inc.
Rhode Island USA

NAMEPLATE FE-_01

Model: 12" B HVT-CI
Size: 12.00" x 7.00"
Ser.NO: 3514-



DIMENSIONS: INCHES

VENTURI DRILLING	INLET	OUTLET
FOR PSI	125	125
NO OF HOLES	12	12
DIA OF HOLES	1.0	1.0
DIA OF BOLT CIRCLE	17	14¼

HOLES EQUALLY SPACED STRADDLE TOP

STD ☐ SPECIAL ☒ SHORT INLET

MATERIALS
1. BODY: ☒ CAST IRON, ASTM A126, GRADE B ☐ _____
2. THROAT LINER: ☒ 304 STAINLESS STEEL
3. BUSHINGS: ☐ 316 STAINLESS STEEL ☐ BRONZE ☐ _____

PAINT (IRON ONLY)
INTERIOR: ☒ ANSI/NSF-61 EPOXY ☐ _____
EXTERIOR: ☒ FACTORY PRIMER ☐ _____

ACCESSORIES: (8) 10" x 12" ADAPTER PLATES

HYDROSTATIC TEST: 50 PSIG, 70° F, 15 MINUTES

DESIGN CONDITIONS: ☒ 150 PSIG ☐ 250 PSIG ☐ _____ ☒ 150° F ☐ 250° F ☐ _____

SERIAL NUMBER	TAG NUMBER
3514-1	FE-101
TO	TO
3514-8	FE-801

ENGINEER:

CERTIFIED: D.W.

	Date	A	R	N
A	4/30/96		X	
B				
C				
D				
E				
F				
G				
H				
I				

6 Blackstone Valley Place, Suite 402
Lincoln, Rhode Island 02865-1145
Tel 401 334 7710 Fax 401 334 7713

Drawing Number: I-12-B-3514

Title: 12.00" x 7.00" HVT-CI

Drawn: D.W. Date: 3/18/96

Scale: None Tolerance: As Shown Dimensions

122098

Summary of Calibration Data

Nominal Inlet Diameter	Beta Ratio	Flow Calibration Facility	Standard HVT Discharge Coefficient	Inlet Tap Factor	Actual Discharge Coefficient	Flow Calibrated Discharge Coefficient	Discharge Coefficient Deviation	n
2.00	0.4822	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	1.0000	0.9900	0.9888	-0.12%	1
2.00	0.5018	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	1.0000	0.9900	0.9919	+0.19%	2
6.00	0.3142	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9935	+0.35%	3
6.00	0.4730	ARL, Bldg. 2 - 10 000 lb Tank	0.9900	0.9884	0.9785	0.9748	-0.38%	4
6.00	0.5999	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9906	+0.06%	5
6.00	0.5999	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9899	-0.01%	6
6.00	0.5999	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9814	0.9716	0.9728	+0.12%	7
6.00	0.5999	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9814	0.9716	0.9720	+0.04%	8
10.00	0.3601	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9868	-0.32%	9
10.00	0.4738	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9907	0.9808	0.9827	+0.19%	10
10.00	0.7059	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9912	+0.12%	11
10.00	0.7060	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9907	+0.07%	12
10.00	0.7060	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9917	+0.17%	13
10.00	0.7507	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9452	0.9357	0.9365	+0.08%	14
10.00	0.7507	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9452	0.9357	0.9362	+0.05%	15
10.00	0.7555	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9432	0.9338	0.9364	+0.28%	16
12.00	0.5875	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9934	+0.34%	17
12.00	0.5875	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9779	0.9681	0.9716	+0.36%	18
18.00	0.4996	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	1.0000	0.9900	0.9865	-0.35%	19
18.00	0.4996	ARL, Bldg. 2 - 50 000 lb Tank	0.9900	0.9916	0.9817	0.9805	-0.12%	20
20.00	0.6307	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9922	+0.22%	21
24.00	0.5240	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9899	-0.01%	22
24.00	0.5240	ARL, Bldg. 2 - Master	0.9900	0.9897	0.9798	0.9790	-0.08%	23
24.00	0.5262	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9923	+0.23%	24
24.00	0.5262	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9874	-0.26%	25
24.00	0.5263	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9909	+0.09%	26
24.00	0.5378	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9832	0.9734	0.9755	+0.22%	27
29.00	0.5184	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9898	-0.02%	28
29.00	0.5184	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9902	0.9803	0.9812	+0.09%	29
29.00	0.5205	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9891	-0.09%	30
29.00	0.5205	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9900	0.9801	0.9812	+0.11%	31
29.00	0.5206	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	1.0000	0.9900	0.9897	-0.03%	32
29.00	0.5206	ARL, Bldg. 1 - 100 000 lb Tank	0.9900	0.9900	0.9801	0.9798	-0.03%	33
36.00	0.5828	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9867	-0.33%	34
36.00	0.5828	ARL, Bldg. 2 - Master	0.9900	0.9836	0.9738	0.9721	-0.17%	35
48.00	0.5271	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9895	-0.05%	36
48.00	0.5271	ARL, Bldg. 2 - Master	0.9900	0.9894	0.9795	0.9778	-0.17%	37
48.00	0.5294	ARL, Bldg. 2 - Master	0.9900	1.0000	0.9900	0.9894	-0.06%	38
48.00	0.5294	ARL, Bldg. 2 - Master	0.9900	0.9893	0.9794	0.9829	+0.36%	39

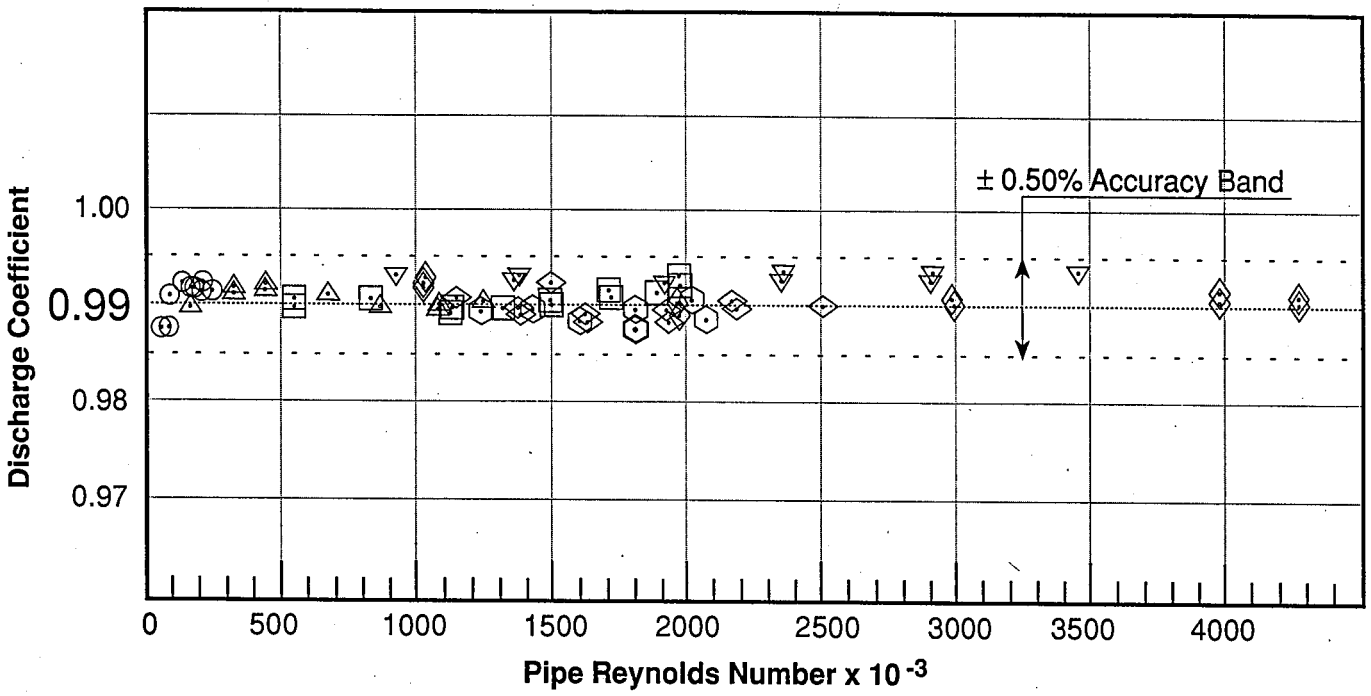
Reynolds Number Range: 60 000 to 4 300 000

- σ = Standard Deviation = $\pm\sqrt{\frac{\Sigma\Delta C^2}{n - 1}}$ = ± 0.202% of C
- R = Reproducibility of C for a New Meter = 2σ = ± 0.404% of C
- P = C Precision = $\pm\frac{t \times \sigma}{\sqrt{n}}$ = ± 0.065% of C

  t = 2.02 = Student's t for 95% confidence level for 38 (n - 1) degrees of freedom
- A_B = Bench Calibrated C Accuracy = $\pm\sqrt{P^2 + R^2}$ = ± 0.41 % of C

Certified by: _____
D. Halmi, Engineering

HVT Discharge Coefficient
Pipe Reynolds Number Behavior

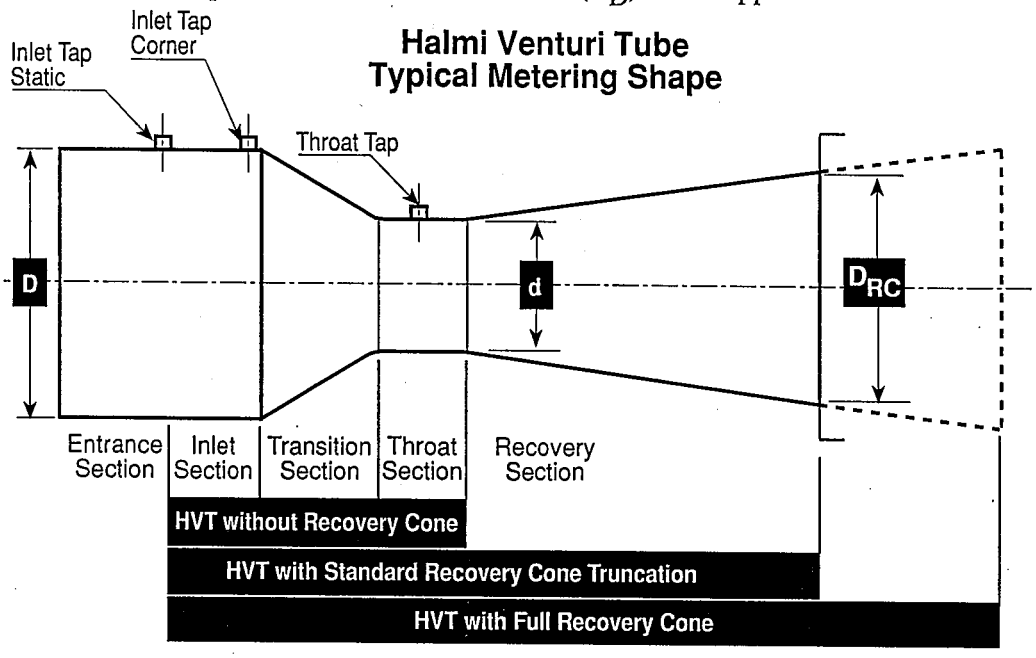


⊙ 2" HVT-FV ß= 0.5018 10 000 lb Facility, 47°
△ 6" HVT-FV ß= 0.5999 50 000 lb Facility, 79°
◇ 10" HVT-CI ß= 0.7060 100 000 lb Facility, 98°
▽ 12" HVT-PS ß= 0.5875 100 000 lb Facility, 93°
⊡ 24" HVT-CI ß= 0.5263 Master Facility, 72°
◈ 30" HVT-CI ß= 0.5184 100 000 lb Facility, 80°
⬡ 48" HVT-CI ß= 0.5271 Master Facility, 70°

Note:
Flow calibrations were performed at Alden Research Laboratory, Inc., Holden, Massachusetts in the flow calibration facilities shown.

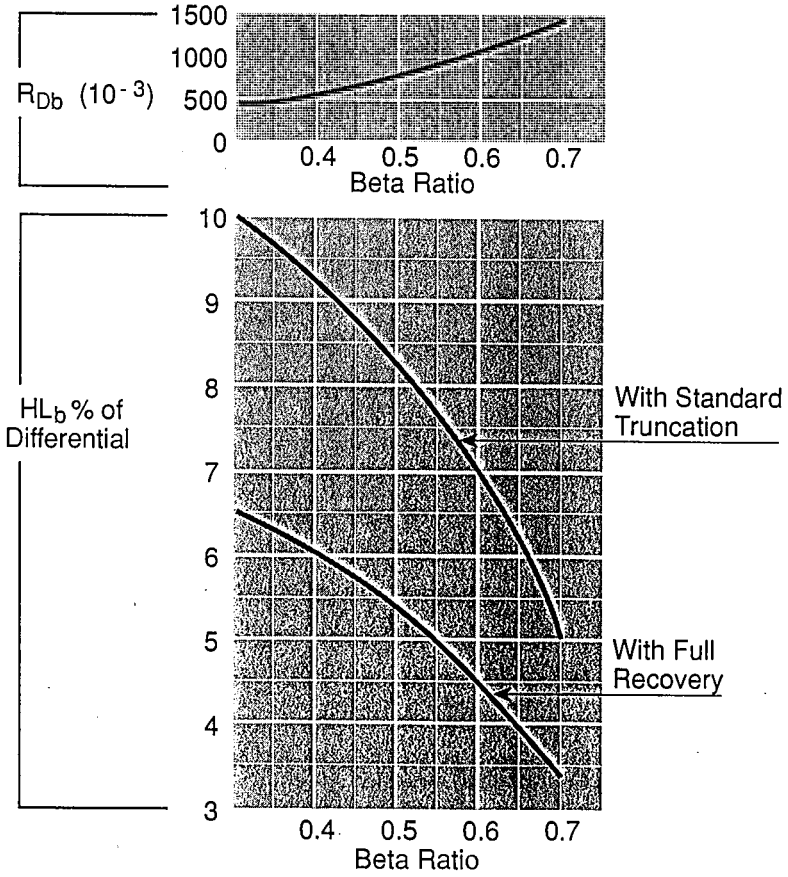
HVT - Headloss

HVTs do "**metering work**" by accelerating the line fluid from inlet to throat velocity to generate the flow signal, i.e., the differential pressure. The higher throat velocity must then be decelerated to full pipe velocity which cannot be achieved without energy loss. This energy loss, called headloss, is the price of the unique reliability that HVT meters provide. Since the flow signal is the result of the "work" the HVT metering shape performs on the line fluid, it is largely independent of the effects of different upstream piping configurations. HVT headloss can be calculated from the graph below, according to the metering shape used, beta ratio, and pipe Reynolds number (R_D) of the application.



Note
Standard Cast Iron HVTs (HVT-CI) and standard Plastic Insert HVTs (HVT-PI) have standard recovery cone truncation as shown. Full Recovery Cones are available at an additional cost.

$$HL = HL_b \left(\frac{R_D}{R_{Db}}\right)^{-0.12} = \text{Headloss \% of } \cdot h_w \text{ at any } R_D$$



Typical Installation Effects

The table below was derived from flow test data. The accuracy of the tests, in view of the purpose for which they are used, is ± [0.25 (ß/0.7)^4] %. Meteringly similar flow disturbers should give similar effects.

Since HVTs have sufficiently long recovery cones, a flow disturber coupled directly to its outlet will have no effect on the throat pressure sensation. Thus, it does not impair the accuracy of the flow measurement. The table below should be used as follows:

- To secure the "normal" accuracy for the flow measurement, the HVT should be located at a distance following the disturber as indicated on the graph for the type of disturber, inlet tapping, and beta ratio of the HVT.
- If there is insufficient piping available to secure normal accuracy, read the disturbance effect from the graph for the beta used and for the length of upstream pipe available.

Calculate the accuracy for the metering section as follows:

Installed Accuracy = (A_B + ΔC) where A_B from page E5 is:

For static inlet tapped HVTs,

ß	A_B
0.5000	± 0.50 %
0.6000	± 0.50 %
0.7000	± 0.50%

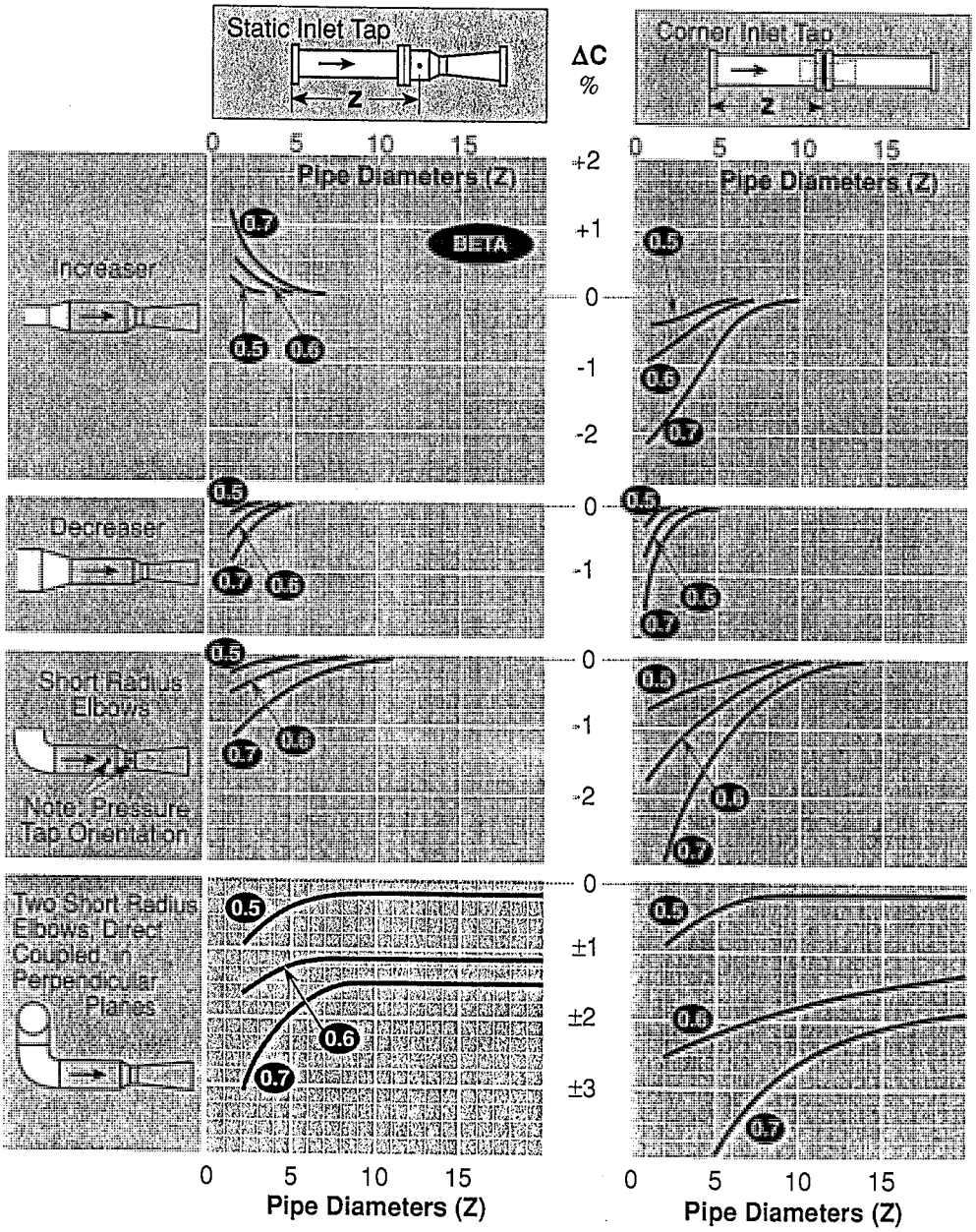
For corner inlet tapped HVTs,

ß	A_B
0.5000	± 0.50%
0.6000	± 0.50 %
0.7000	± 0.53

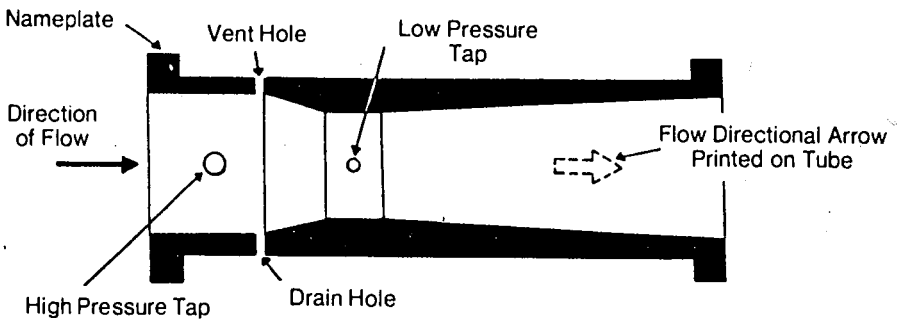
- Use flow straighteners only to stop swirls as in the case of two elbows which are direct- coupled in 90° planes. Contact PFS for design.

  Improperly used straighteners may cause greater errors than the ones they are supposed to eliminate.

- For the effects of other types of disturbers or of disturbers in series, contact PFS.



INSTALLATION DIRECTIONS
Pressure Vessel Design



CAUTION:

- This is a high quality flowmeter!
- If improperly installed, it must be reinstalled!
- If damaged it must be replaced!
- Handle it from its outside!
- Do not damage its inside!
- Pipe flanges must be parallel and properly aligned to prevent cracking of the tube flanges.
- Install meter in the pipe line so that the "Flow Directional Arrow" agrees with the direction of the flow!
- Center meter carefully in the pipe!
- Gaskets must not protrude into the flow!
- Do not use meter as a pipe support!
- Do not overtorque bolts!
- Orient pressure taps horizontally.

!Failure to follow above directions may void warranty!

PFS
Primary Flow Signal, Inc.
6 Blackstone Valley Place, Suite 402
Lincoln, Rhode Island 02865-1145
Tel 401 334 7710
Fax 401 334 7713

Preventive Maintenance

1. Check Flange and Pressure Tap Connections for Leaks	Weekly	By Instrumentation Operator or Mechanical Personnel
2. Inspect Exterior Finish For Scrapes, Dings, or Blistering	Annually	By Instrumentation Operator or Mechanical Personnel

- No special tools or skills are necessary for preventive maintenance tasking.
- No preventive maintenance parts list is applicable.

Corrective Maintenance

In case of loss-of-signal or erratic output, check taps and impulse piping to secondary instrumentation for blockage or debris. Check impulse piping for leaks, trapped condensation (in the case of compressible gas flow), or trapped air (in the case of liquid flow). In case of blockage, purge lines with air or water (as is appropriate) pressurized to approximately 30 PSI above line pressure.

WARNING: IN NO CASE SHOULD FLUSHING PRESSURE EXCEED THE DESIGN PRESSURE OF THE PROCESS OR IMPULSE PIPING

In case of trapped condensate or trapped air, remove by use of bleed valves or plugs, or through the manifold at the flow transmitter.

Stop leaks by tightening, resealing, or regasketing as necessary.

Touch-up exterior finish with the same or a compatible coating system as necessary.

There are no test points, adjustments, or user-serviceable parts in the HVT venturi meter, nor is there any assembly or disassembly. If problems persist, contact the local PFS Sales Representative or service organization, or contact Primary Flow Signal, Inc. directly.

- Corrective maintenance can be performed by mechanical or plant personnel.
- No special tools are required for corrective maintenance.

Spare Parts

The venturi meters provided on this project were designed and manufactured specifically for this project. The HVT product line has no moving or removable parts.

There is no parts list and there is no recommended stocking level.

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Storage Requirements

Cast Iron, Ductile Iron, and Fabricated Pressure Vessel Venturi Flow Meters

Indoor Storage:

- The venturi flow meters can be stored indefinitely indoors.
- Meters should be stored away from high traffic areas in order to minimize damage risk.
- Meters must not be stacked.
- Flanged meters may have bare iron or steel flange faces, or lightly primed flange faces as required by the specification. If meters will be stored in humid or corrosive areas, the flange faces may need to be coated with a suitable rust preventative. Note that any coating or sealant may need to be removed prior to installation; refer to the specification and applicable standards or codes.
- Prolonged exposure to sunlight or other ultraviolet sources (fluorescent lights, etc.) may discolor, degloss, or chalk the exterior finish.
- If storage is to be long-term, it is recommended that meters be covered with a tarp or heavy plastic sheeting.

Outdoor Storage - Short-Term (less than 3 months):

- Meters should be stored away from high traffic areas in order to minimize damage risk.
- Meters must not be stacked.
- If meters will be stored in humid or corrosive areas, the flange faces may need to be coated with a suitable rust preventative appropriate for outdoor exposure. Note that any coating or sealant may need to be removed prior to installation; refer to the specification and applicable standards or codes.
- The ends are capped to eliminate foreign matter from damaging the internal portions of the meter. These caps must not be removed until installation.
- The pressure sensing tap connections have pipe plugs to eliminate the possibility of clogging. These caps must not be removed until installation.
- If the exterior finish gets damaged, it must be touched-up with the same or a compatible coating system. Note that prolonged exposure to sunlight may discolor, degloss, or chalk exterior finish.
- It is recommended that the meters be covered with a tarp or heavy plastic sheeting.

Outdoor Storage - Long-Term (3 months or more):

- Long-term storage is the same as short-term storage with the following amplification: The meters must be covered with a tarp or heavy plastic sheeting.

Meter Transport:

- Depending on unit and order size, the venturi meters are strapped or lagged onto pallets or custom skids.
- Using the skids, the meters can be moved by a forklift of adequate capacity. DO NOT DRIVE THE FORK THROUGH THE FLANGE CAPS OR INTO THE METER INTERIOR.
- The meters can be lifted by a crane or forklift in conjunction with an appropriate sling.
- Avoid scraping or scratching the coated surfaces. Touch-up coatings as needed.

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Safety

Prior to Start-Up:	Determine that the meter is properly installed. The venturi meter is a piping component and should be handled accordingly with the same precautions. DO NOT HANDLE METER FROM ITS INSIDE.
	Determine that the pressure connections are properly made and are appropriate for the intended service.
	Determine that the meter has been installed in strict conformance with the "Installation Directions" included in this manual.
	If the meter appears damaged in any way, contact the local PFS Sales Representative or service organization, or contact Primary Flow Signal, Inc. directly.
At Start-Up:	Do not over-pressurize meter. Refer to approval drawing for design pressure.
	Do not subject meter to shock pressures or water hammer.
	When filling pipe line, bleed-off air in the proper fashion.
After Start-Up:	Do not over-pressurize meter. Refer to approval drawing for design pressure.
	Do not subject meter to shock pressures or water hammer.
	Conform to "Preventive Maintenance" procedures included in this manual.

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Start-Up Procedures

Determine that the meter is properly installed. The venturi meter is a piping component and should be handled accordingly with the same precautions. DO NOT HANDLE METER FROM ITS INSIDE.

Determine that the pressure connections are properly made and are appropriate for the intended service.

Determine that the meter has been installed in strict conformance with the "Installation Directions" included in this manual.

Do not over-pressurize meter. Refer to approval drawing for design pressure.

Do not subject meter to shock pressures or water hammer.

When filling pipe line, bleed-off air in the proper fashion.

Determine that pressure piping to secondary instrumentation is installed correctly.

If the meter appears damaged in any way, contact the local PFS Sales Representative or service organization, or contact Primary Flow Signal, Inc. directly.

Shut-Down Procedures

If it is necessary to isolate the differential pressure signal from the secondary instrumentation, close the isolation valves (if provided) and disconnect impulse piping. If secondary instrumentation is to be disconnected for an extended period, use pipe plugs appropriate for the line pressure.

If the meter is to be removed from the line for any reason, depressurize and drain the pipe line. Move meter with slings or strapping appropriate for the weight and geometry of the meter.

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Differential Producers - Working Flow Equations

The basic flow equation is derived in Section D. From this equation we compose the following working flow equations, each of which has a constant. The constants modify the ideal flow equation (Section D) for the flow and time units to be used; for the preference of using inches for length rather than feet; and for the fact that the ideal flow equation uses the differential pressure expressed in feet of line fluid at line temperature and pressure while the working equations use inches of water at 68°F, 14.7 PSIA.

Equation 1: $$Q = \frac{\text{Constant } d^2\, C\, Y\, F_a \sqrt{h_w \frac{g}{g_o}}}{\sqrt{1-\beta^4}\ \sqrt{\rho_1}}$$

Equation 2: $$Q = \frac{\text{Constant } d^2\, C\, Y\, F_a \sqrt{\rho_1\, h_w \frac{g}{g_o}}}{\sqrt{1-\beta^4}}$$

Equation 3: $$SCFM = \frac{5.982\ d^2\, C\, Y\, F_a \sqrt{\rho_1\, h_w \frac{g}{g_o}}}{\sqrt{1-\beta^4}\ \rho_s}$$

Constants:

	Cubic Feet Eq. 1	Gallons Eq. 1	Liters Eq. 1	Pounds Eq. 2
Second	0.09970	0.7458	2.823	0.09970
Minute	5.982	44.748	169.39	5.982
Hour	358.92	2684.9	10163.2	358.92
Day	8614.1	64438.0	243917.0	8614.1

Symbol ... Explanation ... Unit

A_B = Accuracy of Bench Calibrated C.... ±% of C
A_F = Accuracy of Flow Calibrated C.... ±% of C
C = Coefficient of Discharge .... Ratio
C_B = Bench Calibrated C .... Ratio
C_F = Flow Calibrated C .... Ratio
D = Inlet Diameter .... Inches
d = Throat Diameter .... Inches
F_a = Thermal Expansion Factor ..... Ratio
g = Local Gravitational Acceleration ..... ft/sec²
g_o = Standard Gravitational Acceleration ... ft/sec² (g_o = 32.174 ft/sec²)
G = Specific Gravity .....Ratio
HL = Headloss in % of differential....%
HL_b = Headloss at R_{Db}....%
h_w = Differential Pressure ... Inches of Water 68°F, 14.7 PSIA

I_C = Cavitation Index = $\frac{144\ (P_1 - 0.0361\ h_w - P_w)}{VH_2\ \rho_2}$

P_w = Liquid Vapor Saturation Pressure at Line Pressure .....PSIA
P_1 = Inlet Static Pressure ....PSIA
P_2 = Throat Static Pressure .... PSIA
R_D = Pipe Reynolds Number... Ratio
R_D= (6.32 x lb/hr)/μD
R_{Db}= R_D Value at Which HL_b Was Determined .... Ratio
RH = Relative Humidity .... %
T_1 = Inlet Temperature ..... °R
VH_1 = Velocity Head in Inlet ... Ratio

$VH_1 = \frac{V_1^2}{64.348}$

VH_2 = Velocity Head in Throat ... Ratio
V_1 = Average Inlet Velocity .... ft/sec
V_2 = Average Throat Velocity .... ft/sec
Y = Expansion Factor ... Ratio
Z_1 = Compressibility Factor at Inlet Conditions ... Ratio
β = d/D = Beta Ratio .... Ratio
μ = Absolute Viscosity ... centipoise
ρ_s = Fluid Density at Standard Conditions ... lb/ft³
ρ_1 = Fluid Density at Inlet Conditions ... lb/ft³
ρ_2 = Fluid Density at Throat Conditions ... lb/ft³

FIELD

REAR OF CENTRAL INSTRUMENT CONTROL PANEL

FACE OF CENTRAL INSTRUMENT CONTROL PANEL

LT 901 — LEVEL TRANSMITTER
FOXBORO
MODEL: IGP10
RANGE: 1–4 FT.

FILTER
INFLUENT CHANNEL

FT 902 — FLOW TRANSMITTER
(EXISTING)
RANGE: 0–18.0 MGD

FE 902

HI LO

RAW WATER CONTROL VALVE
(BY OTHERS)

M — CV 902

CURRENT TRANSMITTER
AGM
MODEL: 4000–5 SERIES 502
INPUT: 4–20mA
OUTPUT: (2) 4–20mA

I/I 901A

CURRENT TRANSMITTER
AGM
MODEL: 4000–5
INPUT: 4–20mA
OUTPUT: (2) 4–20mA

I/I 901B

LEVEL CONTROLLER/INDICATOR
MOORE
MODEL: 352B
INPUT: 4–20mA
OUTPUT: 4–20mA

LC/LI 901

ES
120 VAC
60HZ

FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4–20mA
OUTPUT: 4–20mA

FC 902

ES
120 VAC
60HZ

REF. DWG. 16238002 SETPOINT TO FILTERS 1 & 2

REF. DWG. 16238004 SETPOINT TO FILTERS 3 & 4

REF. DWG. 16238006 SETPOINT TO FILTERS 5 & 6

REF. DWG. 16238008 SETPOINT TO FILTERS 7 & 8

NOTE:
△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION / REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

RAW WATER
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04–29–96
JOB NO.	DWG. NO. 16238001	

FIELD

REF. DWG. 16238001

FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–3 MGD
OUTPUT: 4–20mA

FT 101

dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–4 FT.
OUTPUT 4–20mA

dPT 102

FE 101
FLOW ELEMENT
PFS
MODEL: 12" B HVT–CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE

TO FILTER

FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)

CV 101

TO FS–910A
REF. DWG. 16238020

REF. DWG. 16238003

REAR OF FILTER CONSOLE 1

CURRENT TRANSMITTER
AGM
MODEL: 4000–5
INPUT: 4–20mA
OUTPUT: (2) 4–20mA

24 VDC POWER

I/I 101

ES
115V
60HZ

FACE OF FILTER CONSOLE 1

FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4–20mA
OUTPUT: 4–20mA

FC 101

ES
120 VAC
60HZ

FI 101A

FLOW INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–3 MGD

UIR 104

CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0–3.00 MGD
PEN 2 RANGE: 0–4.00 FT.

dPI 102

dP INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–4.00 FT.

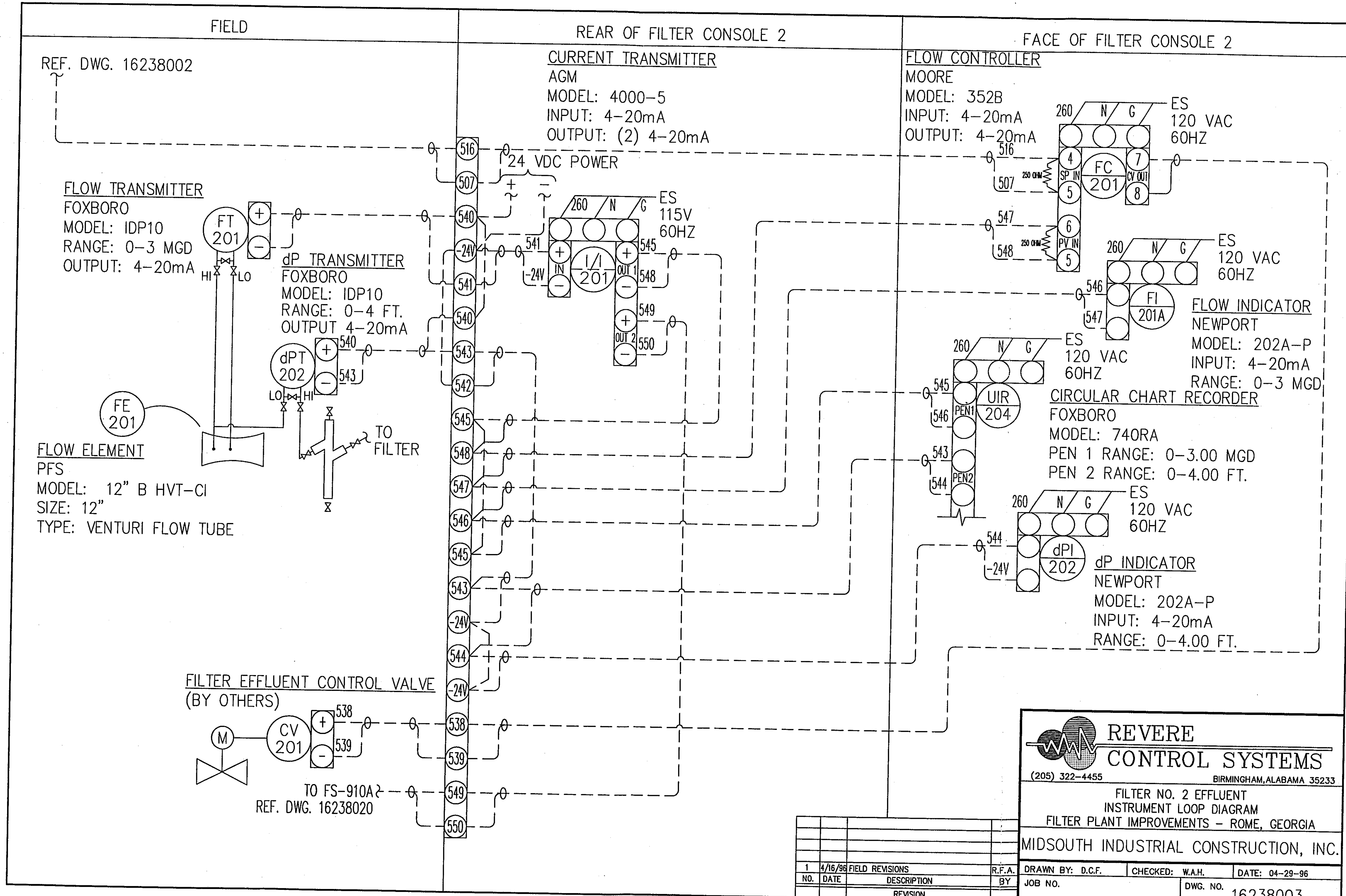
NO.	DATE	DESCRIPTION / REVISION	R.F.A. BY
1	4/18/97	FIELD REVISIONS	

REVERE CONTROL SYSTEMS
(205) 322–4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 1 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04–29–96
JOB NO.	DWG. NO. 16238002	


FIELD
REAR OF FILTER CONSOLE 2
FACE OF FILTER CONSOLE 2
REF. DWG. 16238002
FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0-3 MGD
OUTPUT: 4-20mA
FT 201
dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0-4 FT.
OUTPUT 4-20mA
dPT 202
FE 201
FLOW ELEMENT
PFS
MODEL: 12" B HVT-CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE
TO FILTER
CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA
24 VDC POWER
ES 115V 60HZ
I/I 201
FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4-20mA
OUTPUT: 4-20mA
ES 120 VAC 60HZ
FC 201
250 OHM
FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA
RANGE: 0-3 MGD
FI 201A
CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0-3.00 MGD
PEN 2 RANGE: 0-4.00 FT.
UIR 204
dP INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA
RANGE: 0-4.00 FT.
dPI 202
FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)
CV 201
TO FS-910A
REF. DWG. 16238020
REVERE CONTROL SYSTEMS
(205) 322-4455
BIRMINGHAM, ALABAMA 35233
FILTER NO. 2 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.
1 4/16/96 FIELD REVISIONS R.F.A.
NO. DATE DESCRIPTION BY
REVISION
DRAWN BY: D.C.F.
CHECKED: W.A.H.
DATE: 04-29-96
JOB NO.
DWG. NO. 16238003

FIELD

REF. DWG. 16238001

FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0-3 MGD
OUTPUT: 4-20mA

FT 301

HI LO

551 552

dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0-4 FT.
OUTPUT 4-20mA

dPT 302

LO HI

FE 301

FLOW ELEMENT
PFS
MODEL: 12" B HVT-CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE

TO FILTER

FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)

M CV 301

556 557

REF. DWG. 16238005

TO FS-910A
REF. DWG. 16238020

REAR OF FILTER CONSOLE 3

CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA

24 VDC POWER

508 517 551 -24V 552 551 554 -24V 558 561 560 559 558 554 -24V 555 -24V 556 557 562 563

260 N G ES 115V 60HZ

552 -24V IN I/I 301 OUT 1 558 561 OUT 2 562 563

FACE OF FILTER CONSOLE 3

FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4-20mA
OUTPUT: 4-20mA

260 N G ES 120 VAC 60HZ

508 517 250 OHM 4 SP IN 5 FC 301 7 CV OUT 8 556 557

560 561 250 OHM 6 PV IN 5

260 N G ES 120 VAC 60HZ

559 560 FI 301A

FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA
RANGE: 0-3 MGD

260 N G ES 120 VAC 60HZ

558 559 PEN1 UIR 304 554 555 PEN2

CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0-3.00 MGD
PEN 2 RANGE: 0-4.00 FT.

260 N G ES 120 VAC 60HZ

555 -24V dPI 302

dP INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA
RANGE: 0-4.00 FT.

NO.	DATE	DESCRIPTION / REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 3 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. | CHECKED: W.A.H. | DATE: 04-29-96

JOB NO.

DWG. NO. 16238004

16238012

FIELD

REF. DWG. 16238004

FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–3 MGD
OUTPUT: 4–20mA

FT 401

HI LO

dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–4 FT.
OUTPUT 4–20mA

dPT 402

LO HI

FE 401

FLOW ELEMENT
PFS
MODEL: 12" B HVT–CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE

TO FILTER

FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)

CV 401

TO FS–910A
REF. DWG. 16238020

REAR OF FILTER CONSOLE 4

CURRENT TRANSMITTER
AGM
MODEL: 4000–5
INPUT: 4–20mA
OUTPUT: (2) 4–20mA

24 VDC POWER

I/I 401

ES
115V
60HZ

FACE OF FILTER CONSOLE 4

FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4–20mA
OUTPUT: 4–20mA

FC 401

ES
120 VAC
60HZ

FI 401A

FLOW INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–3 MGD

UIR 404

CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0–3.00 MGD
PEN 2 RANGE: 0–4.00 FT.

dPI 402

dP INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–4.00 FT.

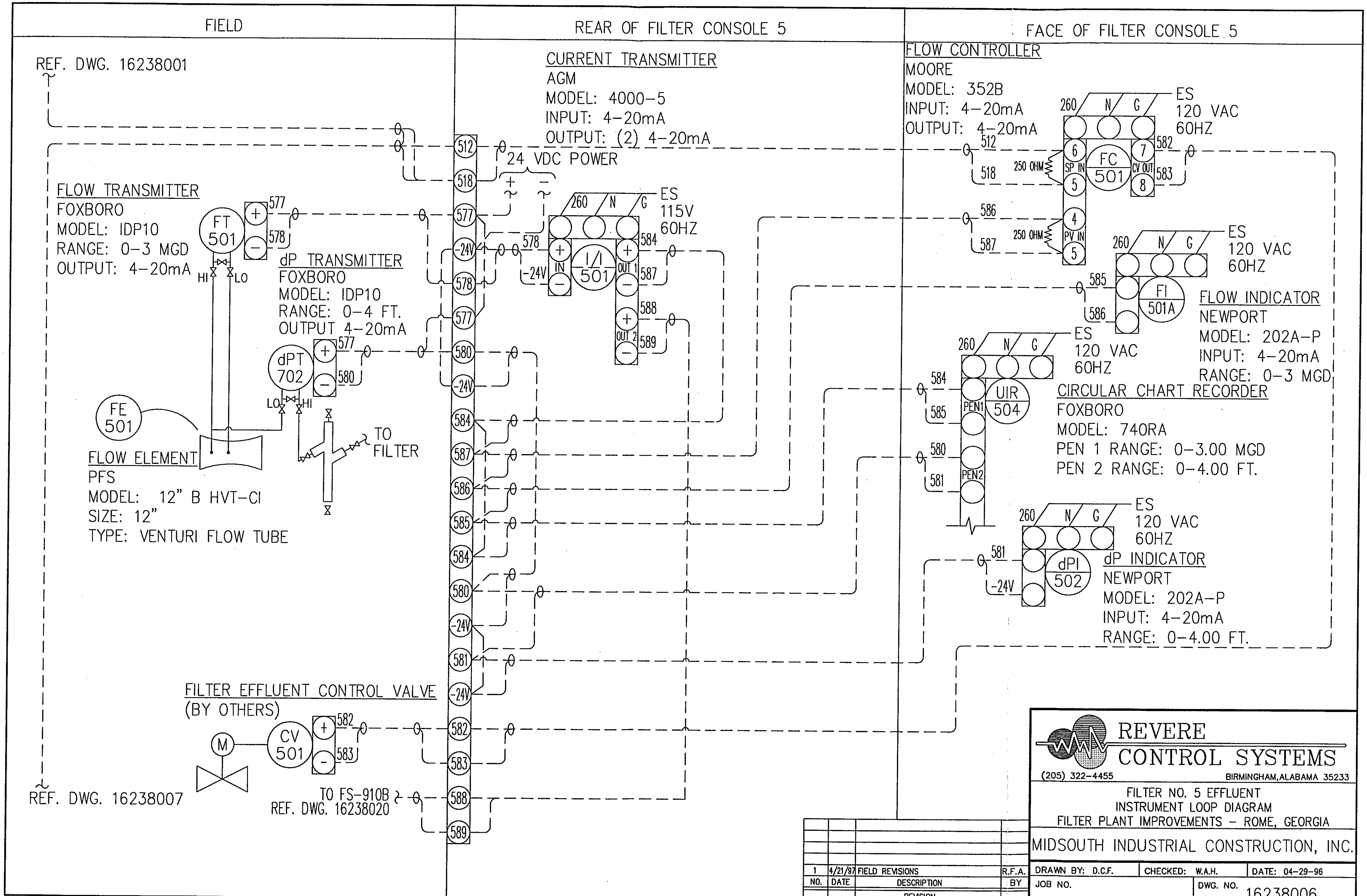
NO.	DATE	REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 322–4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 4 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F. | CHECKED: W.A.H. | DATE: 04–29–96
JOB NO. | DWG. NO. 16238005



FIELD
REAR OF FILTER CONSOLE 5
FACE OF FILTER CONSOLE 5
REF. DWG. 16238001
FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0-3 MGD
OUTPUT: 4-20mA
FT 501
dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0-4 FT.
OUTPUT 4-20mA
dPT 702
FE 501
TO FILTER
FLOW ELEMENT
PFS
MODEL: 12" B HVT-CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE
FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)
CV 501
M
REF. DWG. 16238007
TO FS-910B
REF. DWG. 16238020
CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA
24 VDC POWER
ES
115V
60HZ
I/I 501
FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4-20mA
OUTPUT: 4-20mA
ES
120 VAC
60HZ
FC 501
250 OHM
FI 501A
FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA
RANGE: 0-3 MGD
UIR 504
CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0-3.00 MGD
PEN 2 RANGE: 0-4.00 FT.
dPI 502
dP INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA
RANGE: 0-4.00 FT.
REVERE
CONTROL SYSTEMS
(205) 322-4455
BIRMINGHAM, ALABAMA 35233
FILTER NO. 5 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA
MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.
1 4/21/97 FIELD REVISIONS R.F.A.
NO. DATE DESCRIPTION BY
REVISION
DRAWN BY: D.C.F.
CHECKED: W.A.H.
DATE: 04-29-96
JOB NO.
DWG. NO. 16238006

FIELD

REF. DWG. 16238006

FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–3 MGD
OUTPUT: 4–20mA

FT 601

HI LO

dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–4 FT.
OUTPUT 4–20mA

dPT 602

LO HI

FE 601

FLOW ELEMENT
PFS
MODEL: 12" B HVT–CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE

TO FILTER

FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)

M CV 601

TO FS-910B
REF. DWG. 16238020

REAR OF FILTER CONSOLE 6

CURRENT TRANSMITTER
AGM
MODEL: 4000–5
INPUT: 4–20mA
OUTPUT: (2) 4–20mA

24 VDC POWER

I/I 601

ES
115V
60HZ

FACE OF FILTER CONSOLE 6

FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4–20mA
OUTPUT: 4–20mA

250 OHM

FC 601

ES
120 VAC
60HZ

FI 601A

FLOW INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–3 MGD

UIR 604

CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0–3.00 MGD
PEN 2 RANGE: 0–4.00 FT.

dPI 602

dP INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–4.00 FT.

NO.	DATE	DESCRIPTION / REVISION	BY
1	4/21/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 322–4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 6 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04–29–96
JOB NO.	DWG. NO. 16238007	

FIELD

REF. DWG. 16238001

FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–3 MGD
OUTPUT: 4–20mA

FT 701

HI LO

dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–4 FT.
OUTPUT 4–20mA

dPT 502

FE 501

FLOW ELEMENT
PFS
MODEL: 12" B HVT–CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE

TO FILTER

FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)

M CV 701

REF. DWG. 16238009

REAR OF FILTER CONSOLE 7

CURRENT TRANSMITTER
AGM
MODEL: 4000–5
INPUT: 4–20mA
OUTPUT: (2) 4–20mA

24 VDC POWER

I/I 701

ES
115V
60HZ

TO FS–910B
REF. DWG. 16238020

FACE OF FILTER CONSOLE 7

FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4–20mA
OUTPUT: 4–20mA

FC 701

250 OHM

ES
120 VAC
60HZ

FI 701A

FLOW INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–3 MGD

UIR 704

CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0–3.00 MGD
PEN 2 RANGE: 0–4.00 FT.

dPI 702

dP INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–4.00 FT.

REVERE CONTROL SYSTEMS
(205) 322–4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 7 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION DESCRIPTION	BY
1	4/21/97	FIELD REVISIONS	R.F.A.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04–29–96
JOB NO.	DWG. NO. 16238008	

FIELD

REF. DWG. 18238008

FLOW TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–3 MGD
OUTPUT: 4–20mA

FT 801 — HI / LO — 620 / 621

dP TRANSMITTER
FOXBORO
MODEL: IDP10
RANGE: 0–4 FT.
OUTPUT 4–20mA

dPT 802 — LO / HI — 620 / 623

FE 601

FLOW ELEMENT
PFS
MODEL: 12" B HVT–CI
SIZE: 12"
TYPE: VENTURI FLOW TUBE

TO FILTER

FILTER EFFLUENT CONTROL VALVE
(BY OTHERS)

M — CV 801 — 625 / 626

TO FS-910B
REF. DWG. 16238020 — 631 / 632

REAR OF FILTER CONSOLE 8

CURRENT TRANSMITTER
AGM
MODEL: 4000–5
INPUT: 4–20mA
OUTPUT: (2) 4–20mA

24 VDC POWER

I/I 801 — IN: 621 / -24V — OUT 1: 627 / 630 — OUT 2: 631 / 632

ES 115V 60HZ — 260 / N / G

Terminal strip: 519, 515, 620, -24V, 621, 620, 623, -24V, 627, 630, 629, 628, 627, 623, -24V, 624, -24V, 625, 626, 631, 632

FACE OF FILTER CONSOLE 8

FLOW CONTROLLER
MOORE
MODEL: 352B
INPUT: 4–20mA
OUTPUT: 4–20mA

FC 801 — 519 / 515 — 250 OHM — SP IN: 4 / 5 — CV OUT: 7 / 8 — 625 / 626 — PV IN: 6 / 5 — 629 / 630

ES 120 VAC 60HZ — 260 / N / G

FI 801A — 628 / 629

FLOW INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–3 MGD

ES 120 VAC 60HZ — 260 / N / G

UIR 804 — 627 / 628 — PEN1 — 623 / 624 — PEN2

CIRCULAR CHART RECORDER
FOXBORO
MODEL: 740RA
PEN 1 RANGE: 0–3.00 MGD
PEN 2 RANGE: 0–4.00 FT.

ES 120 VAC 60HZ — 260 / N / G

dPI 802 — 624 / -24V

dP INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA
RANGE: 0–4.00 FT.

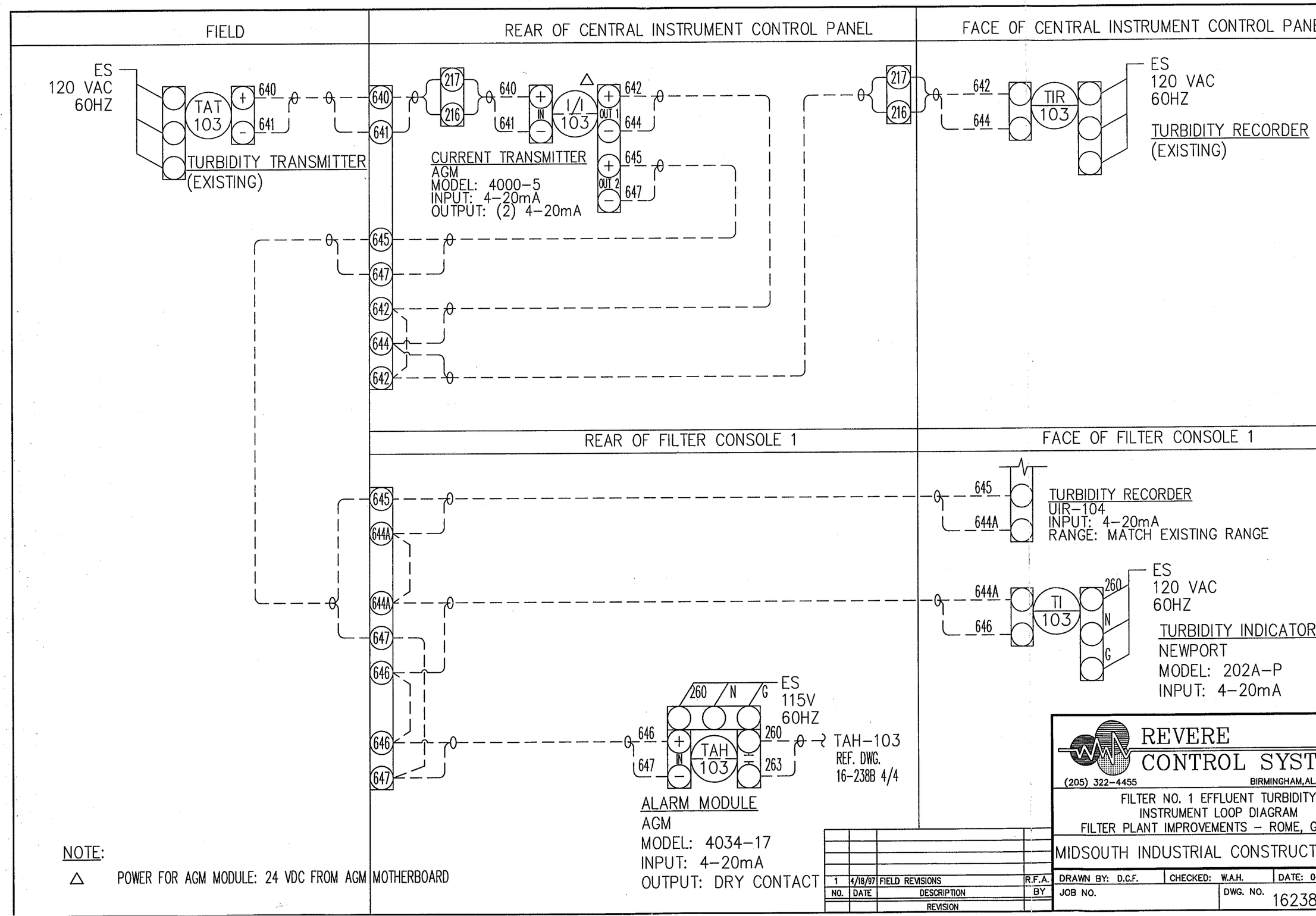
NO.	DATE	DESCRIPTION / REVISION	BY
1	4/21/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 322–4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 8 EFFLUENT
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04–29–96
JOB NO.	DWG. NO. 16238009	



NOTE:

△ POWER FOR AGM MODULE: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION / REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

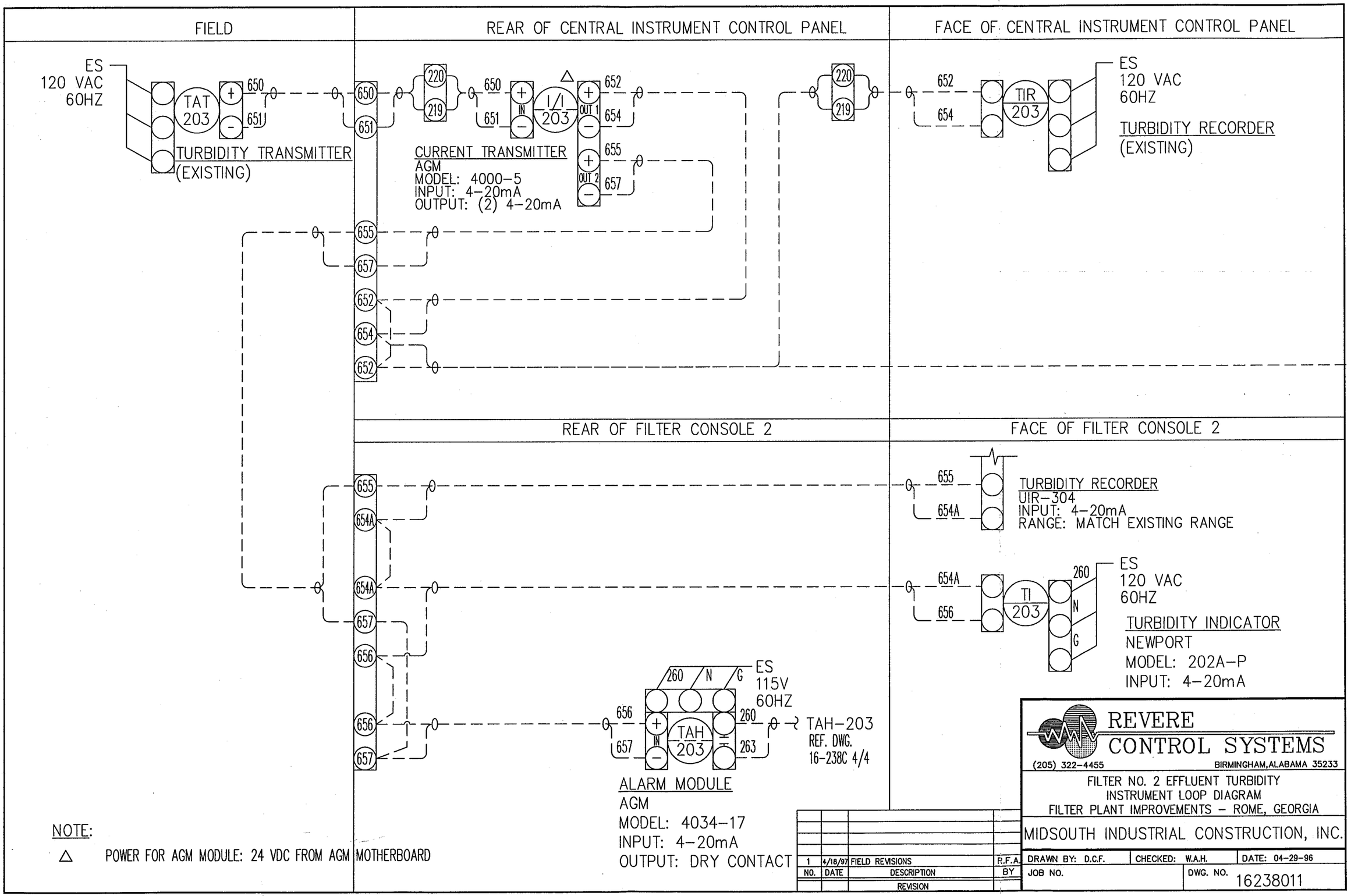
REVERE CONTROL SYSTEMS

(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 1 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238010	



REVERE CONTROL SYSTEMS

(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 2 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

NO.	DATE	REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238011	

FIELD

REAR OF CENTRAL INSTRUMENT CONTROL PANEL

FACE OF CENTRAL INSTRUMENT CONTROL PANEL

ES
120 VAC
60HZ

TAT 303

660
661

TURBIDITY TRANSMITTER
(EXISTING)

660
661

223
222

660
661

I/I 303 △

662
664

665
667

CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA

223
222

662
664

TIR 303

ES
120 VAC
60HZ

TURBIDITY RECORDER
(EXISTING)

REAR OF FILTER CONSOLE 3

FACE OF FILTER CONSOLE 3

665
664A
667
666
666
667

655
664A

TURBIDITY RECORDER
UIR-304
INPUT: 4-20mA
RANGE: MATCH EXISTING RANGE

664A
666

TI 303

260
N
G

ES
120 VAC
60HZ

TURBIDITY INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

260 N G

666
667

TAH 303

260
263

TAH-303
REF. DWG.
16-238D 4/4

ES
115V
60HZ

ALARM MODULE
AGM
MODEL: 4034-17
INPUT: 4-20mA
OUTPUT: DRY CONTACT

NOTE:

△ POWER FOR AGM MODULE: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS

(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 3 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238012	

FIELD

REAR OF CENTRAL INSTRUMENT CONTROL PANEL

FACE OF CENTRAL INSTRUMENT CONTROL PANEL

ES
120 VAC
60HZ

TAT 403

TURBIDITY TRANSMITTER
(EXISTING)

670
671

CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA

I/I 403

IN

OUT 1

OUT 2

672
674
675
677

TIR 403

ES
120 VAC
60HZ

TURBIDITY RECORDER
(EXISTING)

REAR OF FILTER CONSOLE 4

FACE OF FILTER CONSOLE 4

675
674A
677
676

TURBIDITY RECORDER
UIR-404
INPUT: 4-20mA
RANGE: MATCH EXISTING RANGE

TI 403

260
N
G

ES
120 VAC
60HZ

TURBIDITY INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

TAH 403

ES
115V
60HZ

TAH-403
REF. DWG.
16-238E 4/4

ALARM MODULE
AGM
MODEL: 4034-17
INPUT: 4-20mA
OUTPUT: DRY CONTACT

NOTE:

△ POWER FOR AGM MODULE: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 4 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238013	

FIELD

REAR OF CENTRAL INSTRUMENT CONTROL PANEL

FACE OF CENTRAL INSTRUMENT CONTROL PANEL

ES
120 VAC
60HZ

TAT
503

TURBIDITY TRANSMITTER
(EXISTING)

680
681

229
228

I/I
503

IN

OUT 1

OUT 2

CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA

682
684
685
687

TIR
503

ES
120 VAC
60HZ

TURBIDITY RECORDER
(EXISTING)

683

REAR OF FILTER CONSOLE 5

FACE OF FILTER CONSOLE 5

685
684A
687
686

TURBIDITY RECORDER
UIR-504
INPUT: 4-20mA
RANGE: MATCH EXISTING RANGE

TI
503

260
N
G

ES
120 VAC
60HZ

TURBIDITY INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

TAH
503

ES
115V
60HZ

TAH-503
REF. DWG.
16-238F 4/4

ALARM MODULE
AGM
MODEL: 4034-17
INPUT: 4-20mA
OUTPUT: DRY CONTACT

NOTE:

△ POWER FOR AGM MODULE: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
1	4/21/97	FIELD REVISIONS	R.F.A.

REVISION

REVERE
CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 5 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO.	16238014

FIELD

REAR OF CENTRAL INSTRUMENT CONTROL PANEL

FACE OF CENTRAL INSTRUMENT CONTROL PANEL

ES
120 VAC
60HZ

TAT
603

690
691

TURBIDITY TRANSMITTER
(EXISTING)

690
691

232
231

690
691

I/I
603

IN

OUT 1
692
694

OUT 2
695
697

CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA

△

695
697
692
694
692

232
231

692
693

TIR
603

ES
120 VAC
60HZ

TURBIDITY RECORDER
(EXISTING)

REAR OF FILTER CONSOLE 6

FACE OF FILTER CONSOLE 6

695
694A
694A
697
696
696
697

695

694A

TURBIDITY RECORDER
UIR-604
INPUT: 4-20mA
RANGE: MATCH EXISTNG RANGE

694A
696

TI
603

260
N
G

ES
120 VAC
60HZ

TURBIDITY INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

260
N
G

696
697

IN

TAH
603

260
263

ES
115V
60HZ

TAH-603
REF. DWG.
16-238G 4/4

ALARM MODULE
AGM
MODEL: 4034-17
INPUT: 4-20mA
OUTPUT: DRY CONTACT

NOTE:

△ POWER FOR AGM MODULE: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
		REVISION	
1	4/21/97	FIELD REVISIONS	R.F.A.

REVERE
CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 6 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238015	

FIELD

REAR OF CENTRAL INSTRUMENT CONTROL PANEL

FACE OF CENTRAL INSTRUMENT CONTROL PANEL

ES
120 VAC
60HZ

TAT
703

TURBIDITY TRANSMITTER
(EXISTING)

700
701

CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA

I/I
703

IN

OUT 1

OUT 2

235
234

702
704
705
707

TIR
703

ES
120 VAC
60HZ

TURBIDITY RECORDER
(EXISTING)

REAR OF FILTER CONSOLE 7

FACE OF FILTER CONSOLE 7

705
704A
706
707

TURBIDITY RECORDER
UIR-704
INPUT: 4-20mA
RANGE: MATCH EXISTING RANGE

TI
703

260
N
G

ES
120 VAC
60HZ

TURBIDITY INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

TAH
703

263

ES
115V
60HZ

TAH-703
REF. DWG.
16-238H 4/4

ALARM MODULE
AGM
MODEL: 4034-17
INPUT: 4-20mA
OUTPUT: DRY CONTACT

NOTE:

△ POWER FOR AGM MODULE: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	REVISION	BY
1	4/21/97	FIELD REVISIONS	R.F.A.

REVERE
CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 7 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238016	

FIELD

REAR OF CENTRAL INSTRUMENT CONTROL PANEL

FACE OF CENTRAL INSTRUMENT CONTROL PANEL

ES
120 VAC
60HZ

TAT
803

TURBIDITY TRANSMITTER
(EXISTING)

710
711

238
237

I/I
803

IN

OUT 1

OUT 2

712
714
715
717

CURRENT TRANSMITTER
AGM
MODEL: 4000-5
INPUT: 4-20mA
OUTPUT: (2) 4-20mA

TIR
803

ES
120 VAC
60HZ

TURBIDITY RECORDER
(EXISTING)

REAR OF FILTER CONSOLE 8

FACE OF FILTER CONSOLE 8

715
714A
716
717

TURBIDITY RECORDER
UIR-804
INPUT: 4-20mA
RANGE: MATCH EXISTING RANGE

TI
803

260
N
G

ES
120 VAC
60HZ

TURBIDITY INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

TAH
803

ES
115V
60HZ

TAH-803
REF. DWG.
16-2381 4/4

ALARM MODULE
AGM
MODEL: 4034-17
INPUT: 4-20mA
OUTPUT: DRY CONTACT

NOTE:

△ POWER FOR AGM MODULE: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION REVISION	BY
1	4/21/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS

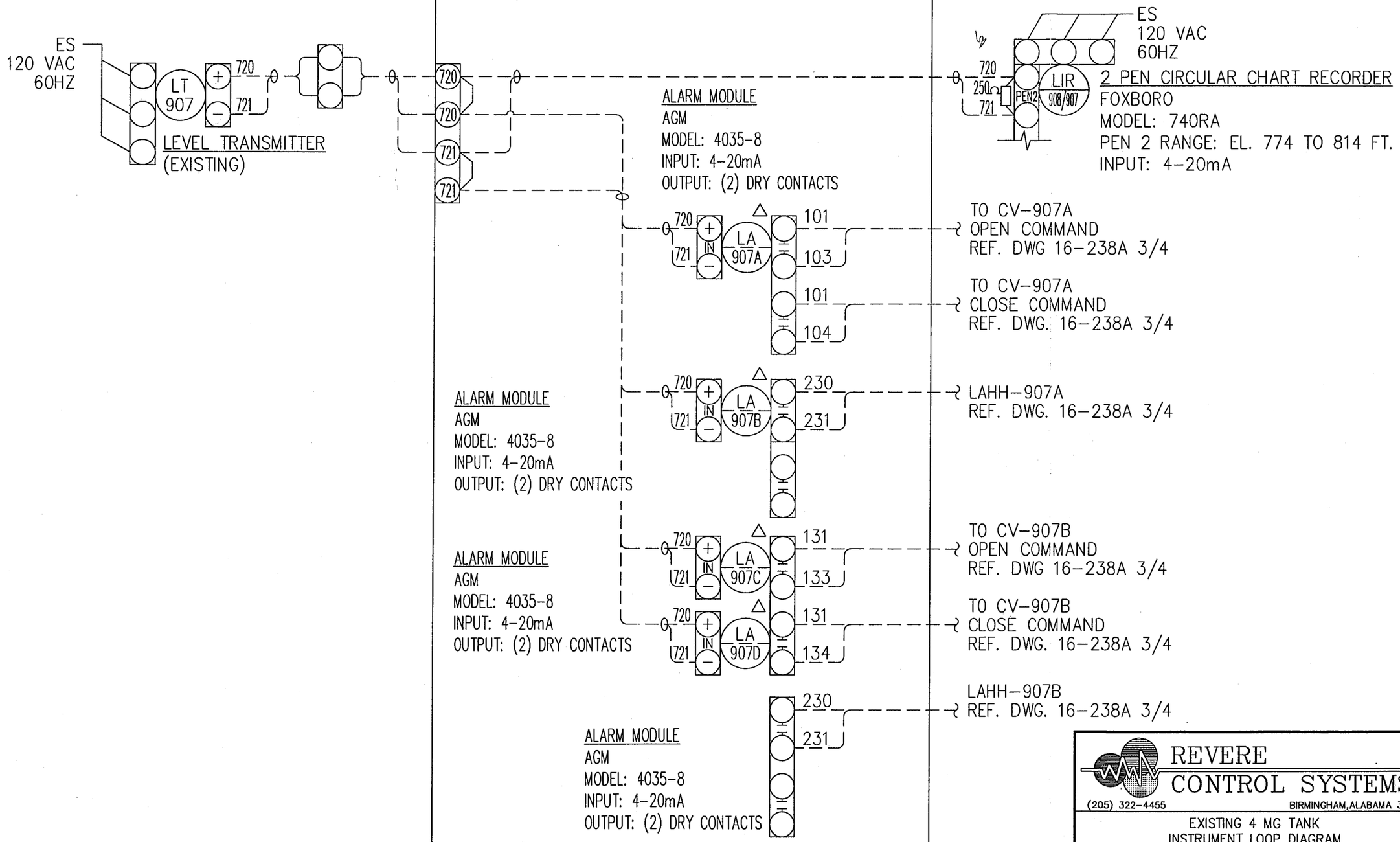
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

FILTER NO. 8 EFFLUENT TURBIDITY
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238017	

FIELD	REAR OF CENTRAL INSTRUMENT CONTROL PANEL	FACE OF CENTRAL INSTRUMENT CONTROL PANEL



NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
		REVISION	
1	4/18/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS

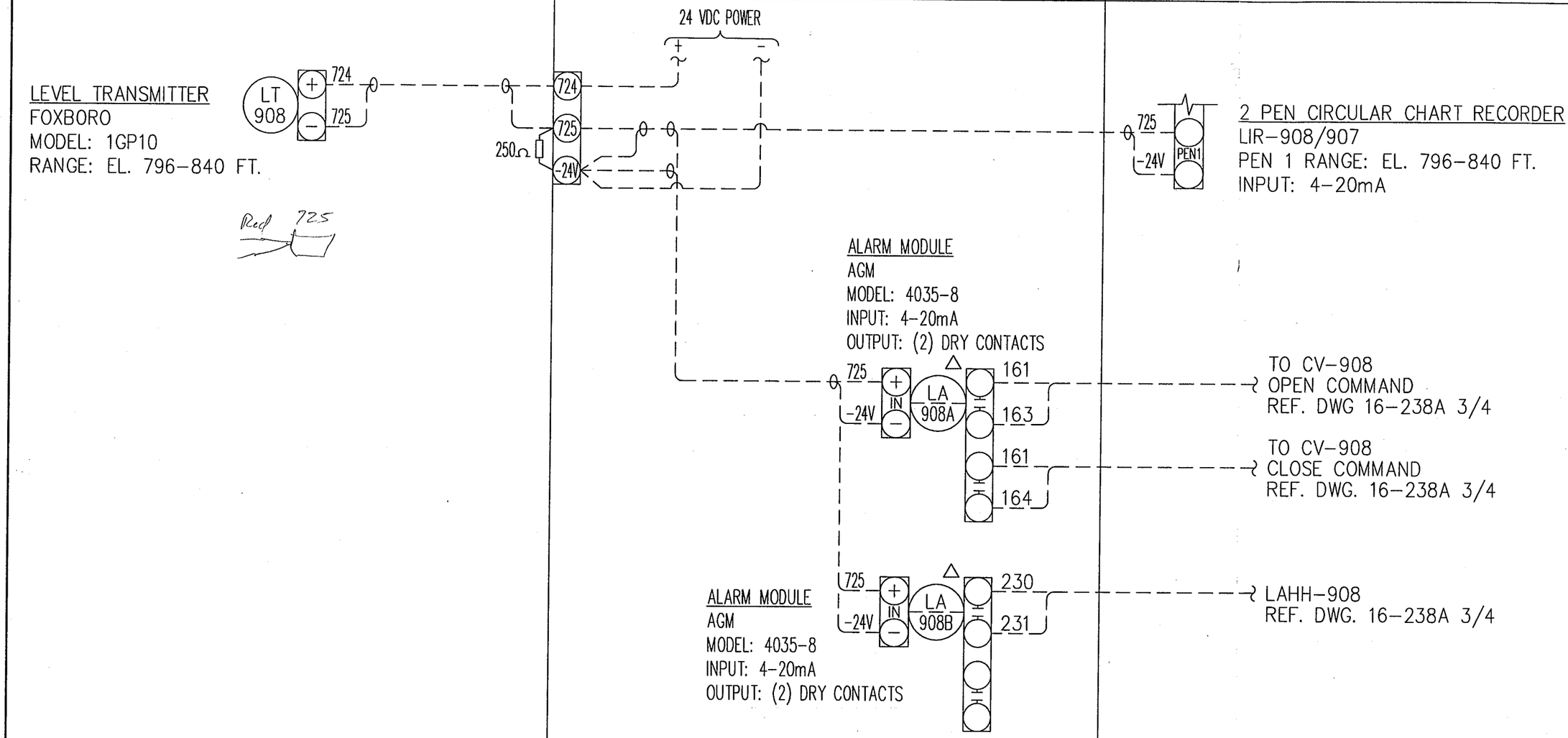
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

EXISTING 4 MG TANK
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION, INC.

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238018	

FIELD	REAR OF CENTRAL INSTRUMENT CONTROL PANEL	FACE OF CENTRAL INSTRUMENT CONTROL PANEL



NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
		REVISION	

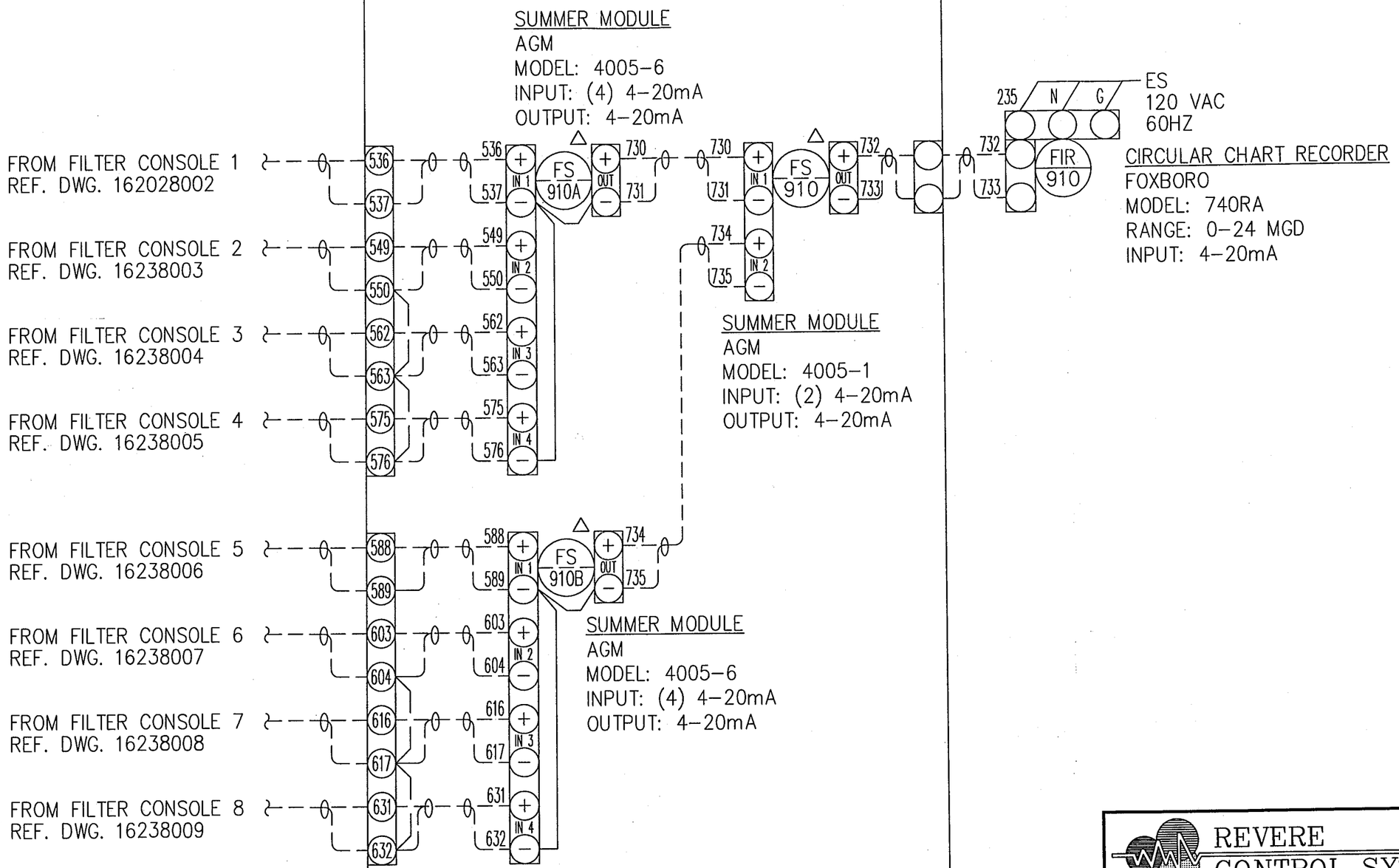
REVERE CONTROL SYSTEMS
(205) 322–4455 BIRMINGHAM, ALABAMA 35233

NEW 4 MG TANK
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04–29–96
JOB NO.	DWG. NO. 16238019	

FIELD	REAR OF CENTRAL INSTRUMENT CONTROL PANEL	FACE OF CENTRAL INSTRUMENT CONTROL PANEL



NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION / REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

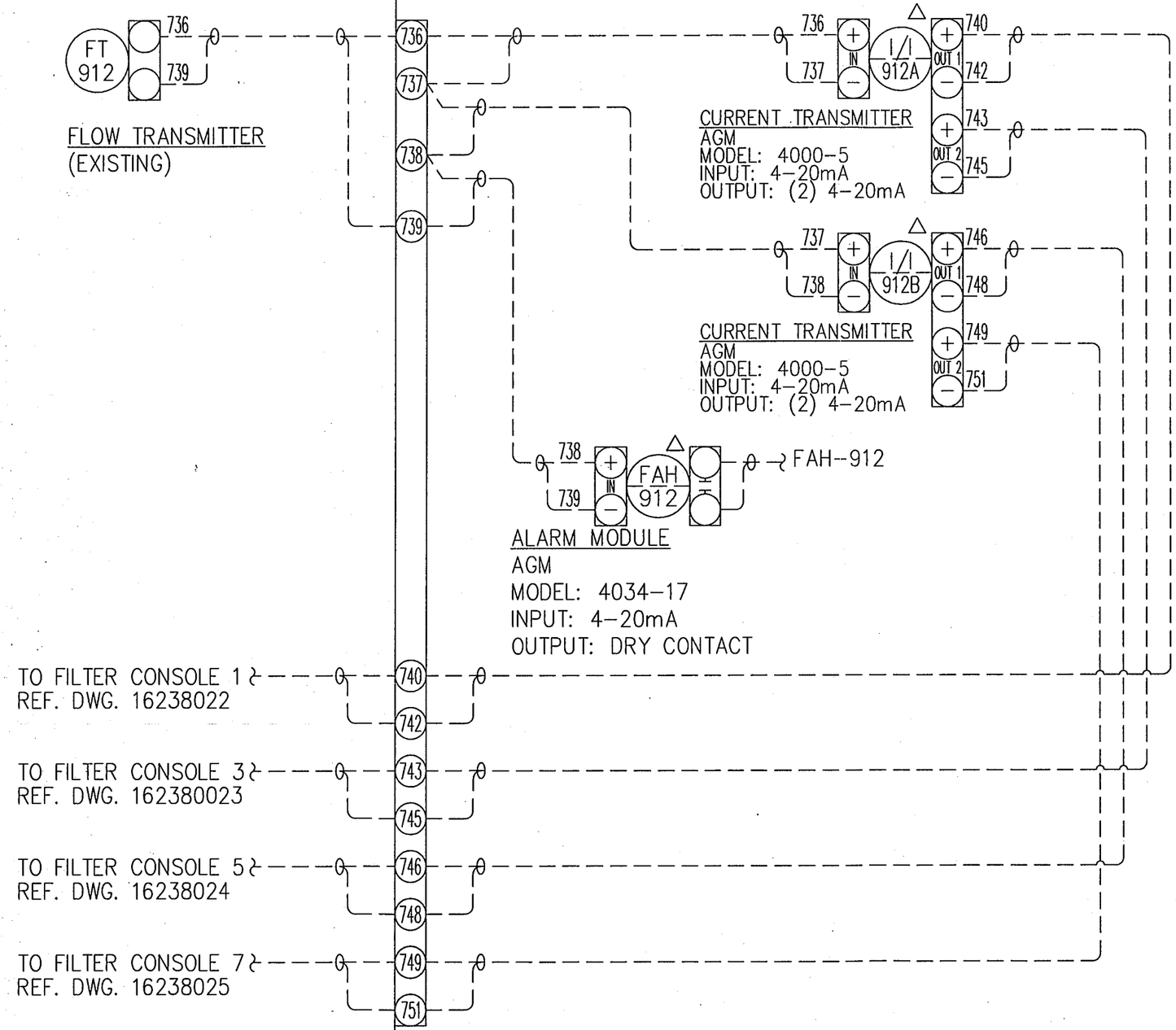
REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

TOTAL FILTERED WATER
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238020	

FIELD	REAR OF CENTRAL INSTRUMENT CONTROL PANEL	FACE OF CENTRAL INSTRUMENT CONTROL PANEL



NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE CONTROL SYSTEMS

(205) 322-4455 BIRMINGHAM, ALABAMA 35233

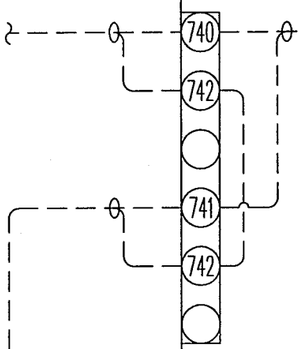
WASHWATER FLOW
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

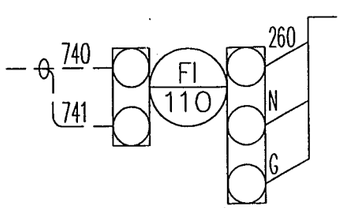
MIDSOUTH INDUSTRIAL CONSTRUCTION

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO.	16238021

FIELD	REAR OF FILTER CONSOLE 1	FACE OF FILTER CONSOLE 1

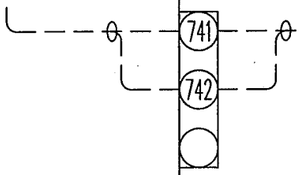
FROM CENTRAL INSTRUMENT CONTROL PANEL
REF. DWG. 16238021

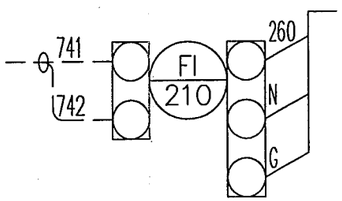




FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

REAR OF FILTER CONSOLE 2	FACE OF FILTER CONSOLE 2





FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION / REVISION	BY
1	4/18/97	FIELD REVISIONS	R.F.A.

REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

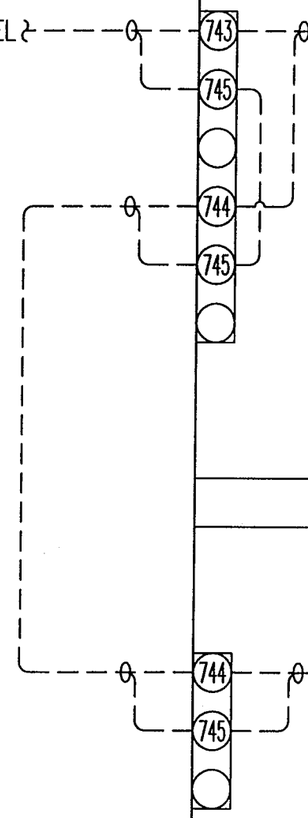
WASHWATER FLOW
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

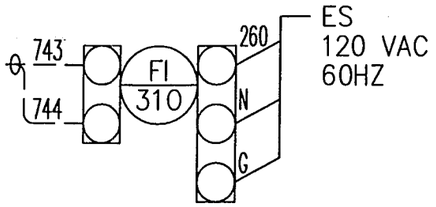
MIDSOUTH INDUSTRIAL CONSTRUCTION

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238022	

FIELD	REAR OF FILTER CONSOLE 3	FACE OF FILTER CONSOLE 3

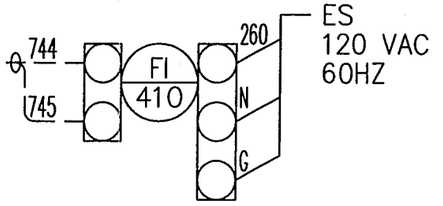
FROM CENTRAL INSTRUMENT CONTROL PANEL
REF. DWG. 16238021





FLOW INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA

REAR OF FILTER CONSOLE 4	FACE OF FILTER CONSOLE 4



FLOW INDICATOR
NEWPORT
MODEL: 202A–P
INPUT: 4–20mA

NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE CONTROL SYSTEMS
(205) 322–4455 BIRMINGHAM, ALABAMA 35233

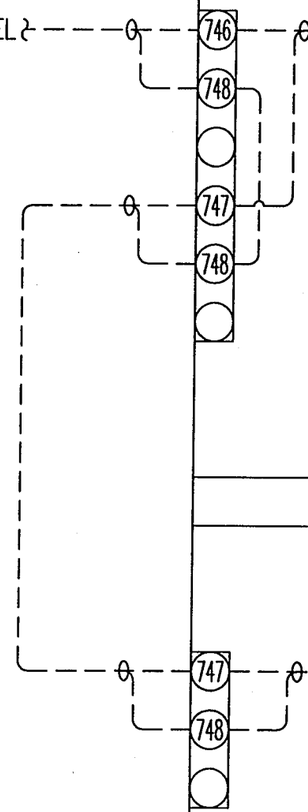
WASH WATER FLOW
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

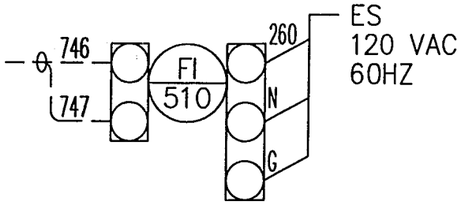
MIDSOUTH INDUSTRIAL CONSTRUCTION

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04–29–96
JOB NO.	DWG. NO. 16238023	

FIELD	REAR OF FILTER CONSOLE 5	FACE OF FILTER CONSOLE 5

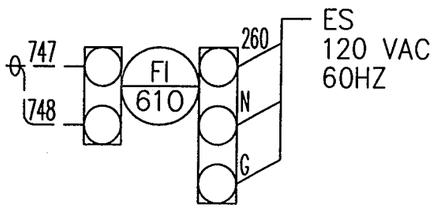
FROM CENTRAL INSTRUMENT CONTROL PANEL
REF. DWG. 16238021





FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

REAR OF FILTER CONSOLE 6	FACE OF FILTER CONSOLE 6



FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

WASHWATER FLOW
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS – ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238024	

FIELD

REAR OF FILTER CONSOLE 7

FACE OF FILTER CONSOLE 7

FROM CENTRAL INSTRUMENT CONTROL PANEL
REF. DWG. 16238021

749
751
750
751

749
750
FI
710
260
N
G
ES
120 VAC
60HZ

FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

REAR OF FILTER CONSOLE 8

FACE OF FILTER CONSOLE 8

750
751

750
751
FI
810
260
N
G
ES
120 VAC
60HZ

FLOW INDICATOR
NEWPORT
MODEL: 202A-P
INPUT: 4-20mA

NOTE:

△ POWER FOR ALL AGM MODULES: 24 VDC FROM AGM MOTHERBOARD

NO.	DATE	DESCRIPTION	BY
		REVISION	

REVERE CONTROL SYSTEMS
(205) 322-4455 BIRMINGHAM, ALABAMA 35233

WASHWATER FLOW
INSTRUMENT LOOP DIAGRAM
FILTER PLANT IMPROVEMENTS - ROME, GEORGIA

MIDSOUTH INDUSTRIAL CONSTRUCTION

DRAWN BY: D.C.F.	CHECKED: W.A.H.	DATE: 04-29-96
JOB NO.	DWG. NO. 16238025	

COMPONENT INFORMATION

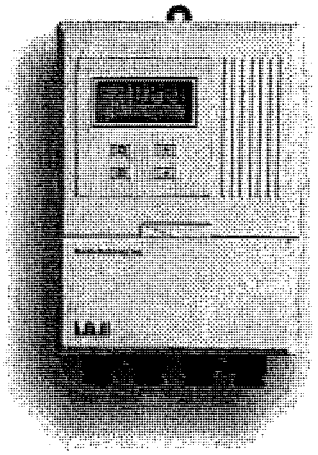
PROJECT:	Bruce Hamler WTF Upgrade, Rome, GA
COMPONENT:	Insertion Magmeter
SPEC. REFERENCE:	13620 Para 1.12
MANUFACTURER:	Marsh McBirney
MODEL:	285
QTY./SYSTEM:	1

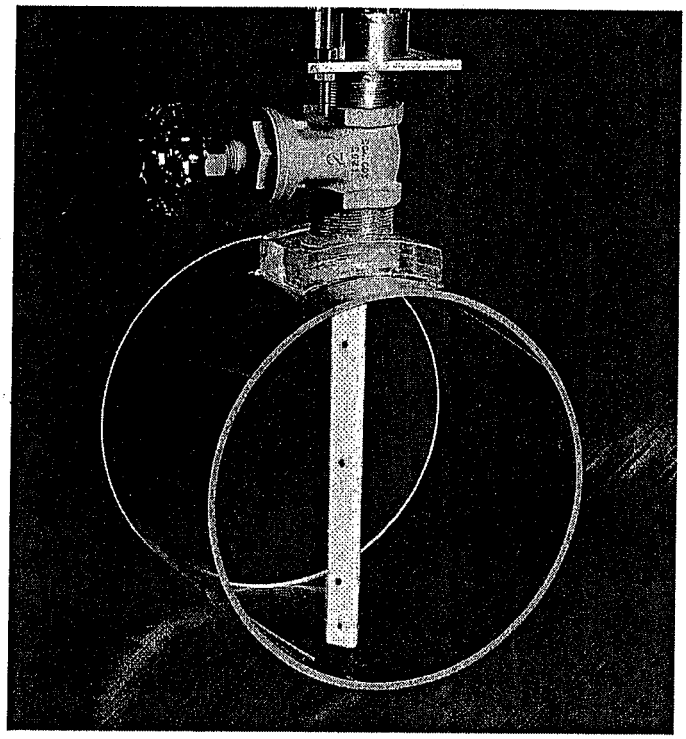
SIZE:	See below
TAG:	FE/FIT 10-1
DESCRIPTION:	Multi-mage Model 285 flowmeter, for 20"id. pipe. Unit to include standard hardware, 20' sensor cable and insertion tool.

Tag	Service	Range
FE/FIT 10-1	Washwater Flow	1500 -1

Installation & Operation

MARSH-McBIRNEY, INC.





Multi-Mag™

Insertable Electromagnetic Averaging Magmeter

Model 285

MARSH-
McBIRNEY, INC.

WARRANTY STATEMENT

Manufacturer warrants all products of its manufacture to be free from defects in workmanship and material under normal use and service. This warranty extends for a period of twelve (12) months after date of shipment, unless altered by mutual agreement between the purchaser and manufacturer prior to the shipment of the product. In addition, the ***Multi-Mag***™ sensor is warranted for an additional forty-eight (48) months (60 months total). If this product is believed to be defective, purchaser shall notify manufacturer and will return the product to the manufacturer, postage paid, within twelve (12) months after date of shipment (60 months for the sensor) by the manufacturer. If the purchaser believes the return of the product to be impractical, manufacturer shall have the option, but will not be required, to inspect the product wherever located. In any event, if the purchaser requests the manufacturer visit their location, the purchaser agrees to pay the non-warranty expenses of travel, lodging and subsistence for the field service response. If the product is found by the manufacturer's inspection to be defective in workmanship or material, the defective part or parts will either be repaired or replaced, at manufacturer's election, free of charge, and if necessary the product will be returned to purchaser, transportation prepaid to any point in the United States. If inspection by the manufacturer of such product does not disclose any defect of workmanship or material, manufacturer's regular service repair charges will apply. Computing devices sold but not manufactured by Marsh-McBirney, Inc. are covered only by the original manufacturer's written warranty. Hence, this warranty statement does not apply.

THE FOREGOING WARRANTY IS MANUFACTURER'S SOLE WARRANTY, AND ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE NEGATED AND EXCLUDED. THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, REPRESENTATIONS, OBLIGATIONS OR LIABILITIES ON THE PART OF THE MANUFACTURER. Purchaser's sole remedy and manufacturer's sole obligation for alleged product failure, whether under warranty claim or otherwise, shall be the aforestated obligation of manufacturer to repair or replace products returned within twelve months after date of original shipment. The manufacturer shall not be liable for, and the purchaser assumes and agrees to indemnify and save harmless the manufacturer in respect to, any loss or damage that may arise through the use by the purchaser of any of the manufacturer's products.

Contents

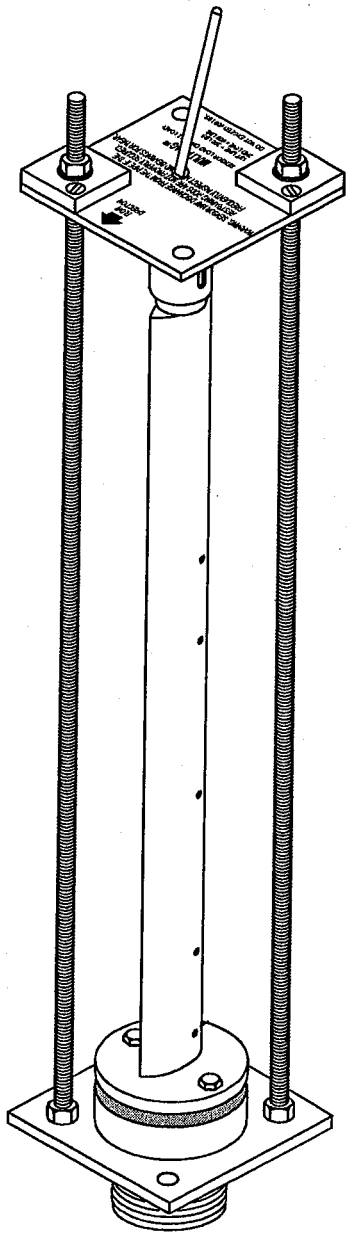
Multi-Mag™ Model 285

Instrument Overview

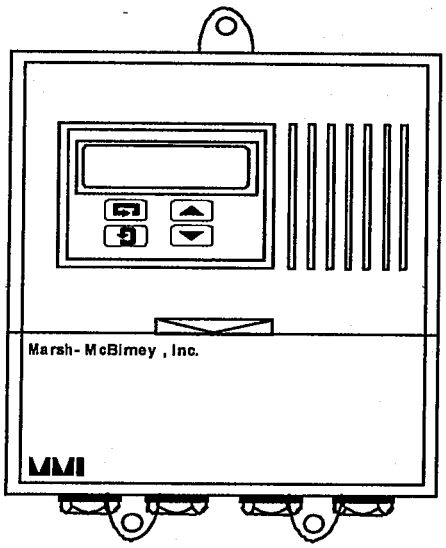
The Model 285 Multi-Mag™ Magmeter combines the innovative Multi-Mag sensor with a comprehensive electronics package to provide accurate flow measurement for full-pipe clean water applications.

The sensor is easily installed (without system shutdown), and requires no site calibration. By using multiple electrodes, the electromagnetic sensor accurately measures average velocity directly.

The instrument has all of the features needed to suit a wide variety of applications, and is easily set up using the keypad display.



Multi-Mag Sensor



Model 285 Electronics

Chapter 1

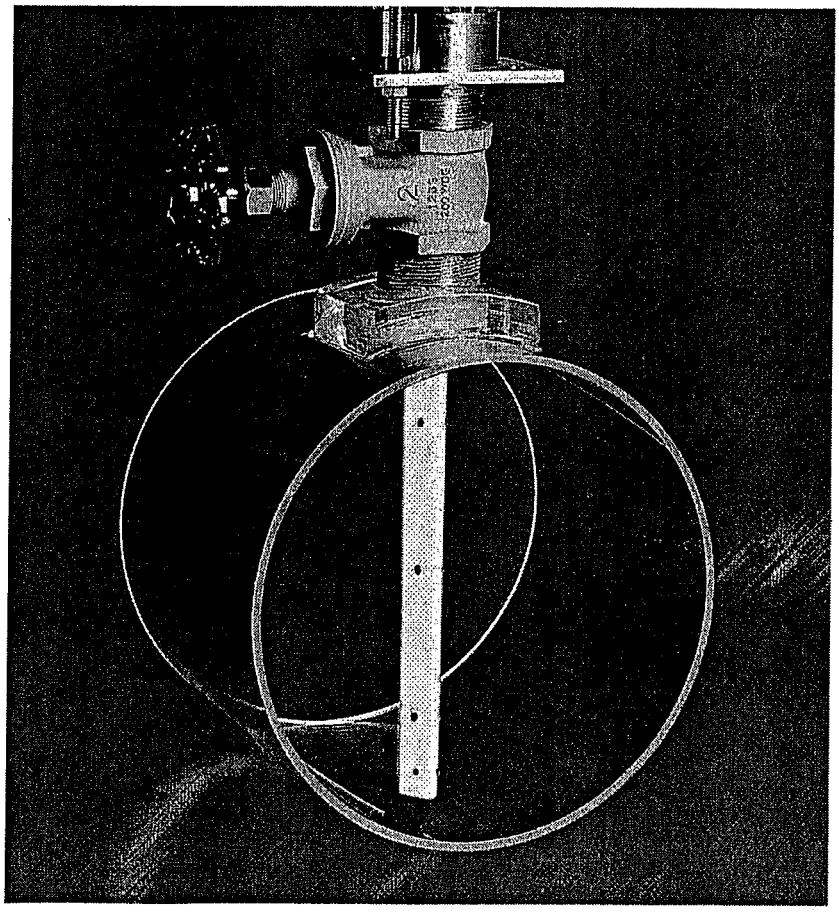
Installation

The Multi-Mag™ Model 285 is installed in two stages:

1. Multi-Mag™ sensor installation
2. Electronics installation and connection

This chapter includes both installation stages. After the sensor and electronics are installed, the instrument is set up for the site. This is included in Chapter 2, *Setting up the Model 285*.

> Note: The transmitter and sensor are supplied as a matched system. Check serial numbers to ensure matched pair.



Location, position, and clearance

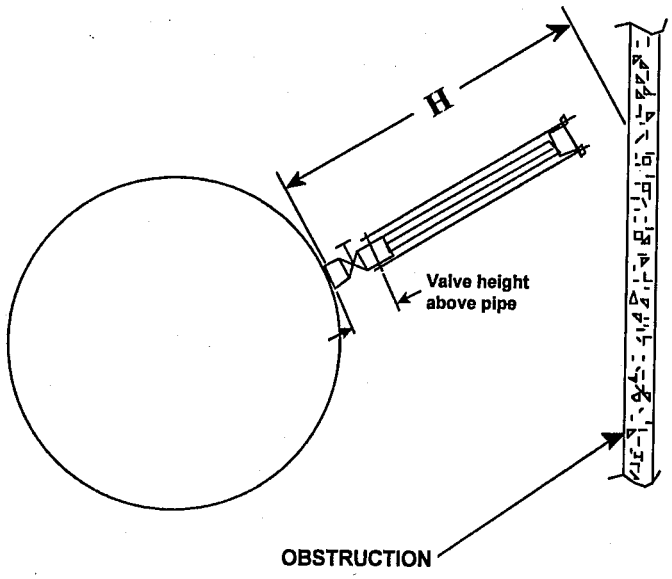
To find the best sensor location, refer to the application schematics located in the appendix to this manual.

In general, locate the sensor downstream from pipe bends, junctions, or obstructions. Install the sensor 90° out of plane from upstream elbows.

If you have any questions, or would like technical assistance in selecting the best possible location for installing the Multi-Mag™ sensor, please call the Marsh-McBirney Customer Support Department (1-800-368-2723).

Sensor clearance

Because the sensor will protrude from the pipe when installed, a clearance of at least the total sensor length plus the distance from the outer pipe wall to the top of the valve plus 9" (229 mm) (distance **H**, below) must be allowed. See Multi-Mag™ Sensor Specification Sheet, page 5.



Install pipe valve

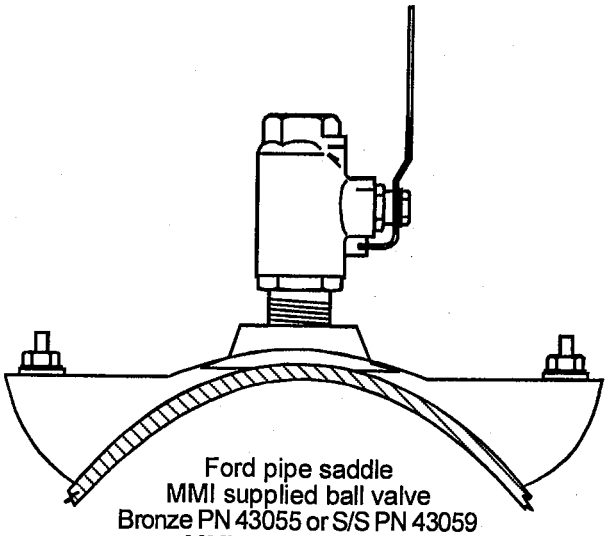
> ***WARNING!***
> Pressurized pipes should only be tapped, cut, or drilled by qualified personnel. If possible, depressurize and drain the pipe before attempting any installation.

Using a corporation stop

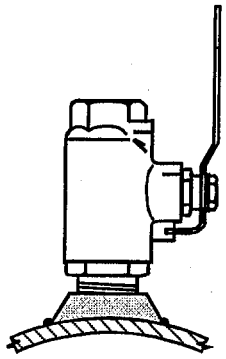
Install a 2" (50mm), full port corporation stop with a 2" (50mm) NPT female pipe thread output (MMI part number 438000401). Follow the installation instructions for the corporation stop.

Using a pipe valve

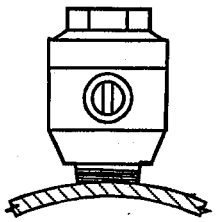
1. Install a pipe nipple using a pipe saddle, welded thread-o-let, or other means.
2. Install a 2", full port valve (ball or gate).
3. Make an access hole in the pipe (2" (50mm) recommended, 1-7/8" (48mm) minimum).
4. If possible, save the pipe section removed when the access hole is made. This can be used to verify the pipe thickness.



Ford pipe saddle
MMI supplied ball valve
Bronze PN 43055 or S/S PN 43059
MMI supplied nipple
S/S PN 43060

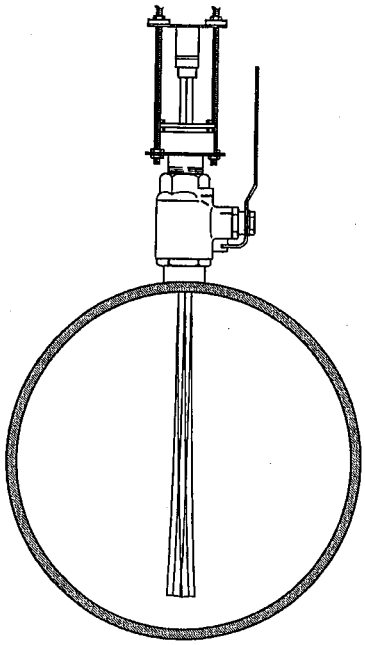


Welded pipe nipple with
MMI supplied ball valve
Bronze PN 43055 or S/S PN 43059



MMI supplied
corporation stop
P/N 438000401

Insert the sensor



Sensor vibration

NOTE
The water velocity should be as slow as possible when the sensor is installed (to prevent sensor vibration). The velocity must be under 5 ft/sec (1.5 m/sec), optimum is zero.

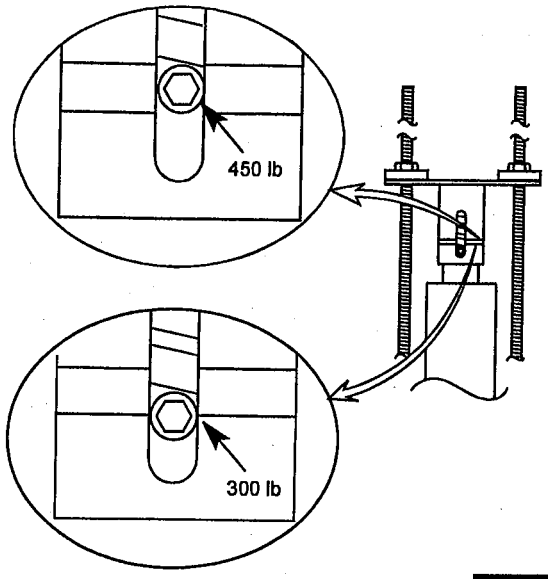
1 Lubricate the compression seal and sensor with soap and water (a bar of soap is provided). This will prevent the compression seal from binding, as well as ease insertion.

IMPORTANT
Do not use oil or grease-based lubricants, as they could coat the electrodes, causing a velocity signal loss.

2 Tighten the two compression seal bolts (located on the sensor bottom plate).

CAUTION
The compression seal/sensor assembly may be under pressure. Serious injury may result if proper procedures are not followed. Do not attempt to install the sensor without the restraining rods fully assembled.

3 After the sensor assembly (with restraining rods in place) has been installed onto the valve and the compression seal bolts have been tightened, fully open the valve. If the valve is not fully open, it may scrape the side of the sensor.



Sensor load

A load is applied at the top of the sensor forcing the bottom of the sensor against the far wall. This keeps the sensor firmly in place against the far wall of the pipe. The amount of load is indicated by the two lines and set screw at the top of the sensor (see drawing). The bottom line indicates a 300-lb. load. The top line indicates a 600-lb. load.

1. Rotate the low gear shaft until the proper load is indicated.

   Recommended sensor loads are 300 lbs. or less for plastic pipes, 450 lbs. for metal pipes.

2. Tighten the compression seal bolts.

NOTE
Tighten the compression seal bolts only enough to seal the sensor. If the compression seal bolts are too tight, the compression seal may grip the sensor, and will distort when the sensor is moved into the pipe. The compression seal bolts will be tightened after the sensor is inserted.

Install the short restraining rods

After the sensor has been inserted and the load adjusted, shorter restraining rods can be installed and the longer ones removed. This will make the sensor assembly compact and reduce the chances of injury by the protruding rods.

1. Secure the short restraining rods to the bottom plate with two 3/8" nuts.
2. Secure the short restraining rods to the top plate with one 3/8" nut and Locktite™ or two 3/8" nuts.
3. Install the locking cotter pins.
4. Remove the long restraining rods.

NOTE
If the short rods are not used, run a 3/8" nut down against each captive nut.

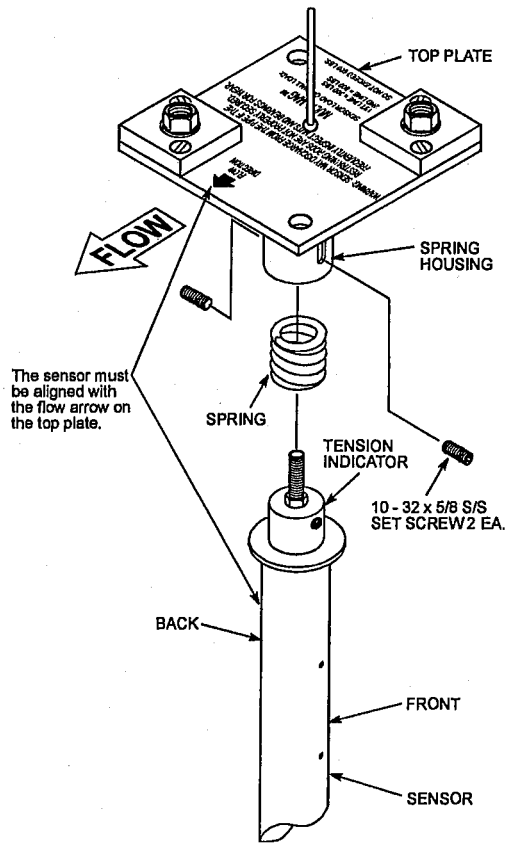
Assembling or disassembling the sensor

The sensor is shipped fully assembled. However, if sensor repair or replacement is required, the sensor may need to be disassembled or reassembled. To disassemble the sensor, follow the assembly instructions in reverse.

Attach the top plate to the sensor

1. Place the spring on top of the tension indicator at the top of the sensor.
2. Slide the spring housing of the top plate over the spring. Secure the top plate to the sensor with the two stainless steel 10-32 x 5/8 set screws. Use a 3/32 hex key wrench to tighten the set screws.

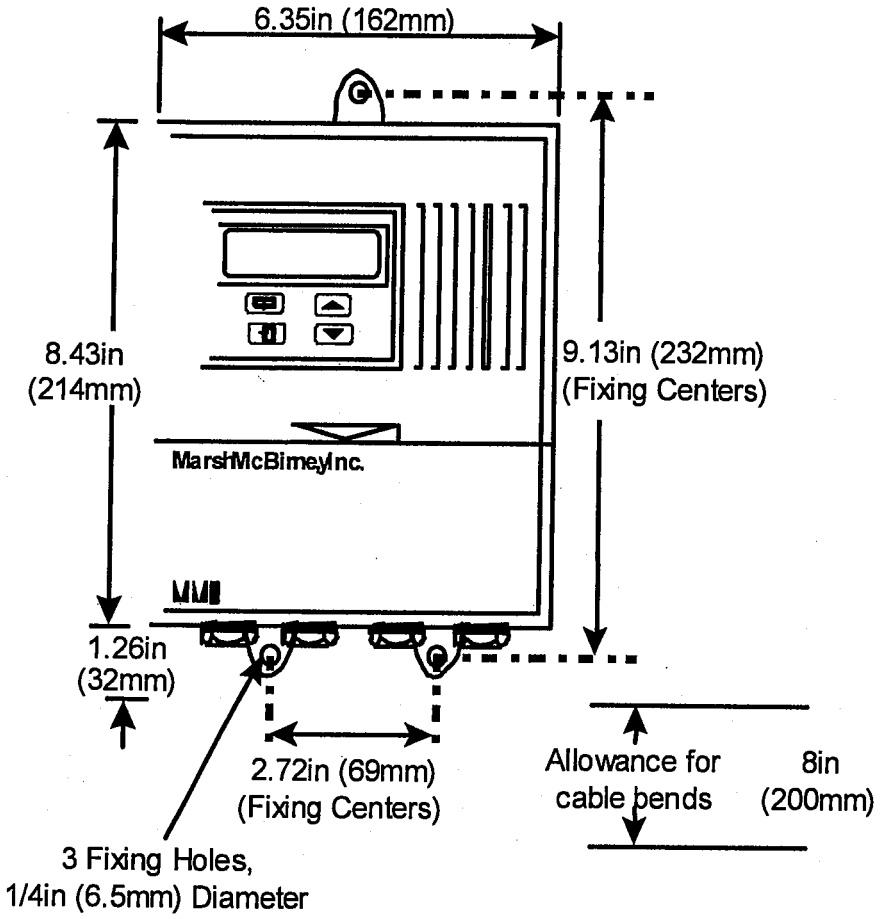
> ***IMPORTANT***
> Make sure the sensor is aligned with the flow arrow on the top plate. The sensor is aligned when the electrodes are facing the opposite direction from the flow arrow.



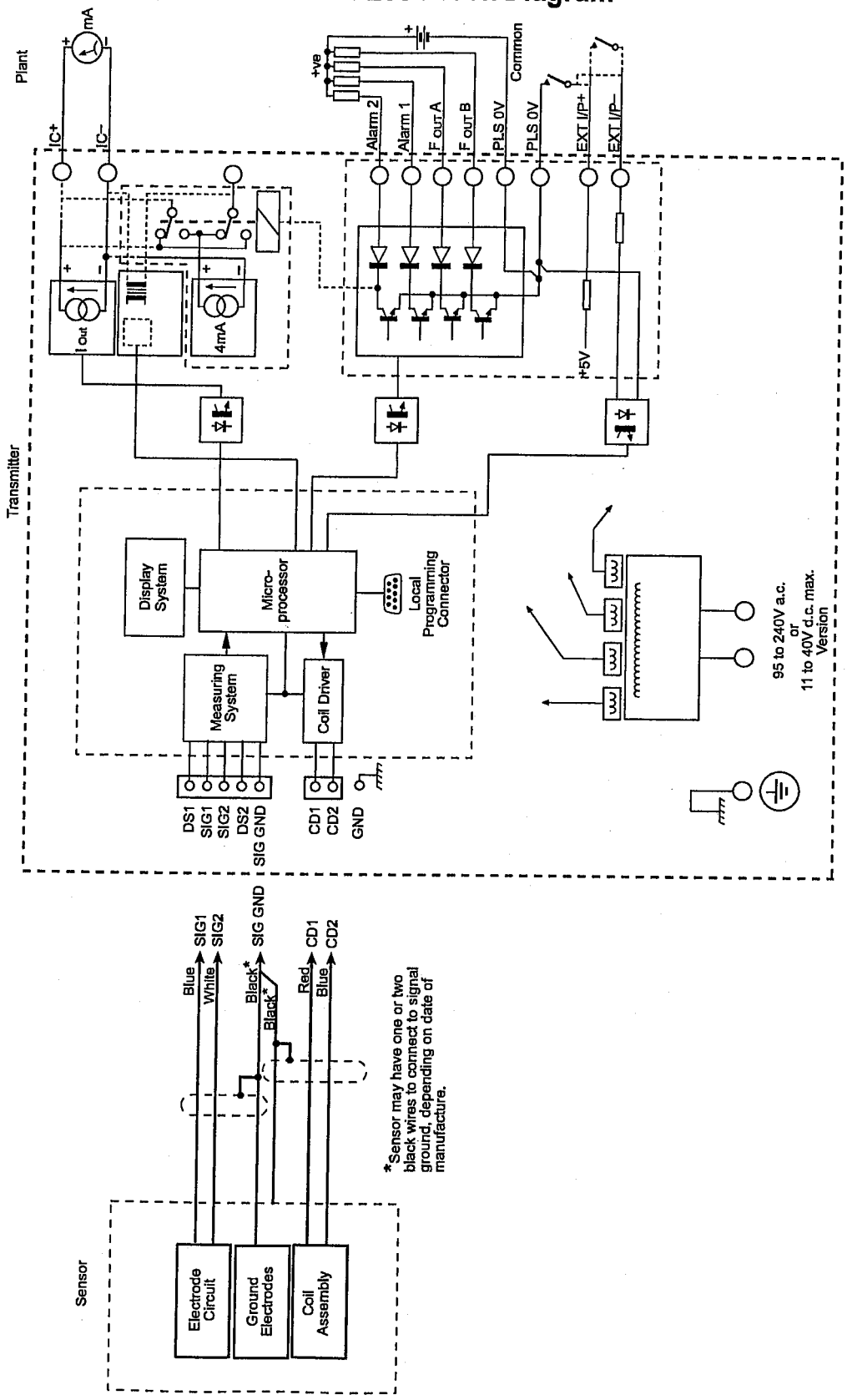
Electronics installation

Mount the electronic housing

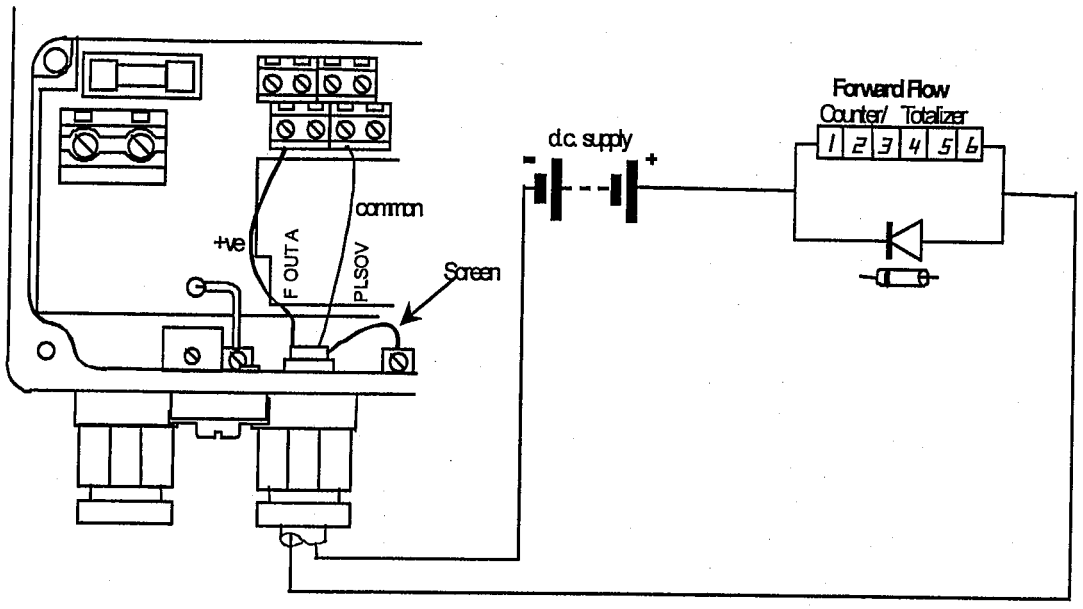
Mount the Model 285 in an electronics shed or environmental enclosure, or outdoors with the optional sun shield (part number 0624B339001). The meter is mounted using three heavy bolts (see dimensions, below). The Model 285 is not suitable for underground vault or manhole installations where submersion could occur.



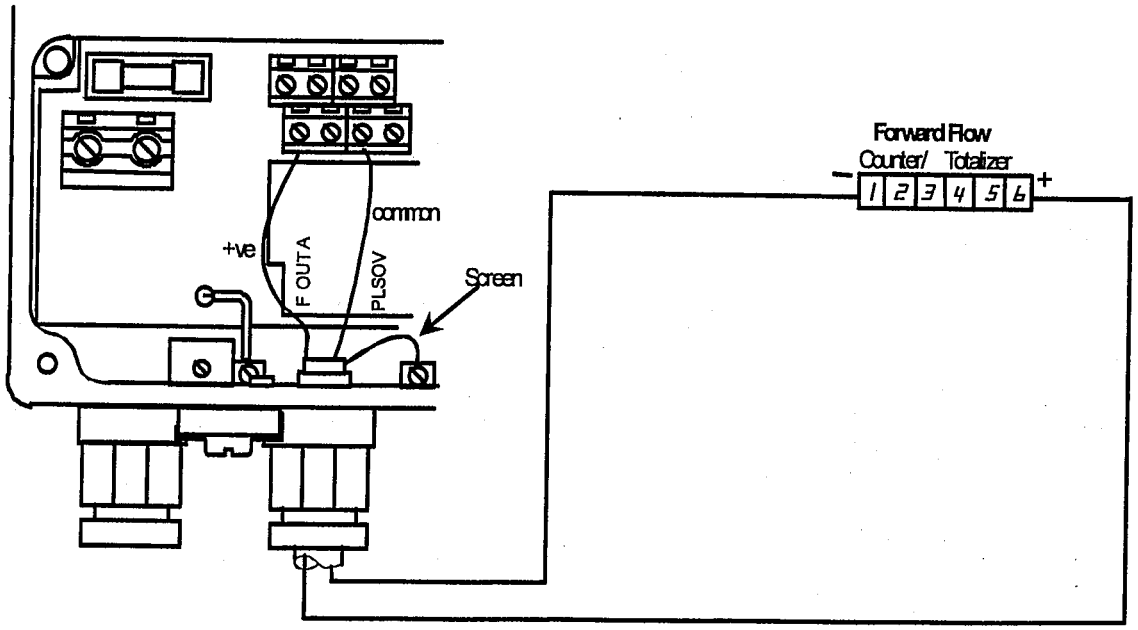
Model 285 Block Diagram



External totalizer/frequency outputs



Electromechanical connections



Telemetry, electronic counters, etc.

Alarm outputs

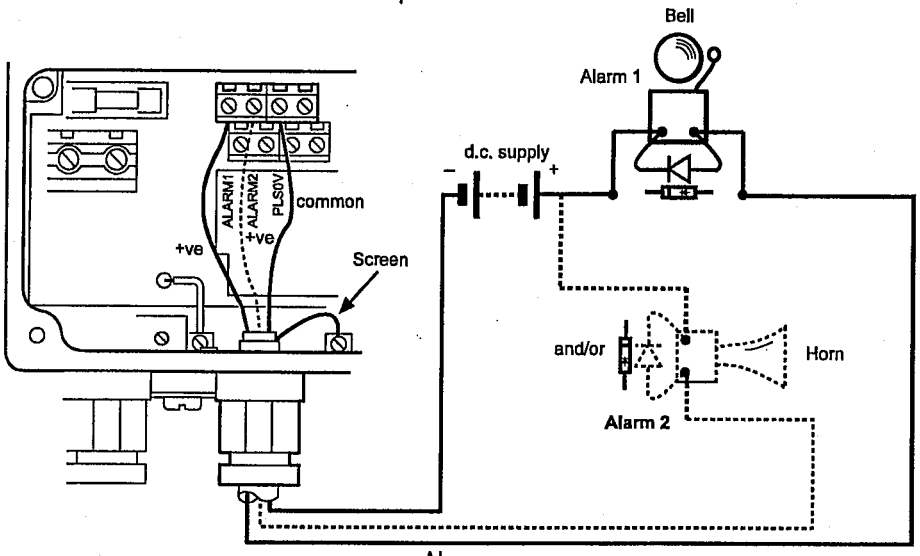
NOTE

Inductive loads may be suppressed by diodes (D) - 1N4004 or similar.

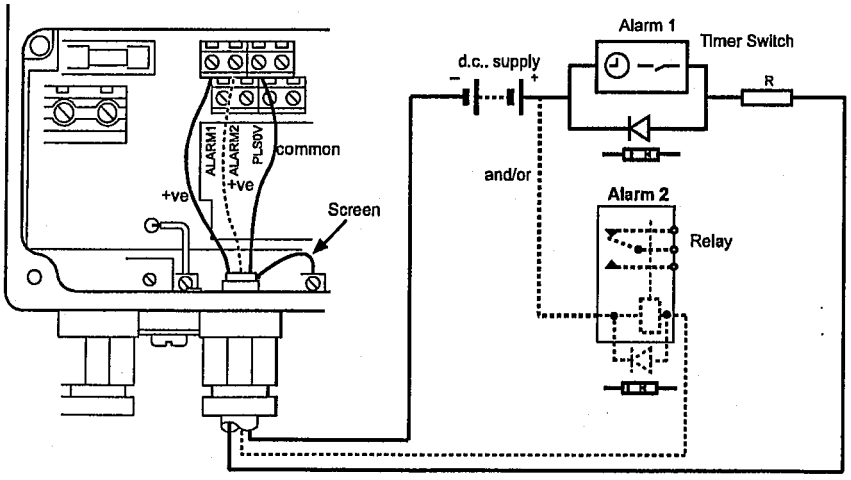
Inrush currents are limited to 1 Amp by resistor R (e.g., 27Ω 1W for 24V systems.

Operation of outputs is programmable (see ***Configuration*** for details).

Frequency and alarm outputs share a common return with contact input.



Alarms



Relay and timers

Current output

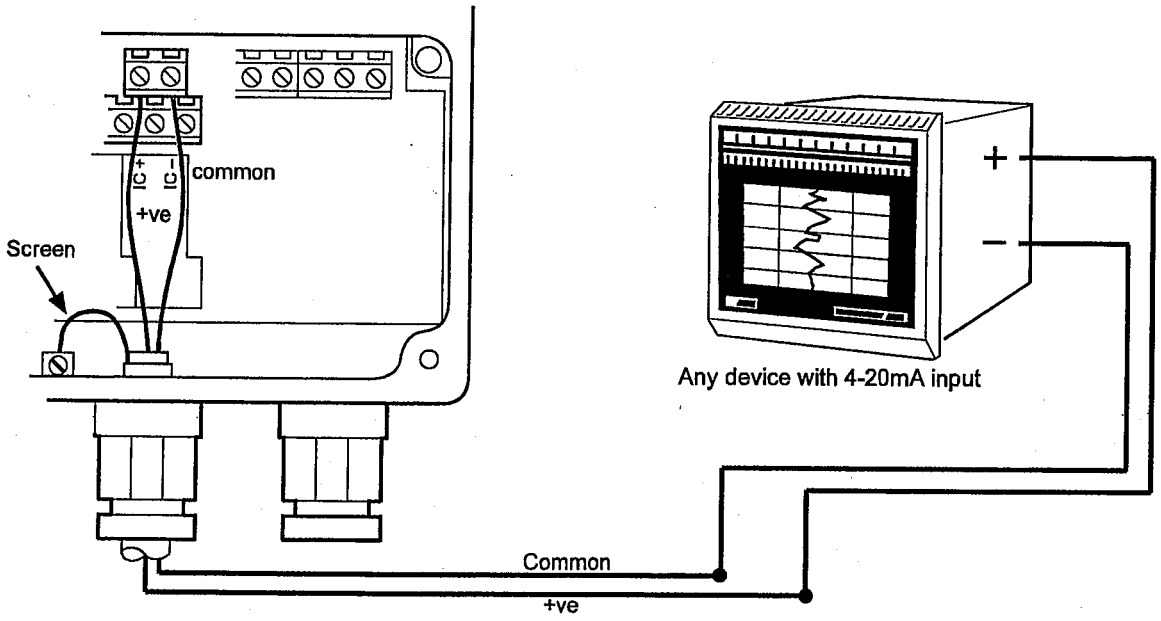
NOTE

Output is fully programmable (see ***Configuration***).

Output is electrically separated from all other Multi-Mag™ connections.

External isolators are not normally required and may significantly limit accuracy if used.

Maximum load resistance is 800Ω.



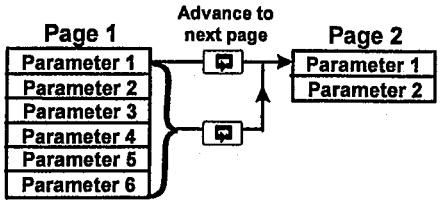
Current output connections: standard

Fuse replacement

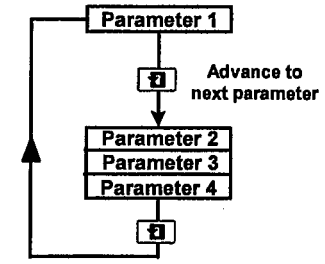
IMPORTANT
Disconnect AC power before checking fuses.

Component Ref.	MMI Part No.	Description	Supplier	Approvals	
				IEC	BS
F1-DC	180002102	FUSE 3.15A AS.T 20mm	SHURTER 034-3122	IEC 127/111	BS4265
			BUSSMAN S506/3.15A	IEC 127/111	UL BS4265
F1-AC	180002101	FUSE 500mA AS.T 20mm	SHURTER 034-3114	IEC 127/111	BS4265
			BUSSMAN S504/500mA	IEC 127/111	UL BS4265
			BUSSMAN S506/500mA	IEC 127/111	UL BS4265

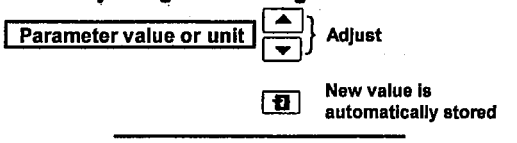
A - Advancing to Next Page



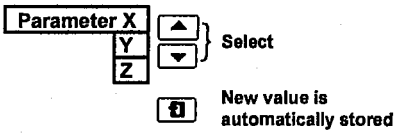
B- Moving Between Parameters



C - Adjusting and Storing a Parameter Value



D - Selecting and Storing a Parameter Choice



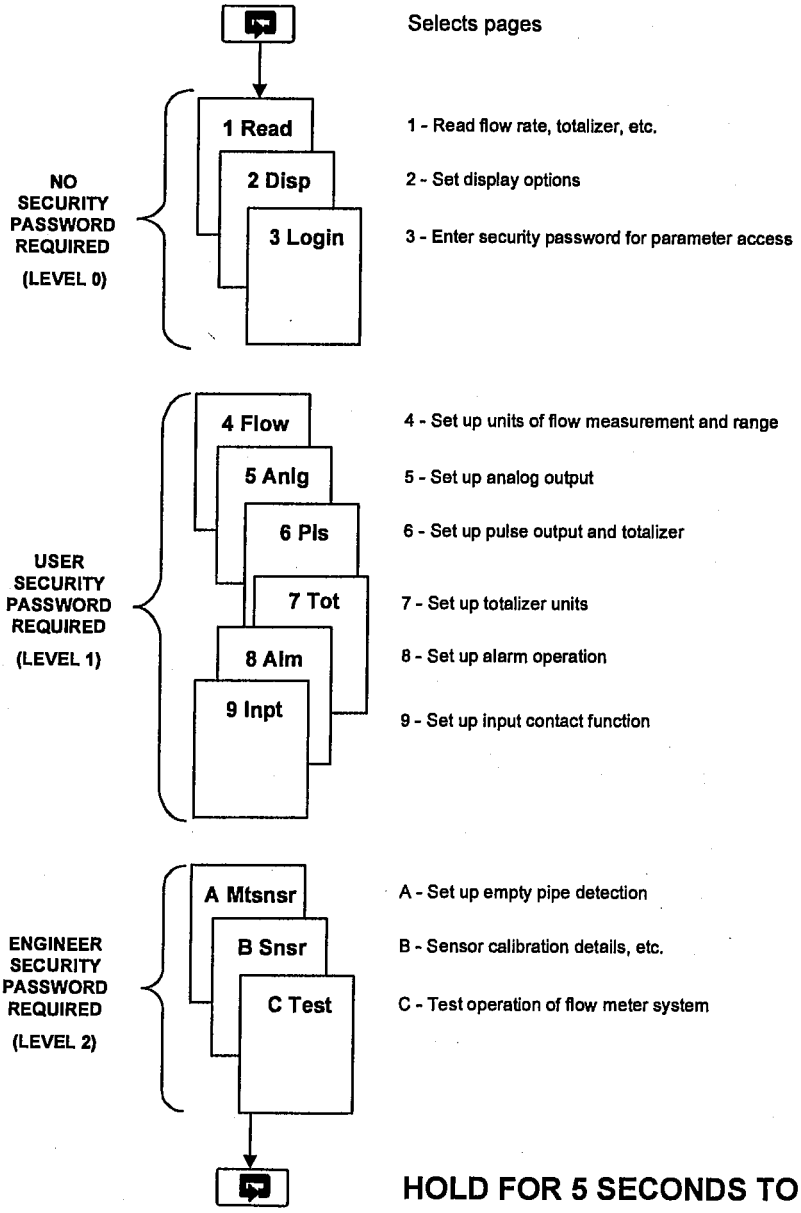
Installation and Operation: Multi-Mag™ Model 285 47

Getting started

The transmitter is delivered set up either with your chosen units, or set with our standard default values.

> ***WARNING!***
> Ensure plant safety while configuring at all times.

If you need to change the transmitter configuration for any reason, this may be done depressing the membrane switches on the front of the transmitter.



Access to secure parameters

A five-digit security code is used to prevent tampering with the secure parameters.

Security codes

A code number, between 00000 and 99999, must be entered to gain access to the secure parameters. A default user code of "00001" has been installed, but this may be changed if required with the "Login Key 1" parameter (see ***Menu layout***).

An engineer code (default 00002) is used to gain access to test procedures, security code settings, and parameters not essential at the user level. This code can be changed if required with the "Login Key 2" parameter (see ***Menu layout***).

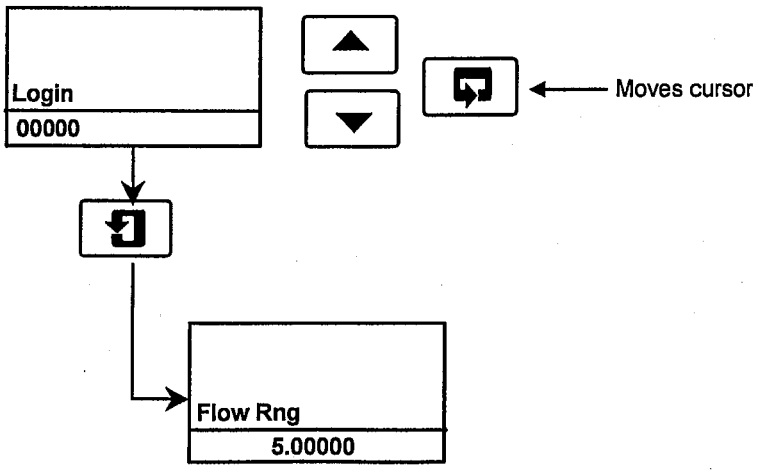
At the flashing cursor on the first digit of the login code number, press either ▲ or ▼ to reach the required digit. To set this digit and pass to the next digit, press ↵. Continue until all digits have been set, and depress ↵ to enter the complete code. If an incorrect value is entered, access to subsequent programming pages is prevented and the display reverts to the operating page.

Flow range parameter

Press ↵ to advance to the next parameter.

Press ↵ to advance to the next page.

These two switches are used to advance to all subsequent parameters and pages. If a parameter is changed, it is automatically stored on operation of the ↵ switch.

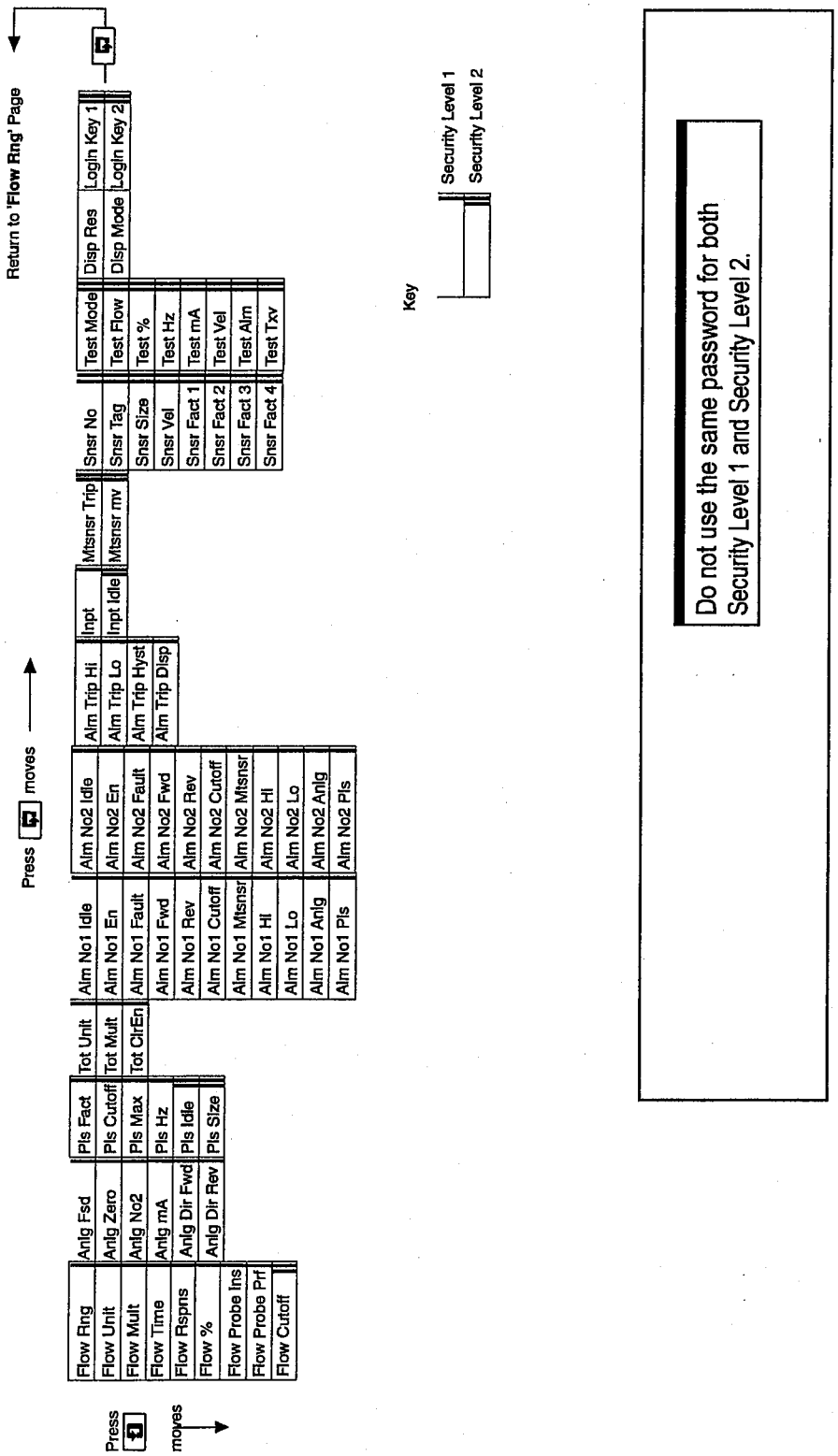


Do not use the same password for both Security Level 1 and Security Level 2.

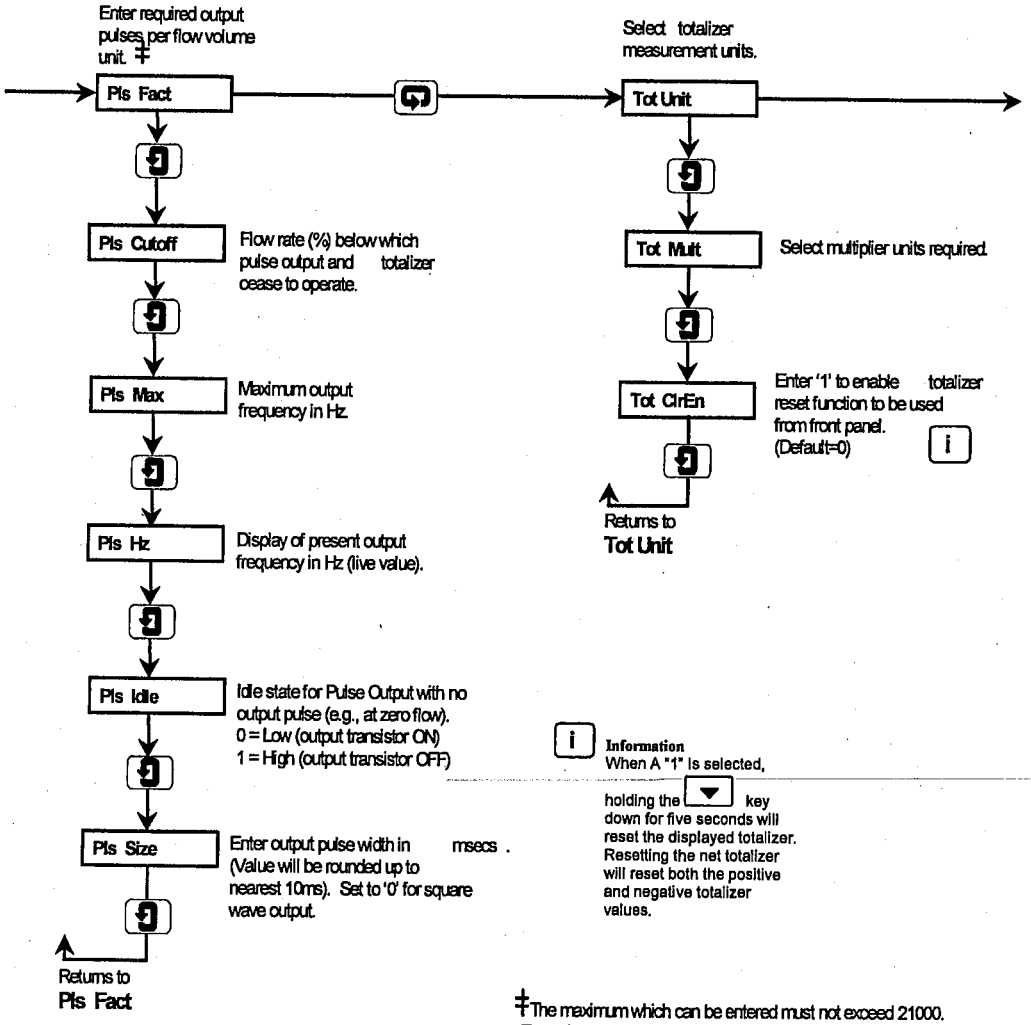
Installation and Operation: Multi-Mag™ Model 285 47

Menu layout

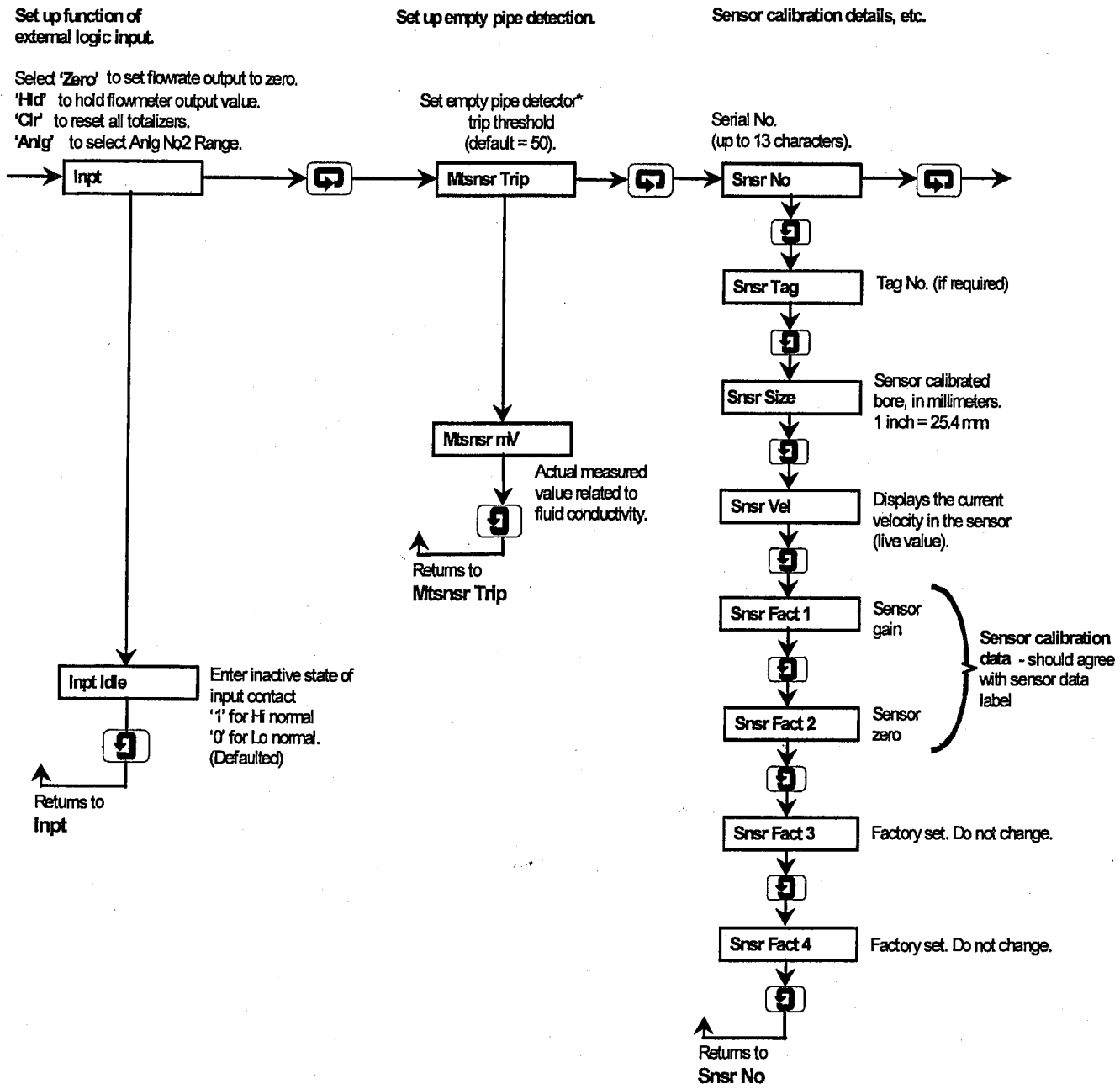
Below is a summary of all the parameters contained in the menu.



Desired Output	Flow Units	Flow Mult	Full Scale	PLS Fact
1 Pulse = 1000 Gal	UGal	x1	Don't care	.001
1 Pulse = 1000 Gal	UGal	k	Don't care	1.0
1 Pulse = 1000 Gal	UGal	m	Don't care	1000.0
800 Hz = Freq	UGal	x1	800 GPM	60



‡The maximum which can be entered must not exceed 21000. The value entered may be displayed with a small error in the decimal digits, e.g., 1.900 may be displayed as 1.899. This is a display characteristic and the value 1.900 will be used by the Multi- Mag .


Set up function of external logic input.
Select 'Zero' to set flowrate output to zero.
'Hld' to hold flowmeter output value.
'Clr' to reset all totalizers.
'Anlg' to select Anlg No2 Range.
Inpt
Inpt Idle
Enter inactive state of input contact
'1' for Hi normal
'0' for Lo normal.
(Defaulted)
Returns to Inpt
Set up empty pipe detection.
Set empty pipe detector* trip threshold (default = 50).
Mtsnsr Trip
Mtsnsr mV
Actual measured value related to fluid conductivity.
Returns to Mtsnsr Trip
Sensor calibration details, etc.
Serial No. (up to 13 characters).
Snsr No
Snsr Tag
Tag No. (if required)
Snsr Size
Sensor calibrated bore, in millimeters. 1 inch = 25.4 mm
Snsr Vel
Displays the current velocity in the sensor (live value).
Snsr Fact 1
Sensor gain
Snsr Fact 2
Sensor zero
Sensor calibration data - should agree with sensor data label
Snsr Fact 3
Factory set. Do not change.
Snsr Fact 4
Factory set. Do not change.
Returns to Snsr No

Faultfinding

A very powerful test mode, especially useful during commissioning and plant faultfinding, enables all external devices connected to the Model 285 to be tested over the full range of flow rates.

This mode can be used regardless of flow conditions at the sensor, or even with the sensor disconnected, and does not require the use of additional equipment.

> ***WARNING!***
>
> Observe all safety measures.
>
> Take all precautions to avoid risk to personnel, plant, and risk of explosion in hazardous areas.
>
> Do NOT open the transmitter main casing. There are no user serviceable parts or adjustments inside.
>
> Service access is restricted to the termination area.

Should the Model 285 fail to operate, first check the power supply, then the power supply connections and fuse located in the termination area. If necessary, replace the fuse with one of the correct rating.

Check that all external connections are made correctly.

Alarms

The transmitter has built-in diagnostics with alarm indications

The table below shows possible alarm indications, and the Faultfinding Flow Chart indicates checking procedures to find the problems causing the alarms.

Display	Alarm
MtSnsr	Empty sensor
Hi	High flow
Lo	Low flow
Anlg	Analog over range
Pls	Pulse frequency limited
Coil	Sensor coil open circuit
19, 20, 21	See Faultfinding Flow Chart

For method of interrogating the local display see ***Startup***.

Test mode

Select ***Engineer*** security level (see ***Access to secure parameters***). Set Test Mode parameter to "1" and enter an appropriate flow rate in the Test Flow parameter.

Output responses may now be viewed from the various test parameters (see ***Configuration*** for full details of operation).

Example:

Assume the flow range is 500 UGAL/MIN and 20 mA = 100% Flow (500 UGAL/MIN)

If 250 is entered as the test flow parameter then the 4-20 mA output will be set to 12 mA and all other outputs will indicate values appropriate for the test flow value.

Depressing the  switch for five seconds will cancel the test mode and return the unit to normal operation.

Appendix

Application Schematics

The purpose of the application schematics is to show different applications and the best sensor location for a particular application.

Clearance

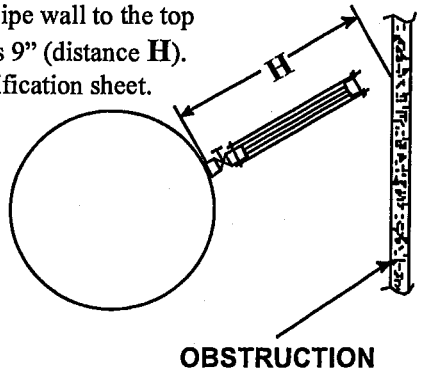
Because the sensor will protrude from the pipe when installed, a clearance length should be allowed. See Obstruction Diagram below and Sensor Specification Sheet on page 50.

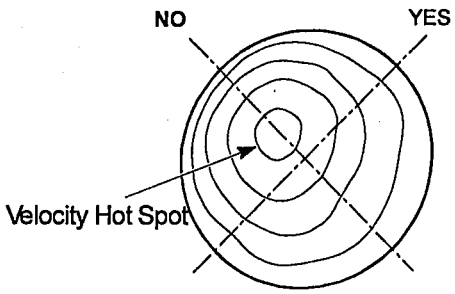
Skewed profiles

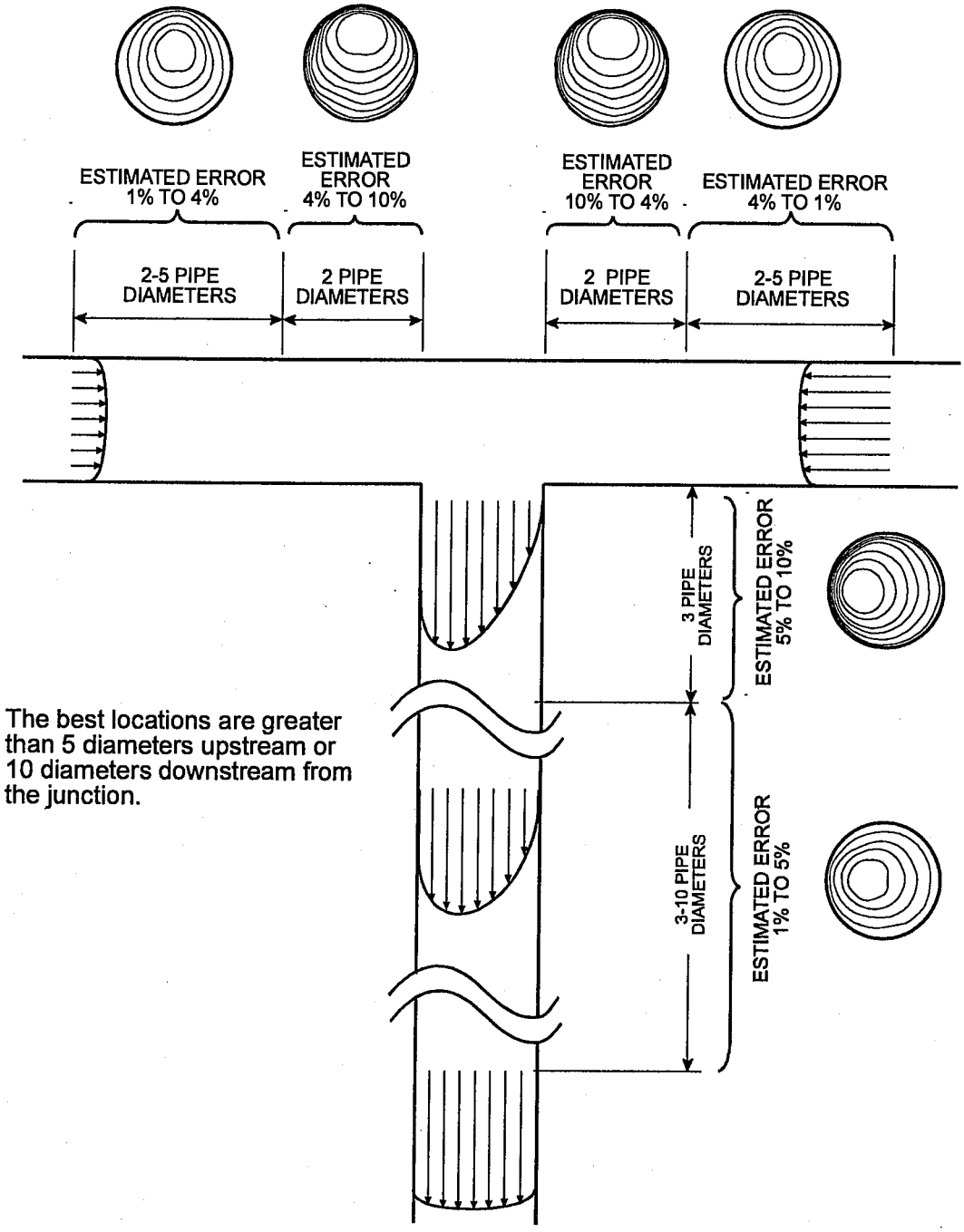
The sensor may not operate within specifications in a location where the profile is skewed These locations are indicated by an ESTIMATED ERROR notation in the application schematics. Errors are estimated for flow at +/-10 ft/sec (±3 m/sec). *If the velocity is less than ±10 ft/sec, the error will be less.*

To avoid velocity "hot" or "cold" spots, choose an insertion angle that is away from the hot spot.

Distance **H** must be at least the total sensor length plus the distance from the outer pipe wall to the top of the valve plus 9" (distance **H**). See sensor specification sheet.



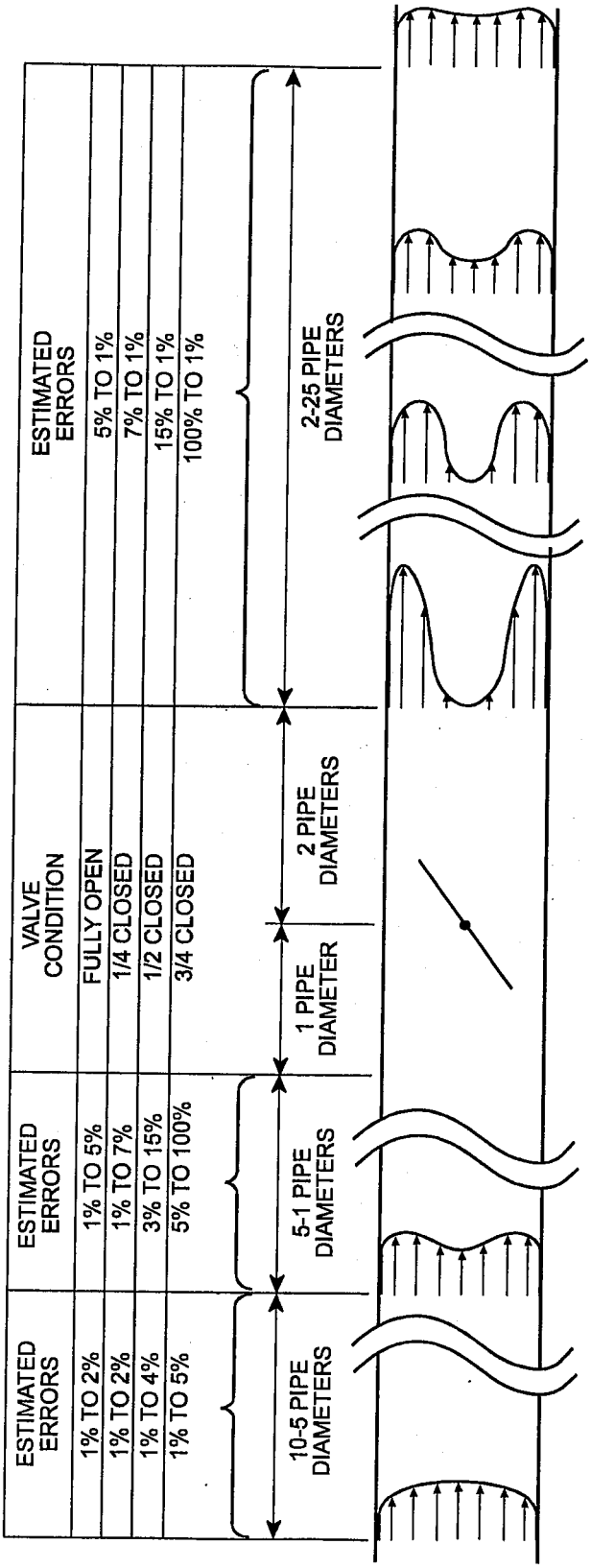


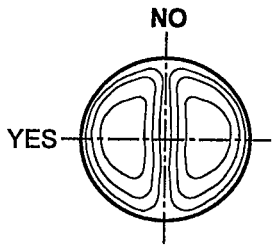


The best locations are greater than 5 diameters upstream or 10 diameters downstream from the junction.

T-Junction

(errors are estimated for flow at 10 ft/sec) (3 m/sec)



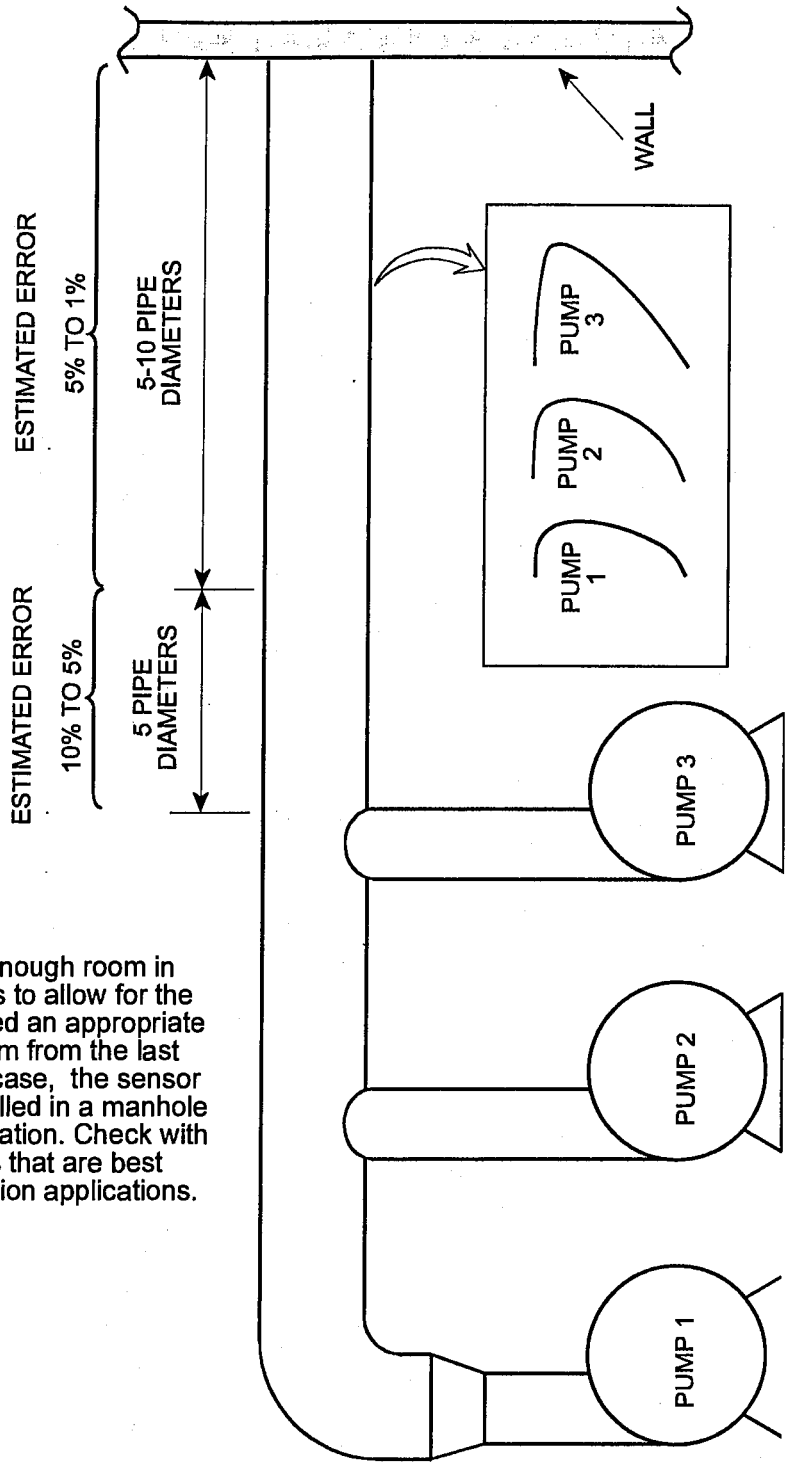


Recommended insertion angle for active valves.

The purpose of an active valve is to vary the flow. An active valve will produce a distorted profile that changes as the flow changes. As a result, the sensor should be installed at least 10 diameters upstream or 25 diameters downstream from an active valve to obtain 1% accuracy. The upstream side is the preferred location.

Active Valves

(errors are estimated for flow at 10 ft/sec)



There may not be enough room in some pump stations to allow for the sensor to be installed an appropriate distance downstream from the last pump. If this is the case, the sensor will have to be installed in a manhole outside the pump station. Check with MMI for instruments that are best suited for pump station applications.

Pump Station

(errors are estimated for flow at 10 ft/sec)

Specifications

Measurement
Volumetric flow in filled flow conduits 4" (101.6 mm) to 60" (1.5 m) utilizing insertable electromagnetic averaging sensor. Flow indication in English Std. or Metric units.
Contact factory for larger pipe sizes.

Flow Measurement
Method: Electromagnetic
Zero Stability: ±0.03 ft/s (±.009 m/s)
Range: +20 ft/s (+6 m/s) Pipe sizes under 24" (600 mm)
+10 ft/s (+3 m/s) Pipe sizes 24" to 42" (600 mm to 1m)
+7.5 ft/s (+2.3 m/s) Pipe sizes 43" to 60" (1m to 1.5m)
Contact factory for pipe sizes >60".(1.5m)
Accuracy: ±1% of reading from 0 to +20 ft/s + zero stability
Has reverse flow indication.
Linearity: 0.3% of range
Repeatability: 0.20% of range

Materials
Sensor: Fiberglass
Cable: Polyurethane outer jacket
Insertion Hardware: 316 stainless steel exposed to flow
Compression Seal: Silicone rubber
Sensor Electrodes: Carbon
4" to 5" probes (92 mm to 144 mm) have 2 electrode pairs
6" to 11" probes (145 mm to 299 mm) have 3 electrode pairs
12" to 60" probes (300 mm to 1.5m) have 5 electrode pairs

Transmitter Enclosure
NEMA 4X/IP65. Separate termination and electronics compartments. Glass filled polypropylene with clear polycarbonate cover.

Dimensions: 8.4"H x 6.4"W x 2.8"D
(214 mm x 163 mm x 70 mm)

Weight: 3.2 lbs. (1.5 kg)

Potable Water Applications
Suitable for use in contact with potable water. Water Byelaws Scheme (WBS) Approved Product. Meets BS6920 – Cert. #9706516.

Configuration and Set-Up
Programming can be easily done on site using the keypad. Two levels of user defined password protection are provided.

Outputs
Analog: Galvanically isolated and fully programmable for zero and full scale. Output capability <16V (800 ohm, 4-20 mA). Secondary range enabled by external input or programmed alarm condition as a percent of full scale.
Pulse/Frequency: One frequency/pulse output for flow rate or for external totalizer. Isolated protected transistor switch capable of sinking <250 mA @ <35V.

Dual Alarms
(2 separate outputs): Isolated protected transistor switch capable of sinking <250 mA @ <35V. Note: Not isolated from frequency output. Fully programmable for high/low flow rates. % of range, empty-pipe, fault conditions, forward/reverse, polarity (normally open/close), analog over-range, pulse over-range, pulse cutoff, etc.

Environmental
Pressure/temperature limits:
Sensor: Flow temperature range
Standard: 32° to 110°F (0° to 44°C) @ 250 psi
Optional: 32° to 175°F (0° to 80°C) @ 250 psi
Electronics: Temperature limits:
Operating: -14° to 140°F (-20° to 60°C)
Storage: 5° to 167°F (-15° to 75°C)

Electrical Connections
0.5 inch NPT with gasket seal

Keypad and Display
Can be used to access and change all setup parameters using four membrane keys and 3-line display.
3-line, 16 character, backlit LCD display with large 1/2" numerals for flow rate and two lines for engineering units, totalizers, alarm status, velocity and percent of range.

Isolation
Galvanic separation to 50VDC between analog, pulse/alarm, and earth/ground.

Electrical Safety
Meets ANSI/ISA-S82.10-1988 and S82.03-1988.

Power Supply
Universal switch mode.
AC: 85 to 265V 45 to 400 Hz at 20VA max. or DC: 11 to 40V at 20VA max. AC or DC must be specified at time of ordering.

Vibration Specification
Meets BS2011: Part 2.1Fc: 1983

Internal Totalizer
9-digit totalizer. Can be programmed to reset via external input or the keypad. Reset from keypad can be password protected.

Test Mode and Output Circuit Loop Verification
After transmitter has been programmed, operation of the test mode will drive all outputs to programmed value, providing a total system test.

Ordering Information
Multi-Mag™ flowmeter includes modified NEMA 4X/IP65 (separate termination and electronics compartment) glass filled polypropylene electronics enclosure with polycarbonate window, electromagnetic velocity sensor with 20' cable, 4 membrane keys for configuring the transmitter, 3-line LCD backlit display with one line of 5-1/2" numerals for flow rate indication and 2 lines containing 16 characters for viewing engineering units, velocity, totalizer, alarm status and flow rate expressed as a percent of full scale, one flow proportional contact closure or frequency output, one 4-20mA output of flow rate and one instruction manual.

Options include high temperature sensor, extended sensor cable (maximum length 500'), pole mounting kit, insertion tool, sun shield, and additional instruction manuals.

Contact factory for sensor mounting hardware ordering information.

Spare parts list

	Part Number
F1-AC, 500mm fuse for AC unit	180002101
F1-DC, 3.15A fuse for DC unit	180002102

Option parts list

	Part Number
Installation and Operation Manual	105004101
Sensor insertion tool	75031
Additional 1/2" NPT cable glands (.187/.250 O.D.)	92125
Sun shield	0624B339001
Pole mounting kit	245000801
Sensor cable (specify length up to 300')	36001
High temperature sensor	SPECIAL

Marsh Multi-Mag
285

Davis
951 652 6811 ext 5359

05W0160S7

Tech

Table of Decimal Equivalents

Fraction	Decimal
1/8	.125
1/4	.25
3/8	.375
1/2	.5
5/8	.625
3/4	.75
7/8	.875

Table of Conversions

Multiply	By	To Get
Centimeters	0.3937	Inches
Centimeters	0.03281	Feet
Inches	25.4	Millimeters
Feet	30.48	Centimeters
Sq. Ft.	144.0	Sq. In
Sq. In	0.006944	Sq. Ft.
Cu. In	0.0005787	Cu. Ft.
Cu. Ft.	7.481	Gallons
Cu. Ft.	1728.0	Cu. In
Cu. Ft.	0.02832	Cu. Meters
Cu. Ft.	28.32	Liters
Cu. Meters	35.31	Cu. Ft.
Cu. Meters	264.2	Gallons
US Gallons	3.785	Liters
US Gallons	0.1337	Cu. Ft.
US Gallons	0.003785	Cu. Meters
US Gallons	.8326748	Imperial Gallons
Liters	0.2642	Gallons
°F = (°C x 9/5) + 32	°C = (°F -32) x 5/9	