Ministry of Public Works

Department of Works and Engineering

Request for Quotations

For

Operation & Maintenance of Tynes Bay Seawater Treatment Facility

Request for Quotations No.: **50/207/21 O&M Contract**

Issued: **Monday November 30, 2020**

Submission Deadline**: Friday January 15, 2021 03:00:00 PM AST**

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ANNEX I – LOCAL BENEFITS

PART 1 – INVITATION AND SUBMISSION INSTRUCTIONS

1.1 Invitation to Respondents

This Request for Quotations (the "RFQ") is an invitation by the Government of Bermuda (the "Government") to prospective respondents to submit non-binding quotations for **Operation & Maintenance of Tynes Bay Seawater Treatment Facility,** as further described in Section A of the RFQ Particulars (Appendix D) (the "Deliverables").

The Government of Bermuda as represented by the Ministry of Public Works is requesting proposals for the Operation, Maintenance and Repair of the Tynes Bay Seawater Treatment Facility and its adjacent ancillary facilities (herein after referred to as the *Affected Property*).

The *Affected Property* at 56 North Shore Road, Devonshire, was completed in two phases to have the ability to produce 1,000,000 imperial gallons per day of Potable Drinking Water from seawater. The seawater is extracted from well head pumping stations adjacent to the property. As part of this contract the respondent is required to submit a lump sum fee to install and commission a replacement Programmable Logic Control System for the *Affected Property*. The *Affected Property* is operated on-demand as directed by the Ministry based on public demand on the water distribution system. The *Affected Property* is powered by the Tynes Bay Waste-to-Energy Facility and there is also a backup generator on site.

1.2 RFQ Contact

For the purposes of this procurement process, the "RFQ Contact" will be:

Mr. J. Tarik Christopher at email tjchristopher@gov.bm

Respondents and their representatives are not permitted to contact any employees, officers, agents, elected or appointed officials or other representatives of the Government, other than the RFQ Contact, concerning matters regarding this RFQ. Failure to adhere to this rule may result in the disqualification of the respondent and the rejection of the respondent's quotation.

Respondents that download this file and intend to respond to this RFQ are required to register their interest with the RFQ Contact by emailing their company name and contact information to

Mr. J. Tarik Christopher at email tjchristopher@gov.bm

prior to the Submission Deadline noted in the RFQ Timetable below.

Amendment/addenda (if any) will be posted at https://www.gov.bm/procurement-notices. Respondents should visit the Government Portal on a regular basis during the procurement process.

1.3 Type of Contract for Deliverables

The selected respondent will be requested to enter into a contract for the provision of the Deliverables on the terms and conditions set out in the Form of Agreement (Appendix A) (the "Agreement"). It is the Government's intention to enter into a contract with only one (1) legal entity.

The term of the contract is to be for a period of 3 Years, with an option in favour of the Government to extend the contract terms and conditions acceptable to the Government and the selected respondent for an additional term of up to 2 Years .

Joint submissions are acceptable however if a joint submission is made, the submission must clearly indicate which party will act as the prime contractor.

1.4 RFQ Timetable

Issue Date of RFQ	Monday November 30, 2020
Pre-Bid / Site Meeting	Monday December 14, 2020
Deadline for Questions	Monday January 04, 2020 4:00 PM
Deadline for Issuing Addenda	Friday January 08, 2020 4:00 PM
Submission Deadline	Friday January 15, 2021 03:00:00 PM
Anticipated Execution of Agreement	Thursday April 01, 2021

All times listed are in Atlantic Standard Time (AST). The RFQ timetable is tentative only, and may be changed by the Government at any time. For greater clarity, business days means all days that the Government is open for business.

The respondent's designated representative is invited to attend a pre-bid meeting and site visit. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage of the procurement.
The respondent is requested, as far as possible, to submit any questions in writing, to reach the RFP Contact not later than one week before the meeting.
Non-attendance at the pre-bid meeting will not be a cause for disqualification of a respondent but it will adversely affect the evaluation of the bid.
The Pre-bid meeting will take place
Date: Monday December 14, 2020
Time: 10:00 am
Place: Tyne's Bay Seawater Treatment Facility, Northshore Rd, Devonshire

1.5 Submission of Quotations

1.5.1 Quotations to be Submitted at Prescribed Location

Quotations may be submitted to:

Tender Box at the Ministry of Public Works,

Located on the 3rd Floor, General Post Office Building,

56, Church Street, Hamilton, HM12, Bermuda.

Responses should be labeled “RFQ for Operation & Maintenance of Tynes Bay Seawater Treatment Facility” and include a statement of interest and information as requested in the description of requirements and output.

Electronic mail (E-Mail) submissions are accepted at water@gov.bm.

If documents are larger than ten (10) MB, please send them within a zip file.

In the subject line of the email, please state “RFQ for Operation & Maintenance of Tynes Bay Seawater Treatment Facility”. Please ensure to send a copy of your proposal in Adobe or equivalent PDF format.

1.5.2 Quotations to be Submitted on Time

Quotations must be submitted at the location set out above on or before the Submission Deadline. Quotations submitted after the Submission Deadline will be rejected. Onus and responsibility rest solely with the respondent to deliver its quotation to the exact location (including floor, if applicable) indicated in the RFQ on or before the Submission Deadline. The Government does not accept any responsibility for submissions delivered to any other location by the Respondent or its delivery agents. Respondents are advised to make submissions well before the deadline. Respondents making submissions near the deadline do so at their own risk.

1.5.3 Quotations to be Submitted in Prescribed Format

Respondents shall submit 2 original signed hard copies of their quotation or one (1) electronic copy (e-copy) in Adobe or equivalent PDF format. If both a hard copy and e-copy of the quotation is submitted and there is a conflict or inconsistency between the hard copy and the e-copy of the quotation, the hard copy of the quotation will prevail. Quotations should be submitted in a sealed package and prominently marked with the RFQ title and number (see RFQ cover) and will not be opened until Friday January 15, 2021 03:00:00 PM. The full legal name and return address of the respondent should be marked on the package as well.

1.5.4 Amendment of Quotations

Respondents may amend their quotations prior to the Submission Deadline by submitting the amendment in a sealed package prominently marked with the RFQ title and number and the full legal name and return address of the respondent to the location set out above. Any amendment

should clearly indicate which part of the quotation the amendment is intended to amend or replace.

1.5.5 Withdrawal of Quotations

At any time throughout the RFQ process until the execution of a written agreement for provision of the Deliverables, a respondent may withdraw a submitted quotation. To withdraw a quotation, a notice of withdrawal must be sent to the RFQ Contact and must be signed by an authorized representative of the respondent. The Government is under no obligation to return withdrawn quotations.

[End of Part 1]

PART 2 – EVALUATION AND AWARD

2.1 Stages of Evaluation

The Government will conduct the evaluation of quotations in the following stages:

2.2 Stage I – Mandatory Submission Requirements

Stage I will consist of a review to determine which quotations comply with all of the mandatory submission requirements. Quotations that fail to satisfy the mandatory submission requirements will be rejected. The mandatory submission requirements are listed in Section C of the RFQ Particulars (Appendix D).

2.3 Stage II – Evaluation

Stage II will consist of the following two sub-stages:

2.3.1 Mandatory Technical Requirements

The Government will review the quotations to determine whether the mandatory technical requirements as set out in Section D of the RFQ Particulars (Appendix D) have been met. Questions or queries on the part of the Government as to whether a quotation has met the mandatory technical requirements will be subject to the verification and clarification process set out in Part 3.

2.3.2 Rated Criteria

The Government will evaluate each qualified quotation on the basis of the rated criteria as set out in Section F of the RFQ Particulars (Appendix D).

2.4 Stage III – Pricing

Stage III will consist of a scoring of the submitted pricing in each qualified quotation in accordance with the price evaluation method set out in Pricing (Appendix C). The evaluation of price will be undertaken after the evaluation of mandatory requirements and rated criteria has been completed.

2.5 Selection of Top-Ranked Respondent

After the completion of Stage III, all scores from Stage II and Stage III will be added together and respondents will be ranked based on their total scores. Subject to the process rules contained in the Terms and Conditions of the RFQ Process (Part 3), the top-ranked respondent will be invited to enter into the Agreement in accordance with Part 3. In the event of a tie, the selected respondent will be the respondent selected by way of the lowest price. The selected respondent will be notified in writing and will be expected to satisfy any applicable conditions of this RFQ, including the pre-conditions of award listed in Section E of the RFQ Particulars (Appendix D), and enter into the Agreement within the timeframe specified in the selection notice. Failure to do so may result in the disqualification of the respondent and the selection of another respondent or the cancellation of the RFQ.

[End of Part 2]

PART 3 – TERMS AND CONDITIONS OF THE RFQ PROCESS

3.1 General Information and Instructions

3.1.1 Respondents to Follow Instructions

Respondents should structure their quotations in accordance with the instructions in this RFQ. Where information is requested in this RFQ, any response made in a quotation should reference the applicable section numbers of this RFQ.

3.1.2 Quotations in English

All quotations must be written in the English language only.

3.1.3 No Incorporation by Reference

The entire content of the respondent's quotation should be submitted in a fixed form, and the content of websites or other external documents referred to in the respondent's quotation but not attached will not be considered to form part of its quotation.

3.1.4 References and Past Performance

In the evaluation process, the Government may include information provided by the respondent's referees and may also consider the respondent's past performance or conduct on previous contracts with the Government or other institutions.

3.1.5 Information in RFQ Only an Estimate

The Government and its advisers make no representation, warranty or guarantee as to the accuracy of the information and empirical data contained in this RFQ or issued by way of addenda. Any quantities shown or data contained in this RFQ or provided by way of addenda are estimates only, and are for the sole purpose of indicating to respondents the general scale and scope of the Deliverables. It is the respondent's responsibility to obtain all the information necessary to prepare a quotation in response to this RFQ.

3.1.6 Respondents to Bear Their Own Costs

The respondent will bear all costs associated with or incurred in the preparation and presentation of its quotation, including, if applicable, costs incurred for interviews, travel or demonstrations.

3.1.7 Quotation to be Retained by the Government

The Government will not return the quotation or any accompanying documentation submitted by a respondent.

3.1.8 No Guarantee of Volume of Work or Exclusivity of Contract

The Government makes no guarantee of the value or volume of work to be assigned to the successful respondent. The contract with the selected respondent will not be an exclusive contract

for the provision of the described Deliverables. The Government may contract with others for goods and services the same as or similar to the Deliverables or may obtain such goods and services internally.

3.1.9 Equivalency

When proprietary names, brands, catalogues or reference numbers are specified in the Deliverables, they are intended to set a minimum standard, and preference for any particular material or equipment is not intended. The respondent may offer material or equipment of similar characteristics, type, quality, appearance, finish, method of construction and performance and if doing so must disclose any difference in the characteristics, type, quality, appearance, finish, method of construction or performance of the material or equipment.

3.2 Communication after Issuance of RFQ

3.2.1 Respondents to Review RFQ

Respondents shall promptly examine all of the documents comprising this RFQ, and

(a) shall report any errors, omissions or ambiguities; and

(b) may direct questions or seek additional information

in writing by email to the RFQ Contact on or before the Deadline for Questions. All questions or comments submitted by respondents by email to the RFQ Contact shall be deemed to be received once the email has entered into the RFQ Contact's email inbox. No such communications are to be directed to anyone other than the RFQ Contact. The Government is under no obligation to provide additional information, and the Government shall not be responsible for any information provided by or obtained from any source other than the RFQ Contact. It is the responsibility of the respondent to seek clarification from the RFQ Contact on any matter it considers to be unclear. The Government shall not be responsible for any misunderstanding on the part of the respondent concerning this RFQ or its process.

3.2.2 All New Information to Respondents by Way of Addenda

This RFQ may be amended only by addendum in accordance with this section. If the Government, for any reason, determines that it is necessary to provide additional information relating to this RFQ, such information will be communicated to all respondents by addendum. All Addenda will be published online at https://www.gov.bm/procurement-notices. Each addendum forms an integral part of this RFQ and may contain important information, including significant changes to this RFQ. Respondents are responsible for obtaining all addenda issued by the Government. In the Submission Form (Appendix B), respondents should confirm their receipt of all addenda by setting out the number of each addendum in the space provided.

3.2.3 Post-Deadline Addenda and Extension of Submission Deadline

If the Government determines that it is necessary to issue an addendum after the Deadline for Issuing Addenda, the Government may extend the Submission Deadline.

3.2.4 Verify, Clarify and Supplement

When evaluating quotations, the Government may request further information from the respondent or third parties in order to verify, clarify or supplement the information provided in the respondent's quotation. This information may include, without limitation, clarification with respect to whether a quotation meets the mandatory technical requirements set out in Section C of the RFQ Particulars (Appendix D). The response received by the Government shall, if accepted by the Government, form an integral part of the respondent's quotation. The Government may revisit, re-evaluate and rescore the respondent's response or ranking on the basis of any such information.

3.3 Notification and Debriefing

3.3.1 Notification to Other Respondents

Once the Agreement is executed by the Government and a respondent, the other respondents may be notified directly in writing of the outcome of the procurement process.

3.3.2 Debriefing

Respondents may request a debriefing after receipt of a notification of the outcome of the procurement process. All requests must be in writing to the RFQ Contact and must be made within sixty (60) days of such notification.

3.3.3 Procurement Protest Procedure

If a respondent wishes to challenge the RFQ process, it should provide written notice to the RFQ Contact in accordance with the Government's Procurement Protest procedures. The notice must provide detailed explanation of the respondent's concern with the procurement process or its outcome.

3.4 Conflict of Interest and Prohibited Conduct

3.4.1 Conflict of Interest

For the purposes of this RFQ, the term "Conflict of Interest" includes, but is not limited to, any situation or circumstance where:

(a) in relation to the RFQ process, the respondent has an unfair advantage or engages in conduct, directly or indirectly, that may give it an unfair advantage, including but not limited to (i) having, or having access to, confidential information of the Government in the preparation of its quotation that is not available to other respondents, (ii) communicating with any person with a view to influencing preferred treatment in the RFQ process (including but not limited to the lobbying of decision makers involved in the RFQ process), or (iii) engaging in conduct that compromises, or could be seen to compromise, the integrity of the open and competitive RFQ process or render that process non-competitive or unfair; or

(b) in relation to the performance of its contractual obligations under a contract for the Deliverables, the respondent's other commitments, relationships or financial interests (i)

could, or could be seen to, exercise an improper influence over the objective, unbiased and impartial exercise of its independent judgement, or (ii) could, or could be seen to, compromise, impair or be incompatible with the effective performance of its contractual obligations.

3.4.2 Disqualification for Conflict of Interest

The Government may disqualify a respondent for any conduct, situation or circumstances, determined by the Government, in its sole and absolute discretion, to constitute a Conflict of Interest as defined above.

3.4.3 Disqualification for Prohibited Conduct

The Government may disqualify a respondent, rescind notice of selection or terminate a contract subsequently entered into if the Government determines that the respondent has engaged in any conduct prohibited by this RFQ.

3.4.4 Prohibited Respondent Communications

Respondents must not engage in any communications that could constitute a Conflict of Interest and should take note of the Conflict of Interest declaration set out in the Submission Form (Appendix B).

3.4.5 Respondent Not to Communicate with Media

Respondents must not at any time directly or indirectly communicate with the media in relation to this RFQ or any agreement entered into pursuant to this RFQ without first obtaining the written permission of the RFQ Contact.

3.4.6 No Lobbying

Respondents shall not in relation to this RFQ or the evaluation and selection process, engage directly or indirectly in any form of political action or other activity whatsoever to influence or attempt to influence Parliament, the Government, or to influence or attempt to influence any legislative or regulatory action, in the selection or evaluation of any respondent.

3.4.7 Illegal or Unethical Conduct

Respondents must not engage in any illegal business practices, including activities such as bid-rigging, price-fixing, bribery, fraud, coercion or collusion. Respondents must not engage in any unethical conduct, including lobbying, as described above, or other inappropriate communications; offering gifts to any employees, officers, agents, elected or appointed officials or other representatives of the Government; deceitfulness; submitting quotations containing misrepresentations or other misleading or inaccurate information; or any other conduct that compromises or may be seen to compromise the competitive process provided for in this RFQ.

3.4.8 Past Performance or Past Conduct

The Government may prohibit a supplier from participating in a procurement process based on past performance or based on inappropriate conduct in a prior procurement process, including but not limited to the following:

(a) illegal or unethical conduct as described above;

(b) the refusal of the supplier to honour its submitted pricing or other commitments; or

(c) any conduct, situation or circumstance determined by the Government, in its sole and absolute discretion, to have constituted an undisclosed Conflict of Interest.

3.4.9 No Collusion

Respondents must not engage in any collusion and must sign the certificate as set out in the Certificate of Confirmation of Non-Collusion (Appendix E).

3.5 Confidential Information

3.5.1 Confidential Information of the Government

All information provided by or obtained from the Government in any form in connection with this RFQ either before or after the issuance of this RFQ

(a) is the sole property of the Government and must be treated as confidential;

(b) is not to be used for any purpose other than replying to this RFQ and the performance of any subsequent contract for the Deliverables;

(c) must not be disclosed without prior written authorization from the Government; and

(d) must be returned by the respondent to the Government immediately upon the request of the Government.

3.5.2 Confidential Information of Respondent

A respondent should identify any information in its quotation or any accompanying documentation supplied in confidence for which confidentiality is to be maintained by the Government. The confidentiality of such information will be maintained by the Government, except as otherwise required by the Public Access to Information Act 2010 or by order of a court or tribunal. Respondents are advised that their quotations will, as necessary, be disclosed, on a confidential basis, to advisers retained by the Government to advise or assist with the RFQ process, including the evaluation of quotations. If a respondent has any questions about the collection and use of personal information pursuant to this RFQ, questions are to be submitted to the RFQ Contact.

3.6 Procurement Process Non-Binding

3.6.1 No Process Contract

This RFQ is a request for quotes only and participation in this RFQ is not intended to create legal obligations between the Government and any of the respondents or their representatives. For greater certainty and without limitation:

(a) Participation in this RFQ will not give rise to any preliminary contract or collateral contract;

(b) No respondent shall have any claim for any compensation of any kind whatsoever (whether in a contract, tort, law, equity or otherwise), as a result of participating in this RFQ, and by submitting a quotation each respondent shall be deemed to have agreed that it has no claim against the Government;

(c) The decision to award or not to award a contract to any respondent is at the discretion of the Government. The Government shall have no liability to any respondent with respect to the awarding of contract or the failure to award a contract to any respondent. Respondents acknowledge that the respondent that submits the quotation with the lowest price might not be awarded a contract.

3.6.2 No Contract until Execution of Written Agreement

This RFQ process is intended to solicit non-binding quotations for consideration by the Government and may result in an invitation by the Government to a respondent to enter into the Agreement. No legal relationship or obligation regarding the procurement of any good or service will be created between the respondent and the Government by this RFQ process until the execution of a written agreement for the acquisition of such goods and/or services.

3.6.3 Non-Binding Price Estimates

While the pricing information provided in quotations will be non-binding prior to the execution of a written agreement, such information will be assessed during the evaluation of the quotations and the ranking of the respondents. Any inaccurate, misleading or incomplete information, including withdrawn or altered pricing, could adversely impact any such evaluation or ranking or the decision of the Government to enter into an agreement for the Deliverables.

3.6.4 Cancellation

The Government may cancel or amend the RFQ process without liability at any time. Cancellation may occur, for example, if:

- where no qualitatively or financially worthwhile offer has been received or there has been no valid response at all;
- the economic or technical parameters of the project have changed fundamentally;
- exceptional circumstances or force majeure render normal implementation of the project impossible;
- all offers exceed the financial resources available, or are otherwise inconsistent with the principles of economy, efficiency and effectiveness; or

- where irregularities require cancellation in the interest of fairness.

The publication of a procurement notice does not commit the Government to implement the programme or project announced.

3.7 Governing Law and Interpretation

These Terms and Conditions of the RFQ Process (Part 3):

(a) are intended to be interpreted broadly and independently (with no particular provision intended to limit the scope of any other provision);
(b) are non-exhaustive and must not be construed as intending to limit the pre-existing rights of the parties to engage in pre-contractual discussions in accordance with the common law governing direct commercial negotiations; and
(c) are to be governed by and construed in accordance with the laws of Bermuda applicable therein.

[End of Part 3]

APPENDIX A – FORM OF AGREEMENT

See Annex A - NEC3 Term Service Contract

APPENDIX B – SUBMISSION FORM

1. Respondent Information

Please fill out the following form, naming one person to be the respondent's contact for the RFQ process and for any clarifications or communication that might be necessary.	
Full Legal Name of Respondent or Personal/Given Name:	
Representative Name (Person with Signing Authority) / Title:	
Any Other Relevant Name under which Respondent Carries on Business:	
Street Address:	
City, Province/State, Parish:	
Country	
Postal Code:	
Phone Number with Area Code:	
*Respondent's Social Insurance Number issued by the Government of Bermuda:	
*Respondent's Payroll Tax Number issued by the Government of Bermuda:	
Company Website (if any):	
Respondent Contact Name and Title:	
Respondent Contact Phone:	
Respondent Contact Fax:	
Respondent Contact Email:	

* Not Required for Companies located outside of Bermuda

2. Acknowledgment of Non-Binding Procurement Process

The respondent acknowledges that the RFQ process will be governed by the terms and conditions of the RFQ, and that, among other things, such terms and conditions confirm that this procurement process does not constitute a formal, legally binding bidding process (and for greater certainty, does not give rise to a Process Contract), and that no legal relationship or obligation regarding

the procurement of any good or service will be created between the Government and the respondent unless and until the Government and the respondent execute a written agreement for the Deliverables.

3. Ability to Provide Deliverables

The respondent has carefully examined the RFQ documents and has a clear and comprehensive knowledge of the Deliverables required. The respondent represents and warrants its ability to provide the Deliverables in accordance with the requirements of the RFQ for the rates set out in its quotation.

4. Non-Binding Pricing

The respondent has submitted its pricing in accordance with the instructions in the RFQ and in Pricing (Appendix C) in particular. The respondent confirms that the pricing information provided is accurate. The respondent acknowledges that any inaccurate, misleading or incomplete information, including withdrawn or altered pricing, could adversely impact the acceptance of its quotation or its eligibility for future work.

5. Addenda

The respondent is requested to confirm that it has received all addenda by listing the addenda numbers, _____to _____ (if applicable) issued by the Government, or if no addenda were issued by the Government write the word "None". The onus is on respondents to make any necessary amendments to their quotations based on the addenda. The respondent confirms it has read, received and complied with these addendums. Respondents who fail to complete this section will be deemed to have received all posted addenda.

6. No Prohibited Conduct

The respondent declares that it has not engaged in any conduct prohibited by this RFQ.

7. Conflict of Interest

Respondents must declare all potential Conflicts of Interest, as defined in section 3.4.1 of the RFQ. This includes disclosing the names and all pertinent details of all individuals (employees, advisers, or individuals acting in any other capacity) who (a) participated in the preparation of the quotation; **AND** (b) were employees of the Government within twelve (12) months prior to the Submission Deadline.

If the box below is left blank, the respondent will be deemed to declare that (a) there was no Conflict of Interest in preparing its quotation; and (b) there is no foreseeable Conflict of Interest in performing the contractual obligations contemplated in the RFQ.

Otherwise, if the statement below applies, check the box.

- ❑ The respondent declares that there is an actual or potential Conflict of Interest relating to the preparation of its quotation, and/or the respondent foresees an actual or potential Conflict of Interest in performing the contractual obligations contemplated in the RFQ.

If the respondent declares an actual or potential Conflict of Interest by marking the box above, the respondent must set out below details of the actual or potential Conflict of Interest:

8. Disclosure of Information

Any information collected or used by or on behalf of the Government under this solicitation document is subject to the Public Access to Information Act 2010 ("Act"). The information belongs to a class of information that might be made available to the general public unless it is contained in a record that is exempt from disclosure under the Act. Any questions regarding the collection, use, or disclosure of the information should be directed to the public authority that issued this solicitation document.

Signature of Witness

Signature of Respondent Representative

Name of Witness

Name of Respondent Representative

Title of Respondent Representative

Date

I have the authority to bind the respondent.

APPENDIX C – PRICING

1. Instructions on How to Provide Pricing

(a) Respondents should provide the information requested under section 3 below ("Required Pricing Information") by reproducing and completing the table below in their quotations, or, if there is no table below, by completing the attached form and including it in their quotations.

(b) Pricing must be provided in Bermuda funds, inclusive of all applicable duties and taxes.

(c) Pricing quoted by the respondent must be all-inclusive and must include all labour and material costs, all travel and carriage costs, all insurance costs, all costs of delivery, all costs of installation and set-up, including any pre-delivery inspection charges, and all other overhead, including any fees or other charges required by law.

2. Evaluation of Pricing

Pricing is worth 25 points of the total score.

Unless stated otherwise in the RFQ documents, the Agreement shall be for the whole works as detailed in these documents and based on the completed pricing information, as submitted by the respondent.

The respondent shall fill in separate prices for all items of works described in the Price Breakdown. Items against which no price is entered by the Respondent will not be paid for by the Government when executed and shall be deemed covered by the other lump sum prices in the Price Breakdown.

Pricing will be scored based on a relative pricing formula using the rates set out in the pricing form. Each respondent will receive a percentage of the total possible points allocated to price for the particular category it has bid on, which will be calculated in accordance with the following formula:

Lowest Price divide by Respondent's Price times weighting = Respondent's pricing points.

In addition to any rights to verify, clarify and supplement,

(a) The Government will examine the responses to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed, and whether the bids are generally in order.

(b) Arithmetical errors will be rectified on the following basis:

  (i) Where there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If the respondent does not accept the correction of errors, its Bid will be rejected. If there is a discrepancy between words and figures the amount in words will prevail;

  (ii) Where there is a discrepancy between the amounts in figures and in words, the amounts in words will govern; and

(iii) Where there is a discrepancy between the individual lump sums and the total amounts derived for the sum of the individual lump sum, the individual lump sum as quoted will govern, and the total amount will be corrected.

3. Required Pricing Information

See Annex B - Pricing

APPENDIX D – RFQ PARTICULARS

A. THE DELIVERABLES

Operation costs for 24hr continuous production

The service will operate under a NEC3 Term Service Contract (June 2005) (with amendments dated June 2006). Refer to **Annex B** Volume 1 - Part 1-Data provided by the *Employer; and* ***Annex*** *C Service Information; and* ***Annex D*** *Service Level Table.*.

See Annex C - Volume 1 Contract Data

Equipment Maintenance

The service will operate under a NEC3 Term Service Contract (June 2005) (with amendments dated June 2006). Refer to **Annex B** Volume 1 - Part 1-Data provided by the *Employer; and* ***Annex*** *C Service Information; and* ***Annex D*** *Service Level Table.*

See Annex D - Volume 3 - Service Information

Contract Administration

The service will operate under a NEC3 Term Service Contract (June 2005) (with amendments dated June 2006). Refer to **Annex B** Volume 1 - Part 1-Data provided by the *Employer; and* ***Annex*** *C Service Information; and* ***Annex D*** *Service Level Table.*

Water Production Cost per 1000 Imperial Gallons

The service will operate under a NEC3 Term Service Contract (June 2005) (with amendments dated June 2006). Refer to **Annex B** Volume 1 - Part 1-Data provided by the *Employer; and* ***Annex*** *C Service Information; and* ***Annex D*** *Service Level Table.*

See Annex E - Service Level Table

Control System Upgrade

See Annex F - Control System Replacement

Provision of Equipment Procurement Services

Refer to ***Annex*** *C Service Information SECTION 8*

B. MATERIAL DISCLOSURES

N/A

C. MANDATORY SUBMISSION REQUIREMENTS

1. Submission Form (Appendix B)

Each quotation must include a Submission Form (Appendix B) completed and signed by an authorized representative of the respondent.

2. Pricing (Appendix C)

Each quotation must include pricing information that complies with the instructions contained in Pricing (Appendix C).

3. Other Mandatory Submission Requirements

Submission Form (Appendix B)

Each proposal must include a Submission Form (Appendix B) completed and signed by an authorized representative of the respondent. Where a joint submission is made details of any sub consultant must be submitted and a Sub Consultant Form signed by an authorized representative of the sub consultant.

Pricing (Appendix C)

Each proposal must include pricing information that complies with the instructions contained in Pricing (Appendix C).

Demonstration of Expertise and Experience

The Respondent shall submit with their completed proposal all appropriate documentation in order to demonstrate the necessary experience and expertise in relation to the scope of work under these terms of reference.

Joint Venture Proposals

Proposals submitted by a joint venture of two or more firms as partners shall comply with the following requirements:

1. The proposal, and in the case of a successful respondent, the Form of Agreement shall be signed so as to be legally binding on all partners.

2. One of the partners shall be nominated as being in charge, and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners.

3. The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture, and the entire execution of the contract including payment shall be done exclusively with the partner in charge.

4. All partners of the joint venture shall be liable, jointly and severally, for the execution of the Contract in accordance with the Contract terms and a relevant statement to this effect shall be included in the authorization mentioned under point 2 above as well as in the Submission Form and the Form of Agreement (in the case of a successful Respondent); and

5. A copy of the joint venture agreement entered into, by the joint venture partners, shall be submitted with the proposal.

Company Qualifications & Project Team

All Respondents must include, with their proposal a completed Annex G (PROJECT PERSONNEL QUALIFICATIONS AND REFERENCES)

This shall provide respondent qualifications and experience working on similar projects, as well as background information on the resources proposed to work on the project. In the event of a consortium, the respondent must indicate the lead firm who will be signatory to the consulting agreement. Lead respondent shall indicate all sub-consultants clearly and their respective roles in the project.

Respondents must have a minimum of 10 years of experience in providing Operational Services to Operate a Seawater Reverse Osmosis Plant to produce Municipal Drinking Water.

The submission shall include an outline of the Project Team with details of the Operations Manager and Key Operational Personnel. An organizational chart outlining all project positions, including company names and the reporting arrangements for personnel shall be included. Availability of all assigned staff throughout the relevant term of the service shall be confirmed by the Contractor in the proposal documents.

It should be noted Respondents should seek clarification on the need for work Permits for proposed staff from the Government of Bermuda Department of Immigration. No direct assistance will be given by the Ministry of Public Works.

Respondents Operational Plan

All proposals shall contain a detailed management plan for the required works. The management plan shall detail such items as:

• The Management Structure.

• Contingencies for problem solving.

• Quality Management System (QMS).

• Financial Control.

• An Environmental Management System (EMS) establishing the Respondents commitment to the protection of human life and safeguarding the natural environment during the course of its normal activities; and

• Health and Safety Program (HSP).

The Management Plan shall detail how the Respondent proposes to ensure that the service as detailed in these Tender Documents will be delivered to the Ministry. The Management Plan will form part of the Agreement, if the proposal is accepted.

See Annex H - Maintenance Schedule

Local Benefits

The respondent shall detail the local benefits arising from their operation of the Plant. All Respondents must include, with their proposal a completed Annex I (LOCAL BENEFITS) for the lead Company and any proposed Sub-Contractors.

Project Understanding and Approach/Methodology

Respondent will present their methodology for undertaking the service and providing their professional and technical services safely, timely, effective and cost-efficient manner.

The methodology shall clearly and concisely demonstrate:

• understanding of the service requirements.

• proposals for the maintenance of a safe working environment,

• proposed use and availability of specialist plant and equipment,

• availability of qualified labour resources both Bermudian and foreign

• familiarity with the geographic, environmental, regulatory and technological requirements of the service.

• any additional factors that the respondent deems appropriate.

• details as required in the Service Information.

Respondents are encouraged to submit proposals, which are innovative and cost-effective to the Ministry.

Health and Safety

All works must be carried out in strict accordance with the Bermuda Occupational Safety & Health Act, 1982 and Occupation Safety and Health Regulations of 2009.

Alcohol, Smoke and Drug-Free Policy: All Government buildings and work sites are designated as alcohol, smoke, and drug-free. The Respondent shall submit a Health and Safety Plan.

Financial Reference

The Respondent shall provide a reference from a bank or other financial institution confirming the Respondent's capacity to provide the necessary financial resources to complete the works in accordance with the contract and schedule.

D. MANDATORY TECHNICAL REQUIREMENTS

Executive Summary of Proposal Offering

An overview of the proposal is required indicating the key differentiators of the respondent's service offering and general approach to projects of this type.

Operator Qualification Requirements

Key Managing Personnel are required to hold certificates of achievement, Reverse Osmosis specialist Certification or equivalent qualifications in treatment or desalination operations from a leading Industry Water Treatment Training Program. The Respondent must provide evidence of general membership in an international or national water treatment society or equivalent organization.

E. PRE-CONDITIONS OF AWARD

Proof of Insurance

The successful respondent shall furnish the Government with certificates showing the type, amount, class of operations covered, effective dates, and date of expiration of policies as may be expected. Such certificates shall also contain substantially the following statement: The insurance covered by this certificate will not be canceled or materially altered, except after thirty (30) calendar days written notice has been received by the Government. (Endorsements to the Policy that name the Government as an Additional insured and establishment of cancellation notice are required).

Certificates should be submitted within 10 calendar days after award of contract and before any work begins at the site.

F. RATED CRITERIA

The following sets out the categories, weightings and descriptions of the rated criteria of the RFQ. Respondents who do not meet a minimum threshold score for a category will not proceed to the next stage of the evaluation process.

Respondents who are shortlisted may be invited to present oral presentations for the purpose of introducing key members of the project team and allowing the Government to fully understand the prospective Respondent's ability to meet the evaluation criteria and deliverables. Oral presentations will not be scored separately. Instead, the Government may modify scores and resulting rankings based on the oral presentation of those prospective respondents.

#	Category	Weighting (%)	Threshold
1	Pricing	25	N/A

2	Experience & Capability	35	25
3	References	10	N/A
4	Local Benefits	30	N/A
Total Points		100	

1. Pricing

See Appendix C - Pricing

2. Experience & Capability

Proposals shall be evaluated on the following

i. Availability of competent and qualified personnel and other resources to perform the Services;

ii. qualifications and past performance of assigned staff for similar assignments;

iii. the respondent's Corporate Background and performance on similar projects;

iv. proposed quality management plan for the project;

3. References

Relevant Projects and References

Each respondent is requested to provide three (3) references from clients who have obtained goods or services similar to those requested in this RFP from the respondent in the last three (3) years.

The following questions will be considered when each proposal is evaluated: -

- Does the respondent have a previous relevant and positive experience in planning and completing projects of this type and scope?
- Does the respondent have prior experience in working with public sector organizations?

4. Local Benefits

The local benefit considerations will be given to each of the following factors when proposals are evaluated:

- Number of Bermudians employed by the respondent;
- If the respondent is a specified business?;
- Engagement of Bermudian employee (%) during the project;
- Use of specified businesses in the respondent's supply chain;
- Use of specified business as subcontractors (if applicable);
- Safety and health record of the respondent for the three immediately preceding years of reporting
- 0 Environmental considerations and policy (each respondent to provide a copy)

APPENDIX E – CERTIFICATE OF CONFIRMATION OF NON-COLLUSION

Notes for the Respondent

The essence of Open Tendering is that the Government of Bermuda shall receive bona fide competitive quotation from suitably qualified persons or entities. In recognition of this principle, each person or entity that submits a quote will be required, by way of the signature of a duly authorized representative of the company, to confirm that the quotation has been submitted without any form of collusion.

All Respondents must complete and sign a Certificate of Confirmation of Non-Collusion. Any proposals submitted which do not include a signed copy of the Certificate will be wholly rejected and will not be included in the evaluation process.

If it is later found that the undertakings made below have been breached at any stage of the procurement process, then the Respondent will be expelled from the process immediately. In the event that this is discovered after a contract award, legal action may be taken against the Respondent and/or any party involved in the matter.

Any Respondent that submits false information in response to this Request for Quotations (RFQ), and any other person or entity involved in collusion, may be excluded from competing for future contracts tendered by the Government of Bermuda.

Confirmation of non-collusion

I/We certify that this is a bona fide proposal, intended to be competitive and that I/We have not fixed or adjusted the amount of the proposal or the rates and prices quoted by or under or in accordance with any agreement or arrangement with any other person.

I/We confirm that we have not received any information, other than that contained within the RFQ pack, or supplementary information provided to all Respondents.

I/We also certify that I/We have not done and undertake that I/We will not do at any time any of the following acts:

(a) communicating to a person other than the RFQ Contact the amount or approximate amount of my/our proposed quote (other than in confidence in order to obtain quotations necessary for the preparation of the quote for insurance);
(b) entering into any agreement or arrangement with any other person that he shall refrain from competing or as to the amount of any proposal to be submitted; or
(c) offering or agreeing to pay or give or paying any sum of money, inducement, gift /hospitality or valuable consideration directly or indirectly to any person in relation to this procurement.

Signed

(1) _____ Title _____ Date _____

(2) _____ Title _____ Date _____

for and on behalf of_____

GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works & Engineering

Annex A – NEC3 Term Service Contract

Table of Contents

Form of Agreement

This agreement is made on the First day of _____ between

Ministry of Public Works

Of PO Box HM 525, Hamilton, HM CX, Bermuda (the *Employer*) and

_____

Of _____ (the *Contractor*)

The *Employer* wishes to have the following *service* provided:

The *Service* of **providing operation and maintenance Services for the Affected Property known as the Tyne's Bay Seawater Desalination Plant** to meet the demand level required by the *Employer.*

- The *Contractor* will provide the Service in accordance with the conditions of contract identified in the Contract Data and Service Information.

- The *Employer* will pay the *Contractor* the amount due and carry out his duties in accordance with the conditions of contract identified in the Contract Data.

- The documents forming this agreement are:

1. Letter of Acceptance
2. Form of Tender
3. Price (Activity) Schedule
4. Service Level Table
5. Certificates of Non-Collusion
6. Addenda
7. Volume 1 Contract Data
8. Volume 2 Conditions of Contract
9. Volume 3 Service Information
10. Contractor's Plan

Signed:

Name: _____

Position: _____

Duly authorized to sign proposals for and on behalf of:

_____
(*Employer*)

Date: _____

Position: _____

Duly authorized to sign proposals for and on behalf of:

_____
(*Contractor*)

Date: _____

Signed:

Name: _____

VOLUME 2
Conditions of Contract

NEC 3 term service contract

June 2005(amended June 2006)

1 General

Actions **10**

10.1 The *Employer*, the *Contractor* and the *Service Manager* shall act as stated in this Contract and in a spirit of mutual trust and co-operation.

Identified and defined terms **11**

11.1 In these conditions of contract, terms identified in the Contract Data are in italics and defined terms have capital initials.

11.2 (1) The Accepted Plan is the plan identified in the Contract Data or is the latest plan accepted by the *Service Manager.* The latest plan accepted by the *Service Manager* supersedes previous Accepted Plans.

(2) Affected Property is property of the *Employer* or Others which is affected by the work of the *Contractor* or used by the *Contractor* in Providing the Service and which is identified in the Contract Data.

(3) The Contract Date is the date when this contract came into existence.

(4) A Defect is

- a part of the *service* which is not provided in accordance with the Service Information or
- a part of the *service* which is not in accordance with the applicable law or the Accepted Plan.

(5) Defined Cost is payments by the *Contractor* in Providing the Service for

- Operation of the *Affected Property*,
- Maintenance and repair of the *Affected Property*, and,
- Administrative costs for the Service Period

less Disallowed Cost.

(6) Disallowed Cost is cost which the *Service Manager* decides

- is not justified by the *Contractor's* accounts and records,
- should not have been paid to a Subcontractor or supplier in accordance with his contract,
- was incurred only because the *Contractor* did not
    - follow an acceptance or procurement procedure stated in the Service Information or
    - give an early warning which this contract required him to give

and the cost of

- Plant and Materials used to provide the Service after the first six(6) months of the Service Period,

- Plant and Materials not used to Provide the Service (after allowing for reasonable wastage) unless resulting from a change to the Service Information,
- resources not used to Provide the Service (after allowing for reasonable availability and utilisation) or not taken away when the *Service Manager* requested,
- events for which this contract requires the *Contractor* to insure and
- preparation for and conduct of an adjudication or proceedings of the *tribunal*

and amounts paid to the *Contractor* by insurers.

(7) Equipment is items provided by the *Contractor* and used by him to Provide the Service and which the Service Information does not require him to include in the Affected Property.

(8) The Fee is the sum of the amounts calculated by applying the *subcontracted fee percentage* to the Defined Cost of subcontracted work and the *direct fee percentage* to the Defined Cost of other work.

(9) Others are people or organisations who are not the *Employer*, the *Service Manager*, the *Adjudicator*, the *Contractor* or any employee, Subcontractor or supplier of the *Contractor*.

(10) The Parties are the *Employer* and the *Contractor*.

(11) Plant and Materials are items intended to be included in the Affected Property.

(12) The Price List is the *price list* unless later changed in accordance with this contract. :

(13) To Provide the Service means to do the work necessary to provide the *service* in accordance with this contract and all incidental work, services and actions which this contract requires.

(14) The Risk Register is a register of the risks which are listed in the Contract Data and the risks which the *Service Manager* or the *Contractor* has notified as an early warning matter. It includes a description of the risk and a description of the actions which are to be taken to avoid or reduce the risk.

(15) Service Information is information which either

- specifies and describes the *service* or
- states any constraints on how the *Contractor* Provides the Service

and is either

- in the documents which the Contract Data states it is in or
- in an instruction given in accordance with this contract.

(16) A Subcontractor is a person or organisation who has a contract with the *Contractor* to

- provide a part of the *service* or
- supply Plant and Materials which the person or organisation has wholly or partly designed specifically for the *service.*

(17) The Price for Services Provided to Date is the total of

- the Price for each lump sum item in the Price List which the *Contractor* has completed and
- where a quantity is stated for an item in the Price List, an amount calculated by multiplying the quantity which the *Contractor* has completed by the rate.

(19) The Prices are the amounts stated in the Price column of the Price List. Where a quantity is stated for an item in the Price List, the Price is calculated by multiplying the quantity by the rate.

(20) A *Day* shall mean a calendar day.

Interpretation and the law **12**

12.1 In this contract, except where the context shows otherwise, words in the singular also mean in the plural and the other way round and words in the masculine also mean in the feminine and neuter.

12.2 This contract is governed by the *law* of *the contract.*

12.3 No change to this contract, unless provided for by the *conditions* of *contract*, has effect unless it has been agreed, confirmed in writing and signed by the Parties.

12.4 This contract is the entire agreement between the Parties.

Communications **13**

13.1 Each instruction, certificate, submission, proposal, record, acceptance, notification, reply and other communication which this contract requires is communicated in a form which can be read, copied and recorded. Writing is in the *language* of *this contract.*

13.2 A communication has effect when it is received at the last address notified by the recipient for receiving communications or if none is notified, at the address of the recipient stated in the Contract Data.

13.3 If this contract requires the *Service Manager* or the *Contractor* to reply to a communication, unless otherwise stated in this contract, he replies within the *period for reply.*

13.4 The *Service Manager* replies to a communication submitted or resubmitted to him by the *Contractor* for acceptance. If his reply is not acceptance, the *Service Manager* states his reasons and the *Contractor* resubmits the communication within the *period for reply* taking account of these reasons. A reason for withholding acceptance is that more information is needed in order to assess the *Contractor's* submission fully.

13.5 The *Service Manager* may extend the *period for reply* to a communication if the *Service Manager* and the *Contractor* agree to the extension before the reply is due. The *Service Manager* notifies the *Contractor* of the extension which has been agreed.

13.6 The *Service Manager* issues his certificates to the *Employer* and the *Contractor.*

13.7 A notification which this contract requires is communicated separately from other communications.

13.8 The *Service Manager* may withhold acceptance of a submission by the *Contractor.* Withholding acceptance for a reason stated in this contract is not a compensation event.

The *Service Manager* **14**

14.1 The *Service Manager's* acceptance of a communication from the *Contractor* or of his work does not change the *Contractor's* responsibility to Provide the Service or his liability for his plan or his design.

14.2 The *Service Manager,* after notifying the *Contractor,* may delegate any of his actions and may cancel any delegation. A reference to an action of the *Service Manager* in this contract includes an action by his delegate.

14.3 The *Service Manager* may give an instruction to the *Contractor* which changes the Service Information.

14.4 The *Employer* may replace the *Service Manager* after he has notified the *Contractor* of the name of the replacement.

Employer **provides right of access and things** **15**

15.1 The *Employer* provides the right of access for the *Contractor* to Affected Property as necessary for the work in this contract subject to any constraints stated in the Service Information.

15.2 The *Employer* provides things which he is to provide as stated in the Service Information.

Early warning **16**

16.1 The *Service Manager* enters early warning matters in the Risk Register by notifying the *Contractor* as soon as either becomes aware of any matter which could

- increase the total of the Prices,
- interfere with the timing of the *service* or
- impair the effectiveness of the *service.*

The *Contractor* may *give* an early warning by notifying the *Service Manager* of any other matter which could increase his total cost. The *Service Manager* enters early warning matters in the Risk Register. Early warning of a matter for which a compensation *event* has previously been notified is not required.

16.2 Either the *Service Manager* or the *Contractor* may instruct the other to attend a risk reduction meeting. Each may instruct other people to attend if the other agrees.

16.3 At a risk reduction meeting, those who attend co-operate in

- making and considering proposals for how the effect of the registered risks can be avoided or reduced,
- seeking solutions that will bring advantage to all those who will be affected,
- deciding on the actions which will be taken and who, in accordance with this contract, will take them and
- deciding which risks *have* now been avoided or *have* passed and can be removed from the Risk Register.

16.4 The *Service Manager* revises the Risk Register to record the decisions made at each risk reduction meeting and issues the revised Risk Register to the *Contractor.* If a decision needs a change to the Service Information, the *Service Manager* instructs the change at the same time as he issues the revised Risk Register.

Ambiguities and inconsistencies **17**

17.1 The *Service Manager* or the *Contractor* notifies the other as soon as either becomes aware of an ambiguity or inconsistency in or between the documents which are part of this contract. The *Service Manager gives* an instruction resolving the ambiguity or inconsistency.

Illegal and impossible requirements **18**

18.1 The *Contractor* notifies the *Service Manager* as soon as he considers that the Service Information requires him to do anything which is illegal or impossible If the *Service Manager* agrees, he *gives* an instruction to change

the Service Information appropriately.

2 The *Contractor*'s Main Responsibilities

Providing the Service **20**

20.1 The *Contractor* Provides the Service in accordance with the Service Information.

20.2 In Providing the Service, the *Contractor* minimises the interference caused to the Affected Property and the activities taking place in it.

20.5 The *Contractor* prepares forecasts of the final total of the Prices for the whole of the Service in consultation with the *Service Manager* and submits them to the *Service Manager*. Forecasts are prepared at the intervals stated in the Contract Data from the *starting date* until the end of the *service period.* An explanation of the changes made since the previous forecast is submitted with each forecast.

The *Contractor*'s plan **21**

21.1 If a plan is not identified in the Contract Data, the *Contractor* submits a first plan to the *Service Manager* for acceptance within the period stated in the Contract Data.

21.2 The *Contractor* shows on each plan which he submits for acceptance

- the *starting date* and the end of the *service period,*
- the order and timing of the work of the *Employer* and Others as last agreed with them by the *Contractor* or, if not so agreed, as stated in the Service Information,
- provisions for
    - time risk allowances,
    - health and safety requirements and
    - the procedures set out in this contract,
- the dates when, in order to Provide the Service in accordance with his plan, the *Contractor* will need
    - access to the Affected Property as stated in the Service Information,
    - acceptances,
    - Plant and Materials, equipment and other things to be provided by the *Employer* and
    - information from Others,

- for each operation, a statement of how the *Contractor* plans to do the work identifying the principal Equipment and other resources which he plans to use and
- other information which the Service Information requires the *Contractor* to show on a plan submitted for acceptance.

21.3 Within two weeks of the *Contractor* submitting a plan to him for acceptance, the *Service Manager* either accepts the plan or notifies the *Contractor* of his reasons for not accepting it. A reason for not accepting a plan is that

- the *Contractor*'s plans which it shows are not practicable,
- it does not show the information which this contract requires,
- it does not represent the *Contractor*'s plans realistically or
- it does not comply with the Service Information.

21.4 The *Contractor* provides information which shows how each item description on the Price List relates to the operations on each plan which he submits for acceptance.

Revising the *Contractor*'s plan **22**

22.1 The *Contractor* submits a revised plan to the *Service Manager* for acceptance showing the effects of implemented compensation events and other changes. It is submitted

- within the *period for reply* after the *Service Manager* has instructed him to and
- when the *Contractor* chooses to.

Design of Equipment **23**

23.1 The *Contractor* submits particulars of the design of an item of Equipment to the *Service Manager* for acceptance if the *Service Manager* instructs him to. A reason for not accepting is that the design of the item will not allow the *Contractor* to Provide the Service in accordance with

- the Service Information,
- the Accepted Plan or
- the applicable law.

People **24**

24.1 The *Contractor* either employs each key person named to do the job stated in the Contract Data or employs a replacement person who has been accepted by the *Service Manager*. The *Contractor* submits the name, relevant qualifications and experience of a proposed replacement person to the *Service Manager* for acceptance. A reason for not accepting the person is that his relevant qualifications and experience are not as good as those of the

person who is to be replaced.

24.2 The *Service Manager* may, having stated his reasons, instruct the *Contractor* to remove an employee. The *Contractor* then arranges that, after one day, the employee has no further connection with the work included in this contract.

Working with the *Employer* and Others **25**

25.1 The *Contractor* co-operates with Others in obtaining and providing information which they need in connection with the *service.* He co-operates with Others and shares the Affected Property with them as stated in the Service Information.

25.2 The *Employer* and the *Contractor* provide facilities and other things as stated in the Service Information. Any cost incurred by the *Employer* as a result of the *Contractor* not providing the facilities and other things he is to provide is assessed by the *Service Manager* and paid by the *Contractor*.

Subcontracting **26**

26.1 If the *Contractor* subcontracts work, he is responsible for Providing the Service as if he had not subcontracted. This contract applies as if a Subcontractor's employees and equipment were the *Contractor's.*

26.2 The *Contractor* submits the name of each proposed Subcontractor to the *Service Manager* for acceptance. A reason for not accepting the Subcontractor is that his appointment will not allow the *Contractor* to Provide the Service The *Contractor* does not appoint a proposed Subcontractor until the *Service Manager* has accepted him.

26.3 The *Contractor* submits the proposed conditions of contract for each subcontract to the *Service Manager* for acceptance unless

- an NEC contract is proposed or
- the *Service Manager* has agreed that no submission is required.

The *Contractor* does not appoint a Subcontractor on the proposed subcontract conditions submitted until the *Service Manager* has accepted them. A reason for not accepting them is that

- they will not allow the *Contractor* to Provide the Service or
- they do not include a statement that the parties to the subcontract shall act in a spirit of mutual trust and co-operation.

Other responsibilities **27**

27.1 The *Contractor* obtains approval from Others where necessary.

27.2 The *Contractor* provides access to work being done and to Plant and Materials being stored for this contract for the *Service Manager* and Others notified to him by the *Service Manager.*

27.3 The *Contractor* obeys an instruction which is in accordance with this contract and is given to him by the *Service Manager.*

27.4 The *Contractor* acts in accordance with the health and safety requirement: stated in the Service Information.

3 Time

Starting and the service period **30**

30.1 The *Contractor* does not start work until the *starting date* and Provides the Service throughout the *service period.*

Access **31**

31.1 The *Employer* allows the *Contractor* access to the Affected Property as shown on the Accepted Plan.

Instruction to stop or not to start work **32**

32.2 The *Service Manager* may instruct the *Contractor* to stop or not to start any work and may later instruct him that he may re-start or start it.

4 Testing and Defects

Tests and inspections **40**

40.1 The sub-clauses in this clause only apply to tests and inspections required by the Service Information or the applicable law.

40.2 The *Contractor* and the *Employer* provide materials, facilities and samples for tests and inspections as stated in the Service Information.

40.3 The *Contractor* and the *Service Manager* each notifies the other of each of his tests and inspections before it starts and afterwards notifies the other of its results. The *Contractor* notifies the *Service Manager* in time for a test or

inspection to be arranged and done before doing work which would obstruct the test or inspection. The *Service Manager* may watch any test done by the *Contractor*.

40.4 If a test or inspection shows that any work has a Defect, the *Contractor* repeats the work if possible and the test or inspection is repeated.

40.5 The *Service Manager* does his tests and inspections without causing unnecessary delay to the work.

40.6 The *Service Manager* assesses the cost incurred by the *Employer* in repeating a test or inspection after a Defect is found. The *Contractor* pays the amount assessed.

Testing and inspection before delivery **41**

41.1 The *Contractor* does not deliver those Plant and Materials which the Service Information states are to be tested or inspected before delivery until the *Service Manager* has notified the *Contractor* that they have passed the test or inspection.

Correcting Defects **42**

42.1 The *Contractor* corrects Defects within a time which minimises the adverse effect on the *Employer* or Others. If the *Contractor* does not correct a Defect within the time required by this contract, the *Service Manager* assesses the cost to the *Employer* of having the Defect corrected by other people and the *Contractor* pays this amount.

42.2 The *Service Manager* arranges for the *Employer* to allow the *Contractor* access if it is needed for correcting a Defect.

Accepting Defects **43**

43.1 The *Contractor* and the *Service Manager* may each propose to the other that the Service Information should be changed so that a Defect does not have to be corrected. If the *Contractor* and the *Service Manager* are prepared to consider the change, the *Contractor* submits a quotation for reduced Prices to the *Service Manager* for acceptance. If the *Service Manager* accepts the quotation, he gives an instruction to change the Service Information and the Prices accordingly.

5 Payment

Assessing the amount due **50**

50.1 The *Service Manager* assesses the amount due at each assessment date. The first assessment date is decided by the *Service Manager* to suit the procedures of the Parties and is not later than the assessment interval after the *starting date*. Later assessment dates occur at the end of each assessment interval until four weeks after the end of the service period.

50.2 The amount due is

- the Price for Services Provided to Date,
- plus other amounts to be paid to the *Contractor*,
- less amounts to be paid by or retained from the *Contractor*.

Any tax which the law requires the *Employer* to pay to the *Contractor* is included in the amount due.

50.3 If no plan is identified in the Contract Data, one quarter of the Price for Services Provided to Date is retained in assessments of the amount due until the *Contractor* has submitted a first plan to the *Service Manager* for acceptance showing the information which this contract requires.

50.4 In assessing the amount due, the *Service Manager* considers any application for payment the *Contractor* has submitted on or before the assessment date. The *Service Manager* gives the *Contractor* details of how the amount due has been assessed.

50.5 The *Service Manager* corrects any wrongly assessed amount due in a later payment certificate.

Payment **51**

51.1 The *Service Manager* certifies a payment within one week of each assessment date. The first payment is the amount due. Other payments are the change in the amount due since the last payment certificate. A payment is made by the *Contractor* to the *Employer*- if the change reduces the amount due. Other payments are made by the *Employer* to the *Contractor*. Payments are in the *currency* of *this contract* unless otherwise stated in this contract.

51.2 Each certified payment is made within three weeks of the assessment date or,

if a different period is stated in the Contract Data, within the period stated. If a certified payment is late, or if a payment is late because the *Service Manager* does not issue a certificate which he should issue, interest is paid on the late payment. Interest is assessed from the date by which the late payment should have been made until the date when the late payment is made, and is included in the first assessment after the late payment is made.

51.3 If an amount due is corrected in a later certificate either

- by the *Service Manager* in relation to a mistake or a compensation event or
- following a decision of the *Adjudicator* or the *tribunal*,

interest on the correcting amount is paid. Interest is assessed from the date when the incorrect amount is paid. Interest is assessed form the date when the incorrect amount was certified until the date when the correcting amount is certified and is included in the assessment which includes the correcting amount.

51.4 Interest is calculated on a daily basis at the *interest rate* and is compounded annually.

Defined Cost **52**

52.1 All the *Contractor*'s costs which are not included in the Defined Cost are treated as included in the Fee. Amounts included in the Defined Cost are at open market or competitively tendered prices with deductions for all discounts, rebates and taxes which can be recovered.

The Price List **54**

54.1 Information in the Price List is not Service Information.

54.2 If the *Contractor* changes a planned method of working at his discretion so that the item descriptions on the Price List do not relate to the operations on the Accepted Plan, he submits a revision of the Price List to the *Service Manager* for acceptance.

54.3 A reason for not accepting a revision of the Price List is that

- it does not comply with the Accepted Plan,
- any changed Prices are not reasonably distributed between the items in the Price List or
- the total of the Prices is changed.

6 Compensation Events

Compensation Events **60**

60.1 The following are compensation events.

(1) The *Service Manager* gives an instruction changing the Service Information except

- a change made in order to accept a Defect or
- a change to the Service Information provided by the *Contractor* for his plan which is made either at his request or to comply with other Service Information provided by the *Employer*.

(2) The *Employer* does not provide the right of access to the Affected Property in accordance with the Accepted Plan.

(3) The *Employer* does not provide something which he is to provide as stated in the Service Information in accordance with the Accepted Plan.

(4) The *Service Manager* gives an instruction to stop or not to start any work.

(5) The *Employer* or Others do not work in accordance with the Accepted Plan or within the conditions stated in the Service Information.

(6) The *Service Manager* does not reply to a communication from the *Contractor* within the period required by this contract.

(7) The *Service Manager* changes a decision which he has previously communicated to the *Contractor*.

(8) The *Service Manager* withholds an acceptance (other than acceptance of a quotation for not correcting a Defect) for a reason not stated in this contract.

(9) A test or inspection done by the *Service Manager* causes unnecessary delay.

(10) A change to the Affected Property other than a change as a result of Providing the Service.

(11) The *Employer* does not provide materials, facilities and samples for tests and inspections as stated in the Service Information.

(12) An event which is an *Employer*'s risk in this contract.

(13) The *Service Manager* notifies a correction to an assumption which he has stated about a compensation event.

(14) A breach of contract by the *Employer* which is not one of the other compensation events in this contract.

Notifying compensation events **61**

61.1 For compensation events which arise from the *Service Manager* giving an instruction or changing an earlier decision, the *Service Manager* notifies the *Contractor* of the compensation event at the time of giving the instruction or changing the earlier decision. He also instructs the *Contractor* to submit quotations, unless the event arises from a fault of the *Contractor* or quotations have already been submitted. The *Contractor* puts the instruction or changed decision into effect.

61.2 The *Service Manager* may instruct the *Contractor* to submit quotations for a proposed instruction or a proposed changed decision. The *Contractor* does not put a proposed instruction or a proposed changed decision into effect.

61.3 The *Contractor* notifies the *Service Manager* of an event which has happened or which he expects to happen as a compensation event if

- the *Contractor* believes that the event is a compensation event, and
- the *Service Manager* has not notified the event to the *Contractor*.

If the *Contractor* does not notify a compensation event within eight weeks of becoming aware of the event, he is not entitled to a change in the Prices unless the *Service Manager* should have notified the event to the *Contractor* but did not.

61.4 If the *Service Manager* decides that an event notified by the *Contractor*

- arises from a fault of the *Contractor*,
- has not happened and is not expected to happen,
- has no effect upon Defined Cost or
- is not one of the compensation events stated in this contract

he notifies the *Contractor* of his decision that the Prices are not to be changed.
If the *Service Manager* decides otherwise, he notifies the *Contractor* accordingly and instructs him to submit quotations.

If the *Service Manager* does not notify his decision to the *Contractor* within either

- one week of the *Contractor*'s notification or
- a longer period to which the *Contractor* has agreed,

the *Contractor* may notify the *Service Manager* to this effect. A failure by the *Service Manager* to reply within two weeks of this notification is treated as acceptance by the *Service Manager* that the event is a compensation event and an instruction to submit quotations.

61.5 If the *Service Manager* decides that the *Contractor* did not give an early warning of the event which an experienced contractor could have given, he notifies this decision to the *Contractor* when he instructs him to submit quotations.

61.6 If the *Service Manager* decides that the effects of a compensation event are too uncertain to be forecast reasonably, he states assumptions about the event in his instruction to the *Contractor* to submit quotations. Assessment of the event is based on these assumptions. If any of them is later found to have been wrong, the *Service Manager* notifies a correction.

61.7 A compensation event is not notified after the end of the service period.

Quotations for compensation events **62**

62.1 After discussing with the *Contractor* different ways of dealing with the compensation event which are practicable, the *Service Manager* may instruct the *Contractor* to submit alternative quotations. The *Contractor* submits the required quotations to the *Service Manager* and may submit quotations for other methods of dealing with the compensation event which he considers practicable.

62.2 Quotations for compensation events comprise proposed changes to the Prices assessed by the *Contractor*. The *Contractor* submits details of his assessment with each quotation. If the plan for remaining work is altered by the compensation event, the *Contractor* includes the alterations to the Accepted Plan in his quotation.

62.3 The *Contractor* submits quotations within three weeks of being instructed to do so by the *Service Manager*. The *Service Manager* replies within two weeks of the submission. His reply is

- an instruction to submit a revised quotation,
- an acceptance of a quotation,
- a notification that a proposed instruction will not be given or a proposed changed decision will not be made or
- a notification that he will be making his own assessment.

62.4 The *Service Manager* instructs the *Contractor* to submit a revised quotation only after explaining his reasons for doing so to the *Contractor*. The *Contractor* submits the revised quotation within three weeks of being instructed to do so.

62.5 The *Service Manager* extends the time allowed for

- the *Contractor* to submit quotations for a compensation event and
- the *Service Manager* to reply to a quotation

if the *Service Manager* and the *Contractor* agree to the extension before the submission or reply is due. The *Service Manager* notifies the extension that has been agreed to the *Contractor*.

62.6 If the *Service Manager* does not reply to a quotation within the time allowed, the *Contractor* may notify the *Service Manager* to this effect. If the *Contractor* submitted more than one quotation for the compensation event, he states in his notification which quotation he proposes is to be accepted. If the *Service Manager* does not reply to the notification within two weeks, and unless the quotation is for a proposed instruction or a proposed changed decision, the *Contractor*'s notification is treated as acceptance of the quotation by the *Service Manager*.

Assessing compensation events

63

63.1 For a compensation event which only affects the quantities of work shown in the Price List, the change to the Prices is assessed by multiplying the changed quantities of work by the appropriate rates in the Price List.

63.2 For other compensation events, the changes to the Prices are assessed as the effect of the compensation event upon

- the actual Defined Cost of the work already done,
- the forecast Defined Cost of the work not yet done and
- the resulting Fee.

The date when the *Service Manager* instructed or should have instructed the *Contractor* to submit quotations divides the work already done from the work not yet done.

Effects on the Defined Cost are assessed separately for

- people who are employed by the *Contractor*,
- Plant and Materials,
- work subcontracted by the *Contractor* and
- Equipment.

The *Contractor* shows how each of these effects is built up in each quotation for a compensation event.

63.3 If the *Service Manager* and the *Contractor* agree, rates and Prices in the Price List may be used as a basis for assessment instead of Defined Cost and the resulting Fee.

63.4 If the effect of a compensation event is to reduce the total Defined Cost, the Prices are not reduced except as stated in this contract.

63.5 The rights of the *Employer* and the *Contractor* to changes to the Prices are their only rights in respect of a compensation event.

63.6 If the *Service Manager* has notified the *Contractor* of his decision that the *Contractor* did not give an early warning of a compensation event which an experienced contractor could have given, the event is assessed as if the *Contractor* had given early warning.

63.7 Assessment of the effect of a compensation event includes risk allowances for cost for matters which have a significant chance of occurring and are at the *Contractor*'s risk under this contract.

63.8 Assessments are based upon the assumptions that the *Contractor* reacts competently and promptly to the compensation event, that any Defined Cost due to the event is reasonably incurred and that the Accepted Plan can be changed.

63.9 A compensation event which is an instruction to change the Service Information in order to resolve an ambiguity or inconsistency is assessed as if the Prices were for the interpretation most favourable to the Party which did not provide the Service Information.

63.10 If the effect of a compensation event is to reduce the total Defined Cost and the event is

- a change to the Service Information or
- a correction of an assumption stated by the *Service Manager* for assessing an earlier compensation event,

the Prices are reduced.

63.12 Assessments for changed Prices for compensation events are in the form of changes to the Price List.

The *Service* **64**

***Manager*'s assessment**

64.1 The *Service Manager* assesses a compensation event

- if the *Contractor* has not submitted a quotation and details of his assessment within the time allowed,
- if the *Service Manager* decides that the *Contractor* has not assessed the compensation event correctly in a quotation and he does not instruct the *Contractor* to submit a revised quotation,
- if, when the *Contractor* submits quotations for a compensation event, he has not submitted a plan or alterations to a plan which this contract requires him to submit or
- if, when the *Contractor* submits quotations for a compensation event, the *Service Manager* has not accepted the *Contractor*'s latest plan for one of the reasons stated in this contract.

64.2 The *Service Manager* notifies the *Contractor* of his assessment of a compensation event and gives him details of it within the period allowed for the *Contractor*'s submission of his quotation for the same event. This period starts when the need for the *Service Manager*'s assessment becomes apparent.

64.3 If the *Service Manager* does not assess a compensation event within the time allowed, the *Contractor* may notify the *Service Manager* to this effect. If the *Contractor* submitted more than one quotation for the compensation event, he states in his notification which quotation he proposes is to be accepted. If the *Service Manager* does not reply within two weeks of this notification the notification is treated as acceptance of the *Contractor*'s quotation by the *Service Manager*.

Implementing compensation events

65

65.1 A compensation event is implemented when

- the *Service Manager* notifies his acceptance of the *Contractor*'s quotation,
- the *Service Manager* notifies the *Contractor* of his own assessment or
- a *Contractor*'s quotation is treated as having been accepted by the *Service Manager*.

65.2 The assessment of a compensation event is not revised if a forecast upon which it is based is shown by later recorded information to have been wrong.

65.3 The changes to the Price List are included in the notification implementing a compensation event.

7 Use of equipment, Plant and Materials

The Parties' use of equipment, Plant and Materials **70**

70.1 The *Contractor* has the right to use equipment, Plant and Materials provided by the *Employer* only to Provide the Service.

70.2 At the end of the service period the *Contractor*

- returns to the *Employer*, equipment and surplus Plant and Materials provided by the *Employer*,
- provides items of Equipment for the *Employer*'s use as stated in the Service Information and
- provides information and other things as stated in the Service Information.

8 Risks and Insurance

***Employer*'s risks** **80**

80.1 The following are *Employer*'s risks.

- Claims, proceedings, compensation and costs payable which are due to
  - the unavoidable result of the service or of Providing the Service,
  - negligence, breach of statutory duty or interference with any legal right by the *Employer* or by any person employed by or contracted to him except the *Contractor* or,
  - a fault of the *Employer* or a fault in his design.
- Loss of or damage to Plant and Materials supplied to the *Contractor* by the *Employer*, or by Others on the *Employer*'s behalf, until the *Contractor* has received and accepted them.
- Loss of or damage to the Affected Property, Plant and Materials due to
  - war, civil war, rebellion, revolution, insurrection, military or usurped power,
  - strikes, riots and civil commotion not confined to the *Contractor*'s employees or
  - radioactive contamination.

- Loss of or wear or damage to any Equipment, Plant and Materials retained by the *Employer* after a termination, except loss, wear or damage due to the activities of the *Contractor* after the termination.
- Additional *Employer*'s risks stated in the Contract Data.

The *Contractor*'s risks **81**

81.1 From the *starting date* until the end of the service period, the risks which are not carried by the *Employer* are carried by the *Contractor*.

Indemnity **82**

82.1 Each Party indemnifies the other against claims, proceedings, compensation and costs due to an event which is at his risk.

82.2 The liability of each Party to indemnify the other is reduced if events at the other Party's risk contributed to the claims, proceedings, compensation and costs. The reduction is in proportion to the extent that events which were at the other Party's risk contributed, taking into account each Party's responsibilities under this contract.

Insurance cover **83**

83.1 The *Contractor* provides the insurances stated in the Insurance Table except any insurance which the *Employer* is to provide as stated in the Contract Data. The *Contractor* provides additional insurances as stated in the Contract Data.

83.2 The insurances are in the joint names of the Parties and provide cover for events which are at the *Contractor*'s risk from the *starting date* until the end of the service period or the termination certificate has been issued.

INSURANCE TABLE

Insurance against	**Minimum amount of cover or minimum limit of indemnity**
Loss of or damage caused by the *Contractor* to the *Employer*'s property	The amount stated in the Contract Data
Loss of or damage to Plant and Materials	The replacement cost, including the amount stated in the Contract Data for the replacement of any Plant and Materials provided by the *Employer*
Loss of or damage to Equipment	The replacement cost
The *Contractor*'s liability for loss of or damage to	The amount stated in the Contract Data for anyone

property (except the *Employer*'s property, Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor*) arising from or in connection with the *Contractor*'s Providing the Service	event with cross liability so that the insurance applies to the Parties separately
Liability for death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract	The greater of the amount required by the applicable law and the amount stated in the Contract Data for any one event

Insurance policies **84**

84.1 Before the *starting date* and on each renewal of the insurance policy, the *Contractor* submits to the *Service Manager* for acceptance certificates which state that the insurance required by this contract is in force. The certificates are signed by the *Contractor*'s insurer or insurance broker. A reason for not accepting the certificates is that they do not comply with this contract.

84.2 Insurance policies include a waiver by the insurers of their subrogation rights against directors and other employees of every insured except where there is fraud.

84.3 The Parties comply with the terms and conditions of the insurance policies.

84.4 Any amount not recovered from an insurer is borne by the *Employer* for events which are at his risk and by the *Contractor* for events which are at his risk.

If the *Contractor* does not insure **85**

85.1 The *Employer* may insure a risk which this contract requires the *Contractor* to insure if the *Contractor* does not submit a required certificate. The cost of this insurance to the *Employer* is paid by the *Contractor*.

Insurance by the *Employer* **86**

86.1 The *Service Manager* submits policies and certificates for insurances provided by the *Employer* to the *Contractor* for acceptance before the *starting date* and afterwards as the *Contractor* instructs. The *Contractor* accepts the policies and certificates if they comply with this contract.

86.2 The *Contractor*'s acceptance of an insurance policy or certificate provided

by the *Employer* does not change the responsibility of the *Employer* to provide the insurances stated in the Contract Data.

86.3 The *Contractor* may insure a risk which this contract requires the *Employer* to insure if the *Employer* does not submit a required policy or certificate. The cost of this insurance to the *Contractor* is paid by the *Employer*.

9 Termination

Termination **90**

90.1 If either Party wishes to terminate the *Contractor*'s obligation to Provide the Service, he notifies the *Service Manager* and the other Party giving details of his reason for terminating. The *Service Manager* issues a termination certificate to both Parties promptly if the reason complies with this contract.

90.2 The *Contractor* may terminate only for a reason identified in the Termination Table. The *Employer* may terminate for any reason. The procedures followed and the amounts due on termination are in accordance with the Termination Table.

TERMINATION TABLE

Terminating Party	Reason	Procedure	Amount Due
The *Employer*	A reason other than R1-R21	P1, P2 and P4	A1, A2 and A4
	R1-R15 or R18	P1, P2, P3 and P4	A1, A2 and A3
	R17 or R20	P1 and P4	A1 and A2
	R21	Pl, P3 and P4	A1 and A2
The *Contractor*	R1-R10, R16 or R19	P1, P2 and P4	A1, A2 and A4
	R17 or R20	P1, P2 and P4	A1 and A2

Reasons for termination **91**

91.1 Either Party may terminate if the other Party has done one of the following or its equivalent.

- If the other Party is an individual and has
    - presented his petition for bankruptcy (R1),
    - had a bankruptcy order made against him (R2),
    - had a receiver appointed over his assets (R3) or
    - made an arrangement with his creditors (R4).

- If the other party is a company or partnership and has
    - had a winding-up order made against it (R5)
    - had a provisional liquidator appointed to it (R6),
    - passed a resolution for winding-up (other than in order to amalgamate or reconstruct) (R7),
    - had an administration order made against it (R8),
    - had a receiver, receiver and manager, or administrative receiver appointed over the whole or a substantial part of its undertaking or assets (R9) or
    - made an arrangement with its creditors (R10).

91.2 The *Employer* may terminate if the *Service Manager* has notified that the *Contractor* has defaulted in one of the following ways and not put the default right within four weeks of the notification.

- Substantially failed to Provide the Service (R11).
- Not provided a bond or guarantee which this contract requires (R12).
- Appointed a Subcontractor for substantial work before the *Service Manager* has accepted the Subcontractor (R13).

91.3 The *Employer* may terminate if the *Service Manager* has notified that the *Contractor* has defaulted in one of the following ways and not stopped defaulting within four weeks of the notification.

- Substantially hindered the *Employer* or Others (R14).
- Substantially broken a health or safety regulation (R15).

91.4 The *Contractor* may terminate if the *Employer* has not paid an amount certified by the *Service Manager* within thirteen weeks of the date of the certificate (R16).

91.5 Either Party may terminate if the Parties have been released under the law from further performance of the whole of this contract (R17).

91.6 If the *Service Manager* has instructed the *Contractor* to stop or not to start any substantial work or all work and an instruction allowing the work to restart or start has not been given within thirteen weeks,

- the *Employer* may terminate if the instruction was due to a default by the *Contractor* (R18),
- the *Contractor* may terminate if the instruction was due to a default by the *Employer* (R19) and

- either.Party may terminate if the instruction was due to any other reason (R20).

91.7 The *Employer* may terminate if an event which the Parties could not reason ably prevent has substantially affected the *Contractor*'s work for a continuous period of more than thirteen weeks (R21).

Procedures on termination **92**

92.1 On termination, the *Employer* may complete the service and may use any Plant and Materials provided by the *Contractor* (P1).

92.2 The procedure on termination also includes one or more of the following as set out in the Termination Table.

P2 The *Employer* may instruct the *Contractor* to remove any Equipment, Plant and Materials and assign the benefit of any subcontract or other contract related to performance of this contract to the *Employer*.

P3 The *Employer* may use any Equipment to which the *Contractor* has title to complete the service. The *Contractor* promptly removes the Equipment when the *Service Manager* notifies him that the *Employer* no longer requires it to complete the service.

P4 The *Contractor* provides to the *Employer* information and other things which the Service Information states he is to provide at the end of tht service period.

Payment on termination 93

93.1 The amount due on termination includes (A1)

- an amount due assessed as for normal payments,
- the Defined Cost for Plant and Materials
  - which have been delivered and retained by the *Employer* or
  - which the *Employer* owns and of which the *Contractor* has to accept delivery,
- other Defined Cost reasonably incurred in expectation of completing the whole of the service and
- any amounts retained by the *Employer*.

93.2 The amount due on termination also includes one or more of the following as set out in the Termination Table.

A2 The forecast Defined Cost of removing the Equipment.

A3 A deduction of the forecast of the additional cost to the *Employer* of completing the whole of the service.

A4 The direct fee percentage applied to

- for Options A and C, any excess of the total of the Prices at the Contract Date over the Price for Services Provided to Date or
- for Option E, any excess of the first forecast of the Defined Cost for the service over the Price for Services Provided to Date less the Fee.

Dispute Resolution

Dispute Resolution **W1** **Delete this Section in its entirety and refer to Secondary Option Clause Z28 for replacement**

Price Adjustment for Inflation

Defined Terms **X1**

X1.1 (a) The Base Date Index (B) is the latest available index before the base date.
(b) The Latest Index (L) is the latest available index before the date of assessment of an amount due.
(c) The Price Adjustment Factor is the total of the products of each of the proportions stated in the Contract Data multiplied by (L - B)/B for the index linked to it.

Price adjustment factor X1.2 If an index is changed after it has been used in calculating a Price Adjustment Factor, the calculation is repeated and a correction included in the next assessment of the amount due.

Compensation events X1.3 The Defined Cost for compensation events is assessed using the

- Defined Cost current at the time of assessing; the compensation event adjusted to base date by dividing by one plus the Price Adjustment Factor for the last assessment of the amount due and
- Defined Cost at base date levels for amounts calculated from rates and prices in the Price List.

Price adjustment Option A

X1.4 Each amount due includes an amount for price adjustment which is the sum of

- the change in the Price for Services Provided to Date since the last assessment of the amount due multiplied by the Price Adjustment Factor for the date of the current assessment,
- the amount for price adjustment included in the previous amount due and
- correcting amounts, not included elsewhere, which arise from changes to indices used for assessing previous amounts for price adjustment.

Changes in the law

Changes in the law **X2**

X2.1 A change in the law of the country in which the Affected Property is located is a compensation event if it occurs after the Contract Date. The *Service Manager* may notify the *Contractor* of a compensation event for a change the law and instruct him to submit quotations. If the effect of a compensation event which is a change in the law is to reduce the total Defined Cost, the Prices are reduced.

Parent Company Guarantee

Parent Company Guarantee **X4**

X4.1 If a parent company owns the *Contractor*, the *Contractor* gives to the *Employer* a guarantee by the parent company of the *Contractor's* performance in the form set out in the Service Information. If the guarantee was not given by the Contract Date, it is given to the *Employer* within four weeks of the Contract Date.

Low service damages

Low service damages **X17**

X17.1 If a part of the *service* does not meet the service level stated in the *service level table*, the *Contractor* pays the amount of low service damages stated in the *service level table*.

Limitation of liability

Limitation of liability **X18**

X18.1 The *Contractor*'s liability to the *Employer* for the *Employer*'s indirect or consequential loss is limited to the amount stated in the Contract Data.

X18.2 For any one event, the liability of the *Contractor* to the *Employer* for loss of damage to the *Employer*'s property is limited to the amount stated in the Contract Data.

X18.3 The *Contractor*'s liability to the *Employer* for Defects due to his design of an item of Equipment is limited to the amount stated in the Contract Data.

X18.4 The *Contractor*'s total liability to the *Employer* for all matters arising under: in connection with this contract, other than the excluded matters, is limited: the amount stated in the Contract Data and applies in contract, tort or delict and otherwise to the extent allowed under the *law of the contract*.

The excluded matters are amounts payable by the *Contractor* as stated in the contract for

- loss of or damage to the *Employer*'s property,
- low service damages if Option X17 applies,
- delay damages if Option X19 applies and
- *Contractor*'s share if Option C applies.

X18.5 The *Contractor* is not liable to the *Employer* for a matter unless it is notified to the *Contractor* before the *end of liability date*.

Task Order

Identified and defined terms X19

X19.1 (1) A Task is work within the *service* which the *Service Manager* may instruct the *Contractor* to carry out within a stated period of time.

(2) A Task Order is the *Service Manager's* instruction to carry out a Task.

(3) Task Completion is when the *Contractor* has done all the work in the Task and corrected Defects which would have prevented the *Employer* or

Others from using the Affected Property and Others from doing their work.

(4) Task Completion Date is the date for completion stated in the Task Order unless later changed in accordance with this contract.

Providing the Service

X19.2 A Task Order includes

- a detailed description of the work in the Task,
- a priced list of items of work in the Task in which items taken from the Price List are identified,
- the starting and completion dates for the Task,
- the amount of delay damages for the late completion of the Task and
- the total of the Prices for the Task when Option A or C is used or the forecast total of the Prices for the Task if Option E is used.

The *Service Manager* consults the *Contractor* about the contents of a Task Order before he issues it.

X19.3 The delay damages in a Task Order, if any, are not more than the estimated cost to the *Employer* of late completion of the Task. If Task Completion is later than the Task Completion Date, the *Contractor* pays delay damages at the rate stated in the Task Order from the Task Completion Date until Task Completion.

The Prices for items in the Task price list which are not taken from the Price List are assessed in the same way as compensation events.

Time

X19.4 The *Contractor* does not start any work included in the Task until the *Service Manager* has instructed him to carry out the Task and does the work so that Task Completion is on or before the Task Completion Date. No Task Order is issued after the end of the *service period.*

Task Order programme

X19.5 The *Contractor* submits a Task Order programme to the *Service Manager* for acceptance within the period stated in the Contract Data.

X19.6 The *Contractor* shows on each Task Order programme which he submits for acceptance

- the Task starting date and the Task Completion Date,
- planned Task Completion,
- the order and timing of the operations which the *Contractor* plans to do in order to complete the Task,
- provisions for
    - float,
    - time risk allowances,
    - health and safety requirements and
    - the procedures set out in this contract,
- the dates when, in order to Provide the Service in accordance with

his Task Order programme, the *Contractor* will need

- access to the Affected Property,
- acceptances,
- Plant and Materials, equipment and other things to be provided by the *Employer* and
- information from Others,

- for each operation, a statement of how the *Contractor* plans to do the work identifying the principal Equipment and other resources which he plans to use and
- other information which the Service Information requires the *Contractor* to show on a Task Order programme submitted for acceptance.

X19.7 Within one week of the *Contractor* submitting a Task Order programme to him for acceptance, the *Service Manager* either accepts the programme or notifies the *Contractor* of his reasons for not accepting it. A reason for not accepting the Task Order programme is that

- the *Contractor's* plans which it shows are not practicable,
- it does not show the information which this contract requires or
- it does not comply with the Service Information.

Revising the Task Order programme

X19.8 The *Contractor* shows on each revised Task Order programme

- the actual progress achieved on each operation and its effect upon the timing of the remaining work,
- the effects of implemented compensation events,
- how the *Contractor* plans to deal with any delays and to correct notified Defects and
- any other changes which the *Contractor* proposes to make to the Task Order programme.

X19.9 The *Contractor* submits a revised Task Order programme to the *Service Manager* for acceptance

- within the period for reply after the Service Manager has instructed him to and
- when the Contractor chooses to.

The latest programme accepted by the *Service Manager* supersedes previous accepted programmes.

Compensation events

X19.10 The following are compensation events.

(1) The *Service Manager* gives an instruction changing a Task Order.

(2) The *Contractor* receives the Task Order after the starting date stated in the Task Order.
(3) The *Employer* does not provide the right of access to the Affected Property in accordance with the latest accepted Task Order programme.
(4) The *Employer* does not provide something which he is to provide as stated in the Service Information in accordance with the latest accepted Task Order programme.
(5) The *Employer* or Others do not work in accordance with the latest accepted Task Order programme or within the conditions stated in the Service Information.
(6) An event which

- stops the *Contractor* completing a Task or
- stops the *Contractor* completing a Task by the Task Completion Date,

and which

- neither Party could prevent,
- an experienced contractor would have judged at the date of issue of the Task Order to have such a small chance of occurring that it would have been unreasonable for him to have allowed for it and
- is not one of the other compensation events stated in this contract.

(7) A Task Completion Date is later than the end of the *service period.*

X19.11 If, due to the compensation event, planned Task Completion is delayed, the delay is stated in the *Contractor's* quotation for the event and a programme is submitted with details of the assessment of the delay.

Assessments of delay include time risk allowances and are based on the assumption that the Task Order programme can be changed and that delays were or will be reasonably incurred.

The *Service Manager* may assess the delay if, when the *Contractor* submits quotations for a compensation event, the *Contractor* has not submitted a Task Order programme required by this contract.

Implementing compensation events

X19.12 The changes to the calculated total of the Prices for the Task Order and any delay to the Task Completion Date are included in the *Service Manager's* notification implementing a compensation event.

Key Performance Indicators

Incentives **X20**

X20.1 A Key Performance Indicator is an aspect of performance by the *Contractor* for which a target is stated in the Incentive Schedule. The Incentive Schedule is the incentive schedule unless later changed in accordance with this contract.

X20.2 From the *starting date* until the end of the service period, the *Contractor* reports to the *Service Manager* his performance against each of the Key Performance Indicators. Reports are provided at the intervals stated in the Contract Data and include the forecast final measurement against each indicator.

X20.3 If the *Contractor*'s forecast final measurement against a Key Performance Indicator will not achieve the target stated on the Incentive Schedule, he submits to the *Service Manager* his proposals for improving performance.

X20.4 The *Contractor* is paid the amount stated in the Incentive Schedule if the target for a Key Performance Indicator is improved upon or achieved. Payment of the amount is due when the target has been improved upon or achieved.

X20.5 The *Employer* may add a Key Performance Indicator and associated payment to the Incentive Schedule but may not delete or reduce a payment stated in the Incentive Schedule.

Additional conditions of contract (Option Z) are:

Z1.		The additional conditions of contract are below.
Laws, Regulations and Orders	**Z2**	The *Contractor* shall make himself fully acquainted with the Laws, Regulations and Orders of Bermuda and of any competent/statutory Authority and shall conform in all respects therewith during the continuance of the Contract. He shall conform similarly with any such Laws, Regulations and Orders which may come in to force after the date of this Agreement.
Construction of Contract	**Z3**	The Contract shall in all respects be constructed and operated in conformity with the Laws of Bermuda and the respective rights and liabilities of the Parties shall be in accordance with the Laws for the time being in force.
Members and Staff of *Employer* and *Service Manager* not Personally Liable	**Z4**	Neither the members nor the staff of the *Employer* or the *Service Manager* shall be in any way personally bound or liable for the acts or obligations of the *Contractor* under the Contract or answerable for any default or omission in the observance or performance of any of the acts, matters or things which are herein contained.
Named key personnel	**Z5**	Acceptance by the *Employer* of key persons stated in Contract Data Part Two does not constitute acceptance that such individuals are suitable for the roles assigned to them or serve to relieve the *Contractor* of his duties or obligations under the contract. Any such key person is not to be removed by the *Contractor* from the part of the *works* for which he has been nominated without the prior written consent of the *Service Manager*.
Named subcontractors	**Z6.1**	Where the *Contractor* has nominated a Subcontractor in Contract Data Part Two for part of the *works*, acceptance of the Contract Data by the *Employer* without qualification of such nomination is deemed to be a consent on the same legal basis as consent by the *Service Manager* under Clause 26.2. Any such Subcontractor is not be removed by the *Contractor* from the part of the *works* for which he has been nominated without the prior written consent of the *Service Manager*.
	Z6.2	Neither the objection to nor any failure to raise an objection to a proposed Subcontractor either by or through the *Service Manager* relieves the *Contractor* of any liability or obligation under the contract.
	Z6.3	The *Contractor* does not subcontract the whole of the *works.*

Details to be Confidential	**Z7**	The *Contractor* shall treat the details of the Contract as private and confidential, save in so far as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the previous consent in writing of the *Employer* or the *Service Manager*. If any dispute arises as to the necessity or disclosure for the purpose of the Contract the same shall be referred to the decision of the *Employer* whose award shall be final.
Rights and Remedies Not Waived	**Z8**	In no event shall the making by the *Employer* of any payment to the *Contractor* constitute or be construed as a waiver by the *Employer* of any breach of Contract, or any default which may then exist, on the part of the *Contractor*, and the making of any such payment by the *Employer* while any such breach or default exists shall in no way impair or prejudice any right or remedy available to the *Employer* in respect of such breach or default.
Arithmetical Accuracy of Proposal	**Z9**	The *Employer* accepts no responsibility for the arithmetical or other accuracy of the *Contractor*'s Proposal. Should it transpire after the Agreement has been executed that there are arithmetical mistakes in the accepted Proposal which would have increased or decreased the total amount of the Proposal had such mistakes not been made, the items affected will be paid for in accordance with the actual measurements of s*ervice* performed and with the unit prices inserted against the said items.
Patents	**Z10**	All concepts, products or processes produced by or resulting from the *service* rendered by the *Contractor* in connection with the Project, or which are otherwise developed or first reduced to practice by the *Contractor* in the performance of the *services*, and which are patentable, capable of trademark or otherwise, shall be and remain the property of the *Contractor*. The *Employer* shall have permanent non-exclusive royalty-free license to use any concept, product or process, which is patentable, capable of trademark or otherwise produced by or resulting from the *services* by the *Contractor* in connection with the Project and for no other purpose or project.
Inspection	**Z11**	The *Employer*, or persons authorised by the *Employer*, shall have the right, at all reasonable times, to inspect or otherwise review the *service* performed, or being performed, under the Project and the premises where they are being performed.
Protection of Utilities	**Z12**	The *Contractor* shall carry out the Works so that there is the minimum of interruption to the supply of water, telephone, electricity and other utility services through existing mains and utility services. Work involving interference with existing works of any kind shall only be carried out with the permission of and during such times and in such a manner as are agreed in writing by the *Service Manager* or competent Authority.

Reporting of Errors	**Z13**	The *Contractor* shall examine and compare the Contract Documents and shall report any errors, inconsistencies, or omissions he may find to the *Employer* immediately.
Damage to Persons and Property	**Z14**	The *Contractor* shall, immediately on occurrence of any incident involving loss or injury at or about the Site, or in connection with the execution of the Works, report such incident to the *Employer* or the *Service Manager*. The *Contractor* shall also report such incident to the appropriate Authority whenever such report is required by Law.
Rates, Wages, Hours and Conditions of Labour	**Z15**	The *Contractor* shall pay to all Foremen, Craftsmen, and Labourers not less than the rates of wages for the various Foremen, Craftsmen, and Labourers that prevail in Bermuda, and comply with such requirements relating to hours of work and conditions of labour as are or may be laid down from time to time by the Laws of Bermuda.
Facilities for Staff and Labour	**Z16**	The *Contractor* shall provide such accommodation and amenities as he may consider necessary for all his expatriate staff and labour, employed for the purposes of or in connection with the Contract. The *Contractor* shall comply with all local statutes and regulations and any amendments thereto with regard to the health and safety of his employees and others, and shall provide adequate latrines for his workers on the Site to conform with the requirements of the Department of Health.
Display of Notices	**Z17**	The *Contractor* shall post notices to inform the workers of their conditions of work in conspicuous places at the establishments and work places concerned.
Alcoholic Liquor and Drugs	**Z18**	The *Contractor* shall not, otherwise than in accordance with the Statutes, Ordinance and Government Regulations or Orders for the time being in force, import, sell, give, barter, or otherwise dispose of any alcoholic liquor, or drugs, or permit, or suffer any such importation, sale, gift, barter, or disposal by his sub-contractors, agents, or employees.
Arms and Ammunition	**Z19**	The *Contractor* shall not give, barter, or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same aforesaid.
Festivals and Religious Festivals	**Z20**	The *Contractor* shall in all dealings with labour in his employment have due regard to all recognised festivals, public holidays, days of rest, and religious or other customs.
Epidemics	**Z21**	In the event of any outbreak of illness of an epidemic nature, the *Contractor* shall comply with and carry out such regulations, orders, and requirements as may be made by the Government, or the local medical or

sanitary authorities for the purpose of dealing with and overcoming the same.

Supply of Drinking Water	**Z22**	The *Contractor* shall so far as is reasonably practicable having regard to local conditions provide on the site, to the satisfaction of the *Service Manager*, an adequate supply of drinking water and other water for the use of the *Contractor*'s staff and work people.
Approval by Other Authorities	**Z23.1**	Where the work of the *Contractor* is subject to the approval or review of an authority, department of Government, or agency other than the *Employer*, such applications for approval or review shall be the responsibility of the *Contractor*, but shall be submitted through the offices of the *Employer* and unless authorised by the *Employer* in writing, such applications for approval or review shall not be obtained by direct contact by the *Contractor* with such other authority, department of Government or agency.
	Z23.2	The *Contractor* shall ensure that a valid work permit is in place for all non- Bermudian staff working in Bermuda.
Taxation	**Z24**	The *Contractor* shall be required to pay Bermudian Taxes on all *Contractor*'s Equipment (except as described in the Fifth Schedule, Section 2 of the Customs Tariff Act 1970) materials and other things of whatsoever nature brought into Bermuda for the purpose of the Contract. Customs Duty is payable for all consumables i.e. chemicals that are imported to the island to operate the Facility.
Bribery	**Z25**	Any commission, advantage, gift, gratuity, reward, or bribe given, promised, or offered by or on behalf of the *Contractor* or his agent or servant or any person on his or their behalf to any officer, servant, representative, or agent of the *Employer* or of the *Service Manager* or to any person on their behalf or on behalf of any of them in relation to the obtaining or to the execution of this or of any other Contract with the *Employer* shall in addition to any criminal liability which may be thereby incurred subject the *Contractor* to the cancellation of this and of all other contracts which he may have entered into with the *Employer* and also to the payment of any loss or damage resulting from such cancellation.
Debt Recovery	**Z26**	The *Employer* shall be entitled upon a certificate in writing of the *Service Manager* to deduct the amounts so certified from any monies or otherwise due to the *Contractor* under this or any other contract or to recover the said amounts as a debt due or partly the one and partly the other as the *Employer* shall deem advisable.
Strikes and Lock-Outs	**Z27**	The *Contractor* shall forthwith notify the *Service Manager* of the commencing of any strike or lock-out and the *Service Manager* on account of any delay caused thereby may, after consultation with the

Employer, grant such extension of time as he considers reasonable without prejudice to the right of the *Employer* to exercise after the expiration of such reasonable extension of time the rights and powers under these Conditions in case of default by the *Contractor*.

Claims Disputes & Arbitration **Z28** Delete Sub-Clauses W1 to W2 in their entirety and replace with the following:

If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Employer, a notice of dissatisfaction shall be issued by either Party to the other Party. Where such notice is given both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of dissatisfaction was given, even if no attempt at an amicable settlement has been made.

Notice of Dissatisfaction **Z28.1** If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Employer, a notice of dissatisfaction shall be issued by either Party to the other Party. Where such notice is given both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of dissatisfaction was given, even if no attempt at an amicable settlement has been made.

Arbitration **Z28.2** Unless settled amicably, any dispute shall be finally settled by arbitration, unless otherwise agreed by both Parties:
(a) the dispute shall be finally settled in accordance with the Bermuda Arbitration Act 1986
(b) the dispute shall be settled by arbitrators appointed in accordance with the said Act, and
(c) the arbitration shall be conducted in the English language.

The arbitrator(s) shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Service Manager, relevant to the dispute. Nothing shall

disqualify the Service Manager from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.

Neither Party shall be limited in the proceedings before the arbitrator(s) to the evidence nor did arguments previously put before the Service Manager to obtain his decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the Service Manager shall be admissible in evidence in the arbitration.

Arbitration may be commenced prior to or after completion of the Works, by mutual agreement. The obligations of the Parties and the Service Manager shall not be altered by reason of any arbitration being conducted during the progress of the Works.

ANNEX B - PRICING

Unless stated otherwise in the Request for Quotation documents, the Contract shall be for the whole Works as detailed in the Request for Proposal documents and based on the completed Price Rates Quotation Form, as submitted by the Respondent.

The Respondent shall fill in separate prices for all items of Works described in the Annex B: PRICE SCHEDULE. Items against which the Respondent enters no price will not be paid for by the Ministry when executed and shall be deemed covered by the other lump-sum prices in the Bid Price Breakdown. All duties, taxes and other levies payable by the Respondent under the Contract, or for any other cause, as of the closing date for submission of the Bid, shall be included in the rates and prices and total Bid.

This contract is a Base Cost monthly fee with a Variable fee based on the volume of water produced. The Respondent may add additional activities to the schedule in order to further break down the tendered total.

The actual cost will be the amount of payments due to sub-contractors for work which has been subcontracted and the cost of the remaining completed works to the Contractor, less any disallowed costs.

Disallowed Costs

Disallowed costs are costs which the Service Manager decides:

Are not justified by the Contractor's accounts and records.
Should not have been paid to a sub-contractor in accordance with his sub-contract.
Were only incurred because the Contractor did not:

- Follow an approved procedure for acceptance or procurement stated in the Service Information.
- Give an early warning which the contract required him to give
- Is the result of the Contractor paying more to a sub-contractor than has been agreed in advance for additional works instructed under the contract and the cost of:

-Plant and Materials not used to provide the Service (after allowing for reasonable wastage) unless resulting from a change to the Service Information,
-Resources not used to provide the Service (after allowing for reasonable availability and utilisation) or not taken away when the Service Manager requested,
-Events for which this contract requires the Contractor to have insurance coverage and preparation for and conduct of an adjudication or proceedings of the tribunal

ANNEX B - BID ATTACHMENT A: - FORM OF PROPOSAL

SUBJECT: QUOTATION FOR THE OPERATION AND MAINTENANCE OF THE TYNES BAY WATER TREATMENT FACILITY

Proposal Offered to: Permanent Secretary, Ministry of Public Works

1. If our Proposal is accepted, to commence the Operation as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to provide the services comprised in the *Contract Documents*.

2. Having examined the request for quotation documents for the above work, we the undersigned, offer to operate and maintain the designated *Affected Property* known as the Tyne's Bay Seawater Desalination Plant in accordance with the tender documents, Annex A: Price Schedule or such other sum as may be ascertained in accordance with the said Conditions

3. The Contract is to be executed as follows:

   Contract Period: 36(thirty Six) Calendar Months

   Proposed Start Date: 1st April, 2021

The Tendered Cost for Operation, Maintenance and Administration

BD$_____(words)

BD$_____(numbers)

The Tendered Variable Fee is _____.……per 1000 Imperial gallons

The Tendered fee to Install & Commission Replacement Plant PLC

BD$_____(words)

BD$_____(numbers)

Signature: _____

Name: _____

Date: _____

in the capacity of _____

Duly authorized to sign proposals for and on behalf of:

_____
(Company Name)

Witness :

Signature: _____

Name: _____

Date: _____

Position: _____

Duly authorized to witness proposals for and on behalf of:

_____
(Company Name)

ANNEX F - BID ATTACHMENT B: PRICE SCHEDULE

	Activity	Cost
1	Operations per month	**BD$**
2	Maintenance/Repair per month	**BD$**
3	Administration per month	**BD$**
	Total Cost(per month)	
	Variable fee per 1000 Imp Gallons	
4	Install & Commission Replacement Plant PLC(Lump Sum)	**BD$**
5	Fee to be applied to Major Equipment Purchase	**%**

STAFFING RATES
(Note: all sheets form part of the Proposal)

ITEM	DESCRIPTION	QUANTITY	RATE
1.	Company Director	Hourly	
2.	Operations Manager	Hourly	
3.	Contract Manager and Scheduler	Hourly	
4.	Technical Staff - Technologist	Hourly	
5.	Skilled Labour	Hourly	
6.	Unskilled Labour	Hourly	
7.	Respondent specified items: Additional Day Work Rates for Labour, Materials or Equipment necessary for the execution of this work.		

GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works and Engineering

OPERATION AND MAINTENANCE
OF THE
TYNES BAY WATER TREATMENT FACILITY

ANNEX B
VOLUME 1
CONTRACT DATA

NEC 3 TERM SERVICE CONTRACT
JUNE 2005(AMENDED JUNE 2006)

NOVEMBER 2020

Table of Contents

Contract Data - Volume 1

VOLUME 1 - CONTRACT DATA

PART 1 – Data provided by the *Employer*

1.	**General**	
1.1	The *conditions of contract* are the core clauses and the clauses for main Option **A,** and secondary Options **X1, X4, X17, X18, X19, X20 and Z** of the NEC3 Term Service Contract (June 2005) (with amendments dated June 2006).	
1.2	The service is:	The operation, maintenance and repair of the Tynes Bay Water Treatment Facility to provide potable water to meet the demand level required by the *Employer*.
1.3	The *Employer* is:	Ministry of Public Works, Government of Bermuda.
	Address	56 Church Street Hamilton Bermuda HM12
1.4	The *Service Manager* is	
	Name Address	Principal Engineer (Water and Wastewater) The Ash Plant Offices 31 Palmetto Road Devonshire, DV 05 Bermuda
1.5	The *Adjudicator* is:	only appointed if deemed necessary by either the *Contractor* or the *Employer*.
1.6	The *Adjudicator* nominating body is:	Chartered Institute of Arbitrators Bermuda Branch
1.7	The Affected Property is	Tynes Bay Water Treatment Facility, buildings and well head pumping station.
1.8	The Service Information is in	in Volume 3 of the Contract Data
1.9	The language of the contract is:	English
1.10	The *law of the contract* is:	the law of Bermuda
1.11	The *period for reply* is:	14 days
1.12	The *tribunal* is:	Arbitration
1.12	The *arbitration procedure* is:	Arbitration in accordance with the Bermuda Arbitration Act 1986
1.13	The place where the arbitration is to be held is:	
1.14		Bermuda
	The person or organisation who will choose an arbitrator	
	• if the Parties cannot agree a choice or • If the arbitration procedure does not state who selects an arbitrator is:	

PART 1 – Data provided by the *Employer* - continued

1.15		Chartered Institute of Arbitrators Bermuda Branch
1.16	The additional conditions of the contract together with deletions of core clauses are given at the end of this document.	
3.	**Time**	
3.1	The starting date is:	1st April 2021
3.2	The service period is:	3 years
3.3	Option to Extend Service Period	Up to 2 years renewable each 12 months
5.	**Payment**	
5.1	The assessment interval is:	1 calendar month
5.2	The Contractor prepares forecasts of the final total of the Prices for the whole of the service at intervals no longer than	1 Calendar Month
5.3	The currency of the contract is:	Bermuda Dollars
5.4	The interest rate is:	2% per annum above the Bank of Butterfield base rate.
5.5	The period for payment is:	4 weeks
8.	**Risks and Insurance**	
8.1	The minimum amount of cover for insurance against loss or damage caused by the Contractor to the Employer's Property is	
		nil
8.2	The minimum amount of cover for insurance in respect of loss of or damage to property (except for Employer's property, Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the Contractor) arising from or in connection with the Contractor's Providing the Service for any one event is	
		2,000,000.00
8.3	The minimum limit of indemnity for insurance in respect of death of or bodily injury to employees of the Contractor arising out of and in the course of their employment in connection with this contract for any one event is	
		2,000,000.00
8.4	The Contractor submits the first plan for acceptance within two weeks of the Contract Date	
X17	**Low service Damages**	
X17.1	The service level table is in Volume 2 of the Contract Data	
X18	**Limitation of Liability**	
X18.1	The Contractor's liability to the Employer for indirect or consequential loss is limited to	
		3,000,000.00
X18.2	For any one event, the Contractor's liability to the Employer for loss of or damage to the Employer's property is limited to	
		nil

PART 1 – Data provided by the *Employer* - continued

X18.3	The Contractor's total liability to the Employer for all matters arising under or in connection with this contract, other than excluded matters, is limited to
	2,000,000.00
X18.4	The end of liability date is 6 months after the end of the service period.
X19.5	The Contractor submits a Task Order programme to the Service Manager within 14 days of receiving the Task Order.
X20	**Key Performance Indicators**
X20.1	A report of performance against each Key Performance indicator is provided at intervals of 3 months
X21	**Installation of Replacement Programmable Logic Controller**
X21.1	During year 1 of the Service period the Contractor shall replace with new the Programmable Logic Controller to operate all elements of the treatment Plant

GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works and Engineering

OPERATION AND MAINTENANCE

OF THE

TYNES BAY WATER TREATMENT FACILITY

ANNEX D

VOLUME 3

SERVICE INFORMATION

NEC 3 TERM SERVICE CONTRACT

JUNE 2005(AMENDED JUNE 2006)

NOVEMBER 2020

Table of Contents

SECTION 1: DESCRIPTION OF SERVICE

1.1 Scope of Work

A The scope of work shall be the overall operation, repair and maintenance of the Tynes Bay Water Treatment Facility. The *Affected Property* includes the main building and the adjacent ancillary buildings and associated plant (herein after referred to as the *Affected Property*) shall be operated and maintained in a manner that is in compliance with the terms of the Agreement, and that maintains the integrity of the *Affected Property*. The operation, repair and maintenance of the buildings and structures defined as *Affected Property* shall include the upkeep of cleanliness and housekeeping of all areas; upkeep of all internal plumbing and electrical systems; provision of telecommunication services with internet connectivity; and maintenance of air condition systems and spaces. Excluded from the Contractor's responsibilities will be the security systems and upkeep of the building fabric and water tightness of any structure.

B The *Affected Property* shall be operated to provide potable water to meet the demand level as required by the *Employer*.

C The *Contractor* shall provide all services that are required to sustain full functionality of the *Affected Property* and shall include but not be limited to:

1. Operation, repair and maintenance of feed wells to the *Affected Property*, including the mains between the wells and *Affected Property*;
2. Operation, repair and maintenance of the mains connection between the *Affected Property* and the North Shore Truckers' Outlet water storage tank and maintenance of tank level and tank filling control systems;
3. Operation, repair and maintenance of the *Affected Property* including all associated equipment; both internal and external;
4. Operation, repair and maintenance of the backup generator adjacent to the *Affected Property*;
5. Sampling, testing and collection of data; and
6. Prepare and submit monthly and quarterly reports as defined in the Service Information.

D Repair and maintenance of the *Affected Property* shall mean fixing any sort of mechanical or electrical *plant* should it be broken or not functioning

(repair) as well as performing the routine actions which keep the *plant* in working order (maintenance) or prevent trouble from arising (preventive maintenance). Repair shall also include the replacement of parts when it is not possible to fix an item of *plant*.

E The *Affected Property* shall be operated and maintained for the Service Period which is stated in Part One of the Contract Data.

F The service shall be conducted under the NEC3 Term Service Conditions of Contract (June 2005) (with amendments dated June 2006).

1.2 Security of the Site

A The *Contractor* is responsible for maintaining the security of the site area.

1.3 Submittals

- *Contractor*'s Plan
- Copies of certification and where appropriate work permits for workforce
- Insurance Certificates
- Monthly and Quarterly Reports

SECTION 2: PLANT AND MATERIALS

2.1 Plant

A The *Affected Property* includes a 1,000,000 imperial gallon per day (igpd) seawater reverse osmosis plant. The plant consists of two trains which can be operated together or independently. The first train was completed in April 2009. The second train was completed in June 2011.

B The main components of the plant include:

- Three seawater wells including pumps
- Media filters
- Two individual Reverse Osmosis treatment trains
- Cartridge filters
- Scrubbers
- Energy Recovery systems
- Post-treatment system
- Backup generator
- Plant infrastructure

C The *Contractor* is responsible for providing all materials and equipment required for the operation and maintenance of the *Affected Property*. This includes the provision of heavy lifting equipment as necessary.

D The plant shall be maintained as per the manufacturers recommendations which is included in the Equipment and Operations Manual for the *Affected Property*.

E Further details and information about the plant is located in the Equipment and Operations Manual for the *Affected Property*.

2.2 Materials

A The *Contractor* shall be responsible for all consumable materials required to operate and maintain the *Affected Property*.

2.3 Spares

A A supply of specific spares is available for the plant. The list of spares currently in inventory is included in Appendix A.

B The current Contractor has a list of further spares and consumables available for purchase by the incoming Contractor. All costs associated with the purchase of such additional items are to be included in the Contractor's bid price.

2.4 Diesel Fuel

A The *Employer* shall be responsible for the purchase of fuel for the emergency generator. The *Contractor* shall ensure that adequate notice is given to the *Employer* when fuel levels are low.

2.5 Seawater Wells

A The seawater wells shall be cleaned every six months to maintain their performance and to ensure an adequate flow of raw water. The cleaning shall include the following;

1. Remove the pump from the well.
2. Mix and pump a chlorine solution into the well.
3. Let stand for 24 hours.
4. Agitate the chlorine solution in the well using a drillers rig.
5. Reinstall pumps and pump wells to divert waste until there is no chlorine residual
6. Once the presence of chlorine is no longer detected in the raw water, the water can be redirected back to the plant.

B A crane and well drilling rig will be required to complete the cleaning work.

SECTION 3: PROPERTY AND FACILITIES

3.1 Affected Property

A The Affected Property is located at 56 North Shore, Devonshire. Infrastructure for the *Affected Property* also exists at 45 North Shore Road, Devonshire which is located directly north of the Affected Property.

B As-built drawings of the *Affected Property* are contained in the Equipment and Operations Manual.

3.2 Building

A The building is a 6300 sq ft, two-storey prefabricated structure located at the eastern side of the Affected Property.

B Electrical power is supplied via the Tynes Bay Waste-to-Energy Facility or BELCO or Standby Power Generator. All power costs shall be paid by the *Employer*.

C The eastern portion of the building is air-conditioned. All other areas of the building are not air-conditioned.

D Water for the *Affected Property* is primarily provided from the cistern located at the southeast corner of the Affected Property.

3.3 Use Of Affected Property

A The *Contractor* shall have full use of *Affected Property* for the service during the Service Period of the Contract except as directed by the *Employer*.

B The *Contractor* shall arrange a site visit to the *Affected Property* to show the *Employer* how the plant is operating. These visits can be arranged around the Quarterly Performance Report submission.

3.4 *Employer*'s Access

A The *Affected Property* shall be accessible to the *Employer* or *Service Manager* at all times. The *Employer* shall have access whether by electronic or standard lock system. The *Employer* or *Service Manager* shall give notification to the *Contractor* when access is required.

3.5 Damages to Affected Property

A The *Contractor* shall make good any damages made to the *Affected Property* during the Service Period as a result of actions by the *Contractor*. The damages shall be repaired to match existing or as approved by the *Employer*.

B Normal maintenance and damages to the building and surrounding grounds shall be reported to the *Service Manager*.

3.6 Transfer of the *Affected Property*

A Transfer of the *Affected Property* shall be undertaken in an orderly manner at the commencement and completion of the Service Period.

B The actual time of day for the transfer of the plant from the *Employer* to the *Contractor* shall be agreed upon prior to commencement of the Service Period.

C A list of all services shall be provided to the *Contractor* prior to commencement of the Service Period. This includes telephone and internet access. These services shall be transferred to the *Contractor* and all associated costs shall be borne by the *Contractor* during the Service Period.

D The *Service Manager* and *Contractor* shall complete an initial joint inspection of the *Affected Property* prior to commencement of the Service Period and agree and certify the condition and operational competency of the *Affected Property*. The following parameters shall be confirmed;

Parameter	**Value**
Calcite Concentration (ppm)	250 (maximum)
Conductivity (Microseimens)	700 (average)
PH	7 (minimum)
Residual Chlorine	0.6 (minimum)
Flow rate per train (US gallons per minute)	375 (minimum)

The product water shall conform to the parameters outlined in Appendix B.

E The *Affected Property* shall be shut down by the *Employer* once the condition and operational competency of the *Affected Property* are confirmed. The *Contractor* shall start the *Affected Property* and commence the Service Period.

F At the completion of the Service Period the *Affected Property* shall be

transferred in the same manner as at the commencement of the Service Period.

G The *Service Manager* and *Contractor* shall complete an inspection at the end of the Service Period. The *Affected Property* shall be fully operational and the *Service Manager* shall certify condition and operational competency. The *Contractor* shall undertake any works required by the *Service Manager* to return the *Affected Property* in same condition and operational competency as when certified prior to commencement of the Service Period, except for reasonable wear and tear as determined by the *Service Manager*. The *Affected Property* shall be fully operational and conform to the operational parameters listed in 3.6 (D) of the Service Information.

H The *Employer* may elect to purchase the remaining consumables from the *Contractor* at the end of the Service Period. The *Employer* may also elect to purchase any tools or equipment from the Contractor at the end of the Service Period with a depreciation rate of 6% per annum. The *Contractor* shall provide evidence of original purchase price and date.

SECTION 4: *CONTRACTOR*'S PLAN

4.1 Plan Details

A The *Contractor* shall prepare a plan detailing how the service shall be undertaken. This should include a management plan which entails:

1. The Management Structure;
2. Contingencies for problem solving;
3. Coverage for staff absences;
4. Financial Control;
5. Health and Safety Program (HSP);
6. Communications plan with Employer which includes contact information for key personnel;
7. Hurricane preparedness and emergency plan; and
8. Blackout operations plan (i.e. loss of electrical power).

4.2 Programme of Works

A The *Contractor* shall plan to operate both trains to ensure that both are available if necessary. The operation shall be rotated periodically and agreed with the Service Manager when only half of the *Affected Property's* capacity is required.

B The *Contractor* shall include a maintenance schedule programme coordinating all tasks and activities and based on the maintenance schedule in Annex H.

C The *Contractor* shall include the maintenance of the generator (including the tank and screens) in the programme of works. The generator shall be operated on full load (one RO train only) for a minimum of one day (24 hours) per month.

4.3 Warning Notices

A The *Contractor* must issue a warning notice to the Service Manager any time it is required to take corrective actions that will impact on the delivery of the service to the *Employer*.

B The *Contractor* shall provide details in the plan which indicates how notification shall be accomplished.

4.4 Hurricanes and Emergency Preparations

A The Contractor shall coordinate with the Employer during tropical storms, hurricanes or other extreme weather conditions.

B In the event of a hurricane, the *Contractor* shall operate the *Affected Property* as follows:

- When a Hurricane Watch is issued by the Bermuda Weather Service, the generator shall be inspected and prepared for operation. Fuel levels, battery condition etc shall be checked.
- The *Affected Property* shall be operated until a Hurricane Warning is issued from the Bermuda Weather Service or at the end of the work day; whichever occurs first. The *Affected Property* shall be shut down to protect it from any damage for the duration of the storm. If the Prospect reservoirs are already full, the *Contractor* will be notified by the *Service Manager* to cease operations until after the storm. The *Affected Property* shall be made secure to minimise any damage from the storm.

C The *Contractor* shall have personnel available to attend the *Affected Property* after a storm. The *Contractor* shall report to the *Affected Property* as soon as is practicable, to assess any potential damage and prepare to restart the *Affected Property*. No water should be sent to the Prospect Reservoirs before notifying and coordinating operations with the *Service Manager*.

SECTION 5: SAFETY AND HEALTH

5.1 Legislation

A The *Contractor* shall comply with all current Health and Safety Legislation.

5.2 Health and Safety Program

A The *Contractor* shall prepare a Health and Safety Program as per Section 4, Clause 4.1 (A) of the Service Information.

5.2 Notification

A The *Contractor* shall, immediately upon the occurrence of any accident at or about the Affected Property, or in connection with the execution of the Works, report such accident to the *Service Manager*. The *Contractor* shall also report such accident to the appropriate Authority whenever such report is required by Law.

B The *Contractor* shall post notices to inform the workers of their conditions of work in conspicuous places at the establishments and work places concerned.

5.3 Safety During Tours

A The *Employer* occasionally conducts tours of the *Affected Property* to Government employees and members of the public. If the *Affected Property* is in operation, no member of the public shall enter the main plant floor.

B No tours shall be undertaken by the *Contractor* without written permission of the *Employer*.

SECTION 6: TESTS AND INSPECTIONS

6.1 Water Quality Standards

A The quality of the water produced by the *Affected Property* shall conform to the Drinking Water Standards contained in Appendix B. This standard is the minimum requirements as established by the Department of Health.

6.2 Measurement Requirements

A In addition to activities that the *Contractor* must perform to satisfy obligations under other sections of this Contract, the *Contractor* is required to provide the sampling and analytical services. All analysis is to be performed in accordance with the protocols and procedures specified in the product water criteria.

6.3 Measurement of Volumes

A The measurement of the volumes of treated water, and basis for payment will be at the point where the treated water exits the *Affected Property* after the pumping unit. The volume of raw water entering the *Affected Property* shall be measured and included with the monthly reports.

All measurements are to be continuous and recorded electronically using SCADA system.

6.4 Measurement of Physical and Chemical Parameters

A Weekly bacteriological testing samples can be delivered to the Central Government Laboratory located at Building 332, 11 Waller's Point Road, St George's Parish. Arrangements will need to be made with the laboratory for an appropriate delivery time. There is a charge per sample (as per current Government Tariff Schedule) all costs to be included by the *Contractor*. The requirements below are the minimum required by the *Employer*. The *Contractor* may require more frequent sampling and analysis for process control.

Raw sea water

- ***Continuous*** - pressure, flowrate
- ***Quarterly*** - TDS, SDI, Iron, H_2S

Product water

- ***Continuous*** – TDS, residual chlorine, flowrate, conductivity, reservoir level at Prospect Reservoir

- ***Weekly*** - Total Coliform, fecal coliform, E. Coli
- ***Quarterly –*** All parameters in the EPA National Primary Drinking Water Standards.
- ***Annual –*** All parameters in the EPA National Primary and Secondary Drinking Water Standards

SECTION 7: RECORD KEEPING

7.1 Reporting

A The *Contractor* shall develop and maintain a system for documenting the operation of the *Affected Property* and other components of the affected property, and preparing monthly reports to the *Employer*. The information includes, but is not limited to that required for the calculation of payments due. The *Employer* may require additional information that the *Contractor* would normally be expected to compile as complete documentation of the service.

B The report shall be submitted to the *Service Manager* each month and shall be used as a basis for payment when invoice is received. The *Contractor* shall meet with the *Service Manager* to review the report. No payment shall be made until the report is received.

7.2 Monthly Performance Report

A The following details shall be contained in the monthly performance report.

- Summary of daily operations.
- Report of all days when water was not treated and/or the *Affected Property* was not available for treating such water.
- Identify the length of time the *Affected Property* was not in operation at a materially low level - report reason for such failures.
- Summary of all maintenance performed at the *Affected Property*.

Detailed daily and continuous measurements to be retained by the *Contractor* and summarized for the *Employer* in the Monthly Report. This shall include:

- Plant totaliser meter readings to Prospect reservoirs
- Each RO train totaliser meter readings
- Average flow rate from *Affected Property*
- Average conductivity of product water
- Number of productions days
- Number of unscheduled downtime days or any part thereof
- Daily production rate of each train including percentage run times of each train
- Total volume of water produced in a month at *Affected Property*
- Monthly production for each train
- Chemical usage per month
- Media filter inlet pressure and differential pressure
- Total run time, in hours, of the emergency generator
- Total diesel fuel consumption

- Results of bacteriological and chemical tests

B A log shall be kept of all maintenance performed on-site as per the maintenance schedule in Appendix A. The log shall be available for review by the *Employer* at all times.

7.3 Quarterly Performance Report

A The Quarterly Report shall contain a summary of overall operations. Results of analysis of the quarterly parameters measured shall be presented.

7.4 Statutory Reporting

A The *Contractor* shall maintain all records and reports as required by law.

SECTION 8: MAJOR EQUIPMENT PROCUREMENT

8.1 Objectives

A The *Contractor* shall have a consistent approach to purchasing to achieve the following objectives:

- Value for money,
- Fairness, i.e. quotations and/or tenders will be treated equally,
- Conduct of business openly and without restrictive practice,
- A variety of suppliers are given the opportunity to quote,

8.2 Initiation of Procurement Process

The *Contractor* must issue a warning notice to the Service Manager any time it is required to take corrective actions arising from the failure of a major piece of equipment that will impact on the delivery of the service to the *Employer*. Within three days the Employer will give written confirmation to initiate the Procurement Process.

8.3 Procurement Process

A

(1) Where the values of items are less than $10,000(Ten Thousand Dollars) the full procedures are given under SECTION 8 will not apply. Where the values of items are greater than $10,000(Ten Thousand Dollars) all goods shall be obtained based on at least three quotations and the full procurement process must be followed. The range of suppliers requested to provide quotations must be as wide as practicable.

(2) Company Officers responsible for ensuring that these procedures are followed may be called upon to justify the tendering process.

(3) The Contractor shall clearly state all the relevant information necessary to secure an accurate price for the replacement equipment.

(4) The Contractor must obtain Quotations in writing and retain all documentation for the duration of the Service Period and hand over the documentation at the end of the Contract.

(5) A closing date/time for submission of quotations must be stated and strictly observed.

(6) The lowest price must be accepted or reasons for not accepting the lowest price must be documented.

(7) Unsuccessful suppliers should not be allowed to re-submit a lower quotation price - the first quotation must be accepted.

(8) Successful and unsuccessful suppliers should be notified in writing.

(9) When requesting quotations from foreign suppliers, ensure that total landed cost is used to compare to local quotations. Landed cost should include purchase price, exchange, freight, duty and all handling costs.

B (1) The purchase of any item under the value of $5,000(Five Thousand Dollars) shall be preceded by an email notification to the Service Manager detailing the justification of the need for the replacement and its estimated cost. The Service Manager shall respond with an approval by the next working day. Where the Service Manager fails to respond by the next working day the purchase will be deemed to have been approved by the Service Manager.

(2) The purchase of replacement items held as part of the spares inventory will not be subject to any procurement requirements

8.4 Payment

A Prior to the accepting any quote for Major Equipment the Contractor shall submit a recommendation to the Employer for approval. Within seven days the Employer will give written confirmation to proceed with the purchasing the recommended goods.

B Upon receipt of the goods at the plant and a confirmed transfer of title to the Employer the Contractor shall submit an invoice for payment. The invoice shall include all fees and services associated with the installation of the major equipment.

C As part of the Contractors' bid a fee for the procurement service under this Section shall be included in Annex A: Price Schedule submitted with the Contractors bid.

D For items that are purchased under the $5,000 (Five Thousand Dollar) limit the Contractor shall submit at the end of each month a separate payment request along with documentation to confirm transfer of title of each item to the Employer.

APPENDIX A

SPARE PARTS LIST

Media Filter Recommended Spare Parts

Air vent valve	Astral Pool 2" PVC Air Relief
Distribution nozzle	Astral Pool Custom Part
Gravel Media	Astral Pool Various Grades
Anthracite media	Astral Pool 50lb Bags ANTH 85 (0.85 - 0.95mm Anthracite)

Cartridge Filter Spare Parts

Basket o-ring	Tua Engineering Custom Dimensions for TRPO-100
Filter Lid o-ring	Tua Engineering Custom Dimensions for TRPO-100

High Pressure Pump Spare Parts

Pump rebuild Kit	Fluid Equipment Development Co FedCo Part# 4-01200K
Pump Bearing Kit	Fluid Equipment Development Co FedCo Part # 4-0120-BK
6" Vic Clamp and Seal	Victaulic Corporation Style 77 6" Galvanized with EPDM Gasket
4" Vic Clamp and Seal	Victaulic Corporation Style 77 4" Galvanized with EPDM Gasket

RO Membrane Array Spare Parts

RO membranes	Filmtec 40" x 8" SW30HRLE400
Inteconnector o-ring	Parker 2-119
3" Vic clamp and seal	Victaulic Corporation Style 77 4" Galvanized with EPDM Gasket
Product Nipple assembly	Aerex Industries Custom Part

Energy Recovery System Spare Parts

Pneumatic Isolation Valve	Asahi America Type 56 8" 150# With Double Acting Pneumatic Actuator
PX-220 rebuild Kit	Energy Recovery Inc ERI Part # 20014-01
ER Boost Pump	Fluid Equipment Development Co FedCo Part # 4-0160-1-0284-60-0-1-0
ER Boost Pump Rebuild Kit	Fluid Equipment Development Co FedCo Part# 4-01600K
ER Boost Pump Motor	Baldor 30-460/60/3 284TC Frame TEFC
ER Boost Pump Bearing Kit	Fluid Equipment Development Co FedCo Part # 4-0160-BK

Product Delivery System Spare Parts

Product Pump Parts

Motor	Bluemenauer Corporation Vertical 60 hp TEFC With Thermostat and Space heater
Line Isolation valve	Asahi America Type 56 8" 150# Manual Gear

Post Treatment System Spare Parts
Degasifier / Scrubber System

Blower Motor	Baldor #M3714T
Pump motor	Worldwide Motor 7.5 hp TEFC with Space Heater and Thermostat
Level Switch	Omega LV-90
Grundfoss dosing Pumps	GrundFoss DME8-10 AR-PV/V/C-F-21RRB

Engine QST30 3,000hrs

Maintenance Parts

Element Air Cleaner	Cummins Power South 140-3163
Element Lub Oil Filter	Cummins Power South LF670
Element Fuel Filter	Cummins Power South FF202
Element Crn Resistor	Cummins Power South WF2075
Front Crank Seal	Cummins Power South 3016792
Rear Crank Seal	Cummins Power South 3092821
Accessory Drive Seal	Cummins Power South 3092812
Thermostat	Cummins Power South 3092114
Seal Thermostat	Cummins Power South 3092399

Support Parts Engine

Belt Alternator	Cummins Power South 3094909
Solenoid Fuel Pump	Cummins Power South 4024809
Oil Drain Plug	Cummins Power South 3678611
Oil Drain Washer	Cummins Power South 3093799
Turbo HX80	Cummins Power South 4025026
Turbo Repair Kit	Cummins Power South 3575236
Kit Water Pump Repair	Cummins Power South 3800322-NX

APPENDIX B

DRINKING WATER STANDARDS

Chemical

		Maximum Acceptable Limit
Aresenic	…….	**0.05 mg/l**
Cadmium	…….	**0.005 mg/l**
Chromium	…….	**0.05 mg/l**
Cyanide (CN)	…….	**0.05 mg/l**
Flouride	…….	**1.5 mg/l**
Lead	…….	**0.015 mg/l**
Mercury	…….	**0.001 mg/l**
Nitrate (as N)	…….	**10.00 mg/l**
Nitrite (as N)	…….	**1.00 mg/l**
Selenium	…….	**0.01 mg/l**
Silver	…….	**0.05 mg/l**
Pesticides (total)	…….	**0.005 mg/l**
Phenols	…….	**0.002 mg/l**
Trihalomethanes	…….	**0.10 mg/l**
Asbestos fibres	…….	**7 x 10^6 fibres/l**

Aesthetic Quality

Aluminium	…….	**0.2 mg/l**
Chloride	…….	**300.0 mg/l**
Colour	…….	**15 (TCU)**
Copper	…….	**1.0 mg/l**
Anionic synthetic detergents	…….	**0.2 mg/l (no foaming, taste, no odour problem)**
Hardness	…….	**300.0 mg/l**
Total Dissolved Solids	…….	**800.0 mg/l**
Iron	…….	**0.3 mg/l**
Manganese	…….	**0.1 mg/l**
pH	…….	**6.5 – 8.5**
Sodium	…….	**200 mg/l**
Sulfate	…….	**250.0 mg/l**
Turbidity	…….	**1-5 (JTU)**
Zinc	…….	**5.0 mg/l**

Bacteriological

Treated Water Entering Distribution System		
Faecal coliforms	…….	**0/100 ml**

Coliform organisms	**…….**	**0/100 ml**

<u>Unpiped Water Supplies</u>

Faecal coliforms	**…….**	**0/100 ml**
Coliform organisms	**…….**	**5/100 ml (should not occur repeatedly)**
Chlorine residual	**…….**	**0.5 ppm**

Note: These standards are the requirements set forth by the Bermuda Government, Department of Health.

GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works and Engineering

OPERATION AND MAINTENANCE
OF THE
TYNES BAY WATER TREATMENT FACILITY

ANNEX E - SERVICE LEVEL TABLE

JANUARY 2016

Service Level Table

Service	Low Service Level	Damages
The operation, maintenance and repair of the Tynes Bay Water Treatment Facility to provide potable water to meet the demand level required by the *Employer*.	When the *Contractor* through his own negligent actions fails to produce sufficient water to meet the Customer Demand (Low Service Volume or LSV) up to a maximum average of 575,000 imperial gallons per day for any given one (1) month period. The Facility shall have 95% availability from March to July. The Facility shall have 75% availability between August and February. This availability shall be averaged over a one (1) month period.	The *Contractor* shall pay the *Employer* $34 per 1000 imperial gallons for the difference in the volume of the water produced below the low service level (Volume Water Produced or VWP) and the amount stated as the low service level (LSV). Damages = (LSV - VWP) x $34 / 1000 imp gal

I/We also certify that I/We accept the method of assessment of damages for failure of Service:

Signed

(1) _____Status_____Date _____

(2) _____Status_____Date_____

for and on behalf of

_____

GOVERNMENT OF BERMUDA

Ministry of Public Works
Department of Operations and Engineering
Water Section

Ministry of Public Works

Department of Works and Engineering

Upgrade/Replacement Tyne's Bay Water Treatment Plant Control System

GOVERNMENT OF BERMUDA

Ministry of Public Works
Department of Operations and Engineering
Water Section

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GOVERNMENT OF BERMUDA

Ministry of Public Works
Department of Operations and Engineering
Water Section

The following scope of work describes a turnkey solution to provide a Control & Monitoring System upgrade/replacement for Government operated Tynes Bay Water Treatment Plant

1.0 CURRENT FACILITIES

The water treatment plant located at Tynes Bay was commissioned in 2005 and consists of two (2) RO units (Train 1 and Train 2) operated by a common control system. The RO plant treats sea water abstracted from three wells in close proximity to the plant.

The existing control and monitoring equipment for the Tynes Bay RO plant **(detailed in Appendix A)** comprises of a GE Fanuc control system supported by a GE Operator Interface and Wonderware InTouch monitoring system. This plant consists of a single controller for the entire plant with wonderware software run on a Personnel Computer to provide operator interface.

The control and monitoring system uses a new version of the GE controller and as a result the hardware and software are not compatible with other Government-owned facilities. In addition, the monitoring system makes use of a version of the Wonderware InTouch HMI software which is also not compatible to the other water treatment plants.

The entire control and monitoring system is protected by an office-class UPS unit.

2.0 SCOPE OF WORK

The following is a scope of work to provide a Control & Monitoring System upgrade for Government operated Water Treatment Plant at Tynes Bay.

2.1 Summary

The associated works are to include, but not limited to the following:

1) Hardware incl. PLC, I/O, Ethernet, racks, etc. plus 4G cell modem.

2) Allen Bradley VersaView 6300M - 24ins wide Industrial Monitor/HMI

3) Satellite Wall Mounted Allen Bradley ArmorView Plus 7 12 ins HMI

4) HMI software – Allen Bradley Factory Talk View

5) New design drawings for the PLC replacement.

6) PLC and HMI programming.

7) All commissioning costs for one week on site including all rack replacements and wiring

2.2 Proposed Works

2.2.1 Timing

The Contractor is required to provide the Client with 7 days' notice before commencing the transition from the old control system to the new. All transition works must be completed in 6 days and the Contractor must provide all necessary personnel to continue running the existing plant during the transition. The plant will not be required to continue operation overnight between 7pm and 7am during the transition.

2.2.2 General Submittal Procedure Requirements:

Prior to the commencement of the transition the Contractor shall the following electronic submittals via email as PDF electronic files.

Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

Mark each copy of each submittal to show which products and options are applicable.

Include the following information, as applicable:

- Manufacturer's catalog cuts.
- Manufacturer's product specifications.
- Standard color charts.
- Statement of compliance with specified referenced standards.
- Testing by recognized testing agency.
- Application of testing agency labels and seals.
- Notation of coordination requirements.
- Availability and delivery time information.

Submit Product Data in PDF electronic file.

Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

2.2.3 Control System Replacement

The Contractor shall upgrade and standardize the entire control system to the Allen-Bradley ControlLogix platform, the same platform used at the Government owned Tynes Bay WTE Facility. This approach shall result in future savings on personnel training, troubleshooting, common spare parts and technical support. All existing cabinetry to be utilized as far as is feasible.

A single main control interface will be installed adjacent to the existing control cabinet. This will be a Allen Bradley VersaView 6300M panel. Integrated with this will be a satellite HMI an Allen Bradley ArmorView Plus 7 12 ins HMI located remotely on the ground floor to allow operator access during maintenance operations.

The work is to include the redesign and simplification of operator graphic screens in order to better navigate the system. HMI software shall be based on- Factory Talk by Rockwell Automation products. The new layout shall also offer streamlined alarming and signal trending. The upgraded system shall transmit key operational data via the internet to provide a web based interface for the client to have real-time plant monitoring.

The work shall include the installation of a single industrial grade UPS to replace individual UPS units. The industrial grade UPS shall be rated to maintain control system power for 4 hours and protect against power surges.

The proponent shall provide an engineering laptop to house master software licenses and master water treatment plant software applications. The engineering laptop shall be used to trouble-shoot and maintain the entire control system.

2.2.3.1 Engineering Laptop:

In order to reduce and simplify relevant software licences for the water treatment plant, a single engineering laptop shall be supplied and used for making PLC and HMI modifications for the water treatment plant. The engineering laptop shall be inclusive of hardware, for making separate standalone backups, MS Office, .dwg viewer, .pdf creator, virus protection, etc. An engineering workstation shall be located in the central office of the Tynes Bay Water Plant.

2.2.3.2 Backup HMI:

In order to add a level of redundancy to control the water treatment plant, a single backup Allen Bradley VersaView 6300M panel HMI Workstation shall be supplied fully configured and tested. The backup HMI shall follow the same specifications as the installed HMI. The backup workstation shall be located in the central office.

2.2.3.3 Software licences:

The Engineering Laptop shall hold a single software licence for the PLC program, Operator Interface, communications software and a developer licence for the HMI software. The central workstation and backup workstation shall include RT licenses for all software used.

2.3 Cost Estimate

The vendor will submit a quotation as follows:

Costs for design and development

Cost for installation including supply of all equipment onsite works to transition from old to new

2.4 Options

Provide a comprehensive list of recommended spares and prices for two (2) years of operation.

2.5 Other

The turnkey solution shall include a fully commissioned system startup, two (2) days formal training and three (3) sets of O&M Manuals in both hard-copy and electronic format. All CAD drawings shall be in AutoCAD 2019 format.

APPENDIX A – DETAILS OF EXISTING SYSTEM

Description:

The Supervisory Control and Data Acquisition System (SCADA) currently installed is designed for the collection and manipulation of the operating data from the plant and a control network which handles the operating logic, the interlocks and generates alarms to alert the operators to any conditions that are outside the preset parameters.

The SCADA software has the following workstation:

Interface PC

- Wonderware Intouch 9.0 Development with I/O
- Wonderware Industrial SQL for data collection and historization
- Wonderware Active Factory for historical trending
- PC Anywhere V .11.5

All software licenses are registered to the Government of Bermuda.

The PC communicates via Ethernet to the plant PLC using I/O drivers from Wonderware.

All analog data, and alarms will be recorded in the system historian on the PC which has a rolling list log. Recorded data are available for output as graphic based reports and as queries in csv (comma separated variable) format which can be imported into data base programs, such as Microsoft Excel.

Alarms

All alarms are logged and stored on the PC. Alarms are generated by the control system to tell the operator that a problem has occurred in a portion of the process. When an alarm occurs, a flashing warning is visible on the interface PC and an alert sound will be generated. When an Alarm triggers a shutdown the plant an Autodialler is used to call out to the operator.

Workstation.

All currently active alarms can be viewed by selecting the alarm screen on interface PC. When an alarm is acknowledged, the alert sound will be silenced and the visual alert will no longer flash. When the alarm condition has been corrected, it can be cleared by selecting Reset on the alarm screen of the workstation. AU alarms, alarm acknowledgement and alarm-reset actions are logged on the system historian.

Alarms generally arise from the failure of mechanical equipment which is detected by process parameters going out of range. There are not switches on the valves to determine if they open or close for example.

The PLC and Field control panel details

The PLC is a GE series 90-30 with CPU Model 374 (240Kbytes configurable user memory. processor with remote input/outputs (I/0) as required for the control system. The battery for the CPU is included in the CPU backplane box, Embedded Ethernet 10/ 1 00Mbs w/built-in switch. The processor network consists of:

- Ethernet communications capability for communications with the interface PC.
- The VFD for each motor controller is hard wired to the PLC for operational control.

Main Control Panel (MCP)

The main control panel will be located in the Control Room and contains the following devices

- GE 90-30 series PLC
- Processor (Part# IC693CPU374): CPU 374 Module (240K Bytes configurable user memory) The battery for the CPU is now included in the CPU backplane box, Embedded Ethernet 10/ lO0Mbs w/built-in switch, 133Mhz Processor Speed, Web diagnostic support. No serial ports.
- Base (Part# IC693CHS391): Base, CPU, 10 Slots, Use With CPU331/CSE331 and above
- Power Supply (Part# IC693PWR330): Power Supply, 120/240 Vac, 125 Vdc, High Capacity. Battery not included. Battery is now included in the CPU backplane box.
- Plant E-Stop Relay connected to each MCC bucket and external equipment for Emergency Shutdown. The E-Stop will also be monitored by the PLC for proper shutdown sequence of the RO Plant
- Autodialer mounted exterior to the plc cabinet

Remote Control Panels

There are no remote control panels in the plant. There are marshaling cabinets with local instrumentation on them

Documentation

The following is provided for information:

Appendix A.1 – List of PC IO Points

Appendix A.2 – IO Diagrams

Appendix A.3 – Screen Shots

Appendix A.4 – Control Programs

Appendix A.1 List of PLC IO Points

Introduction

The following tables summarise the number of I/O points per panel for the existing control system.

Tynes Bay RO Plant

Main Rack 0

Slot	Description	Model	Comment
	Chassis, 13-slot , Power Supply 120VAC	GE IC693PWR321	
	Ethernet	GE IC693CMM321	
	Processor	GE IC693CPU350	
4	Input, 16-point, 120VAC	GE IC694MDL240	16 points used
5	Input, 16-point, 120VAC	GE IC694MDL240	13 points used
6	Output, 16-point, 120VAC	GE IC694MDL350	7 points used
7	Output, 16-point, 120VAC	GE IC694MDL350	7 points used
8	Output, 8-point, Relay	GE IC694MDL930	8 points used
9	Output, 8-point, Relay	GE IC694MDL930	8 points used
10	Input, 16-point, Analog	GE IC694ALG223	9 points used
11	Input, 16-point, Analog	GE IC694ALG223	9 points used
12	Output, 8-point, Analog	GE IC694ALG392	6 points used
13	Output, 8-point, Analog	GE IC694ALG392	8 points used
14	Input, 4-point, Analog	GE IC694ALG???	Spare?
15	Input, 4-point, Analog	GE IC694ALG???	Spare?

Appendix A.1 List of PLC IO Points

Extended I/O Rack 1

Slot	Description	Model	Comment
	Chassis, 10-slot , Power Supply 120VAC	GE IC693PWR321	
	Ethernet	GE IC693CMM321	
1	Input, 16-point, 120VAC	GE IC694MDL240	9 points used
2	Input, 16-point, 120VAC	GE IC694MDL240	spare
3	Output, 16-point, 120VAC	GE IC694MDL350	8 points used
4	Output, 16-point, 120VAC	GE IC694MDL350	spare
5	Output, 8-point, Relay	GE IC694MDL930	8 points used
6	Input, 16-point, Analog	GE IC694ALG223	16 points used
7	Input, 16-point, Analog	GE IC694ALG223	11 points used
8	Output, 8-point, Analog	GE IC694ALG392	8 points used
9	Spare		

END OF SECTION

Appendix A.2 IO Diagrams

Index

To Power Distribution | BTB--

120V Neutral

BTB-- | From Power Distribution

120V Supply

16 Channel Digital Output Module #1

Well Pump #1 DO-1000	PLC DO1-1
Well Pump #2 DO-1001	PLC DO1-2
Well Pump #3 DO-1002	PLC DO1-3
Train 1 High Pressure Pump DO-3110	PLC DO1-4
Train 2 High Pressure Pump DO-3114	PLC DO1-5
Train 1 ER Boost Pump DO-3312	PLC DO1-6
Train 2 ER Boost Pump DO	PLC DO1-7
Product Transfer Pump #1 DO-5301	PLC DO1-8
Product Transfer Pump #2 DO-5306	PLC DO1-9
Cleaning Flush Pump #2 DO-7000	PLC DO1-10
Degasifier Blower DO-5103	PLC DO1-11
Scrubber Recirculaton Pump DO-5112	PLC DO1-12
Calcite System Feed Pump DO-5201	PLC DO1-13
Air Compressor DO-9101	PLC DO1-14
Spare	PLC DO1-15
Spare	PLC DO1-16

16 Channel Digital Input Module #1

Well Pump #1 VFD Fault DI-1000	PLC DI1-1
Well Pump #2 VFD Fault DI-1001	PLC DI1-2
Well Pump #3 VFD Fault DI	PLC DI1-3
Train 1 High Pressure Pump VFD Fault DI-3110	PLC DI1-4
Train 2 High Pressure Pump VFD Fault DI-3114	PLC DI1-5
Train 1 ER Boost Pump VFD Fault DI-3312	PLC DI1-6
Train 2 ER Boost Pump VFD Fault DI	PLC DI1-7
Product Transfer Pump #1 VFD Fault DI-5301	PLC DI1-8
Product Transfer Pump #2 VFD Fault DI-5306	PLC DI1-9
Calcite System Feed Pump VFD Fault DI-5201	PLC DI1-10
Spare	PLC DI1-11
Spare	PLC DI1-12
Spare	PLC DI1-13
Spare	PLC DI1-14
Spare	PLC DI1-15
Spare	PLC DI1-16

PLCTP-D1- 1	Black	
PLCTP-D1- 2	White	Well Pump #1 VFD DI-1000
PLCTP-D1- 3	Black	
PLCTP-D1- 4	White	Well Pump #2 VFD DI-1001
PLCTP-D1- 5	Black	
PLCTP-D1- 6	White	Well Pump #3 VFD
PLCTP-D1- 7	Black	
PLCTP-D1- 8	White	Train 1 High Pressure Pump VFD DI-3110
PLCTP-D1- 9	Black	
PLCTP-D1- 10	White	Train 2 High Pressure Pump VFD DI-3114
PLCTP-D1- 11	Black	
PLCTP-D1- 12	White	Train 1 ER Boost Pump VFD DI-3312
PLCTP-D1- 13	Black	
PLCTP-D1- 14	White	Train 2 ER Boost Pump VFD DI
PLCTP-D1- 15	Black	
PLCTP-D1- 16	White	Product Transfer Pump #1 VFD DI-5301
PLCTP-D1- 17	Black	
PLCTP-D1- 18	White	Product Transfer Pump #2 VFD DI-5306
PLCTP-D1- 19	Black	
PLCTP-D1- 20	White	Cleaning Flush FVNR Starter DI-7000
PLCTP-D1- 21	Black	
PLCTP-D1- 22	White	Degasifier Blower FVNR Starter DI-5103
PLCTP-D1- 23	Black	
PLCTP-D1- 24	White	Scrubber Recirculaton Pump FVNR Starter DI-5112
PLCTP-D1- 25	Black	
PLCTP-D1- 26	White	Calcite System Feed Pump VFD DI-5201
PLCTP-D1- 27	Black	
PLCTP-D1- 28	White	Air Compressor FVNR Starter DI-9101
PLCTP-D1- 29	Black	
PLCTP-D1- 30	White	Spare
PLCTP-D1- 31	Black	
PLCTP-D1- 32	White	Spare
PLCTP-D1- 33		
PLCTP-D1- 34		
PLCTP-D1- 35	Black	
PLCTP-D1- 36	White	Well Pump #1 VFD Fault DO-1000
PLCTP-D1- 37	Black	
PLCTP-D1- 38	White	Well Pump #2 VFD Fault DO-1001
PLCTP-D1- 39	Black	
PLCTP-D1- 40	White	Well Pump #3 VFD Fault DO
PLCTP-D1- 41	Black	
PLCTP-D1- 42	White	Train 1 High Pressure Pump VFD Fault DO-3110
PLCTP-D1- 43	Black	
PLCTP-D1- 44	White	Train 2 High Pressure Pump VFD Fault DO-3114
PLCTP-D1- 45	Black	
PLCTP-D1- 46	White	Train 1 ER Boost Pump VFD Fault DO-3312
PLCTP-D1- 47	Black	
PLCTP-D1- 48	White	Train 2 ER Boost Pump VFD Fault DO
PLCTP-D1- 49	Black	
PLCTP-D1- 50	White	Product Transfer Pump #1 VFD Fault DO-5301
PLCTP-D1- 51	Black	
PLCTP-D1- 52	White	Product Transfer Pump #2 VFD Fault DO-5306
PLCTP-D1- 53	Black	
PLCTP-D1- 54	White	Calcite System Feed Pump VFD Fault DO-5201
PLCTP-D1- 55		
PLCTP-D1- 56		
PLCTP-D1- 57		
PLCTP-D1- 58		
PLCTP-D1- 59		
PLCTP-D1- 60		
PLCTP-D1- 61		
PLCTP-D1- 62		
PLCTP-D1- 63		
PLCTP-D1- 64		
PLCTP-D1- 65		
PLCTP-D1- 66		

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CONSOLIDATED WATER

Customer: Bermuda Government			
Project: Tynes Bay SWROD Plant			
Drawn By: DMW	Checked:	Approved	
Sheet No. 2 Of:	Scale: N/A		
Title: Motor Digital I/O			
Date: 31/05/07	Drawing No. BTB-CS1100	Rev: 00	

To Power Distribution BTB–

24V Neutral

To Power Distribution BTB–

Shield

4 Channel Analog Output Module #1

Well Pump #1 Speed control A0-1000	PLC AO1-1
Well Pump #2 Speed control A0-1001	PLC AO1-2
Well Pump #3 Speed control	PLC AO1-3
Train 1 High Pressure Pump Speed Control AO-3110	PLC AO1-4

4 Channel Analog Output Module #2

Train 2 High Pressure Pump Speed Control AO-3114	PLC AO2-1
Train 1 ER Boost Pump Speed Control AO-3312	PLCAO2-2
Train 2 ER Boost Pump Speed Control	PLC AO2-3
Product Pump #1 Speed Control AO-5301	PLC AO2-4

4 Channel Analog Output Module #3

Product Pump #2 Speed Control AO-5306	PLC AO3-1
Calcite Dosing Pump Speed Control AO-5201	PLC AO3-2
Spare	PLC AO3-3
Spare	PLC AO3-4

4 Channel Analog Input Module #1

Well Pump #1 Speed Return Signal AI-1000	PLC AI1-1
Well Pump #2 Speed Return Signal AI-1001	PLC AI1-2
Well Pump #3 Speed Return Signal	PLC AI1-3
Train 1 High Pressure Pump Speed Return Signal AI-3110	PLC AI1-4

4 Channel Analog Input Module #2

Train 2 High Pressure Pump Speed Return Signal AI-3114	PLC AI2-1
Train 1 ER Boost Pump Speed Return Signal AI-3312	PLC AI2-2
Train 2 ER Boost Pump Speed Return Signal	PLC AI2-3
Product Pump #1 Speed Return Signal AI-5301	PLC AI2-4

4 Channel Analog Input Module #3

Product Pump #2 Speed Return Signal AI-5306	PLC AI2-1
Calcite Dosing Pump Speed Return Signal AI-5201	PLC AI2-2
Spare	PLC AI2-3
Spare	PLC AI2-4

PLCTP-A1- 1		
PLCTP-A1- 2		
PLCTP-A1- 3	Black	Well Pump #1 VFD Speed Command AI-1000
PLCTP-A1- 4	White	
PLCTP-A1- 5	Shield	
PLCTP-A1- 6	Black	Well Pump #2 VFD Speed Command AI-1001
PLCTP-A1- 7	White	
PLCTP-A1- 8	Shield	
PLCTP-A1- 9	Black	Well Pump #3 VFD Speed Command
PLCTP-A1- 10	White	
PLCTP-A1- 11	Shield	
PLCTP-A1- 12	Black	Train #1 HP Pump VFD Speed Command AI-3100
PLCTP-A1- 13	White	
PLCTP-A1- 14	Shield	
PLCTP-A1- 15	Black	Train #2 HP Pump VFD Speed Command AI-3114
PLCTP-A1- 16	White	
PLCTP-A1- 17	Shield	
PLCTP-A1- 18	Black	Train #1 ER Boost Pump VFD Speed Command AI-3312
PLCTP-A1- 19	White	
PLCTP-A1- 20	Shield	
PLCTP-A1- 21	Black	Train #2 ER Boost Pump VFD Speed Command
PLCTP-A1- 22	White	
PLCTP-A1- 23	Shield	
PLCTP-A1- 24	Black	Product Pump # VFD Speed Command AI-5301
PLCTP-A1- 25	White	
PLCTP-A1- 26	Shield	
PLCTP-A1- 27	Black	Product Pump #2 VFD Speed Command AI-5306
PLCTP-A1- 28	White	
PLCTP-A1- 29	Shield	
PLCTP-A1- 30	Black	Calcite Dosing Pump VFD Speed Command AI-5201
PLCTP-A1- 31	White	
PLCTP-A1- 32	Shield	
PLCTP-A1- 33	Black	Spare
PLCTP-A1- 34	White	
PLCTP-A1- 35	Shield	
PLCTP-A1- 36	Black	Spare
PLCTP-A1- 37	White	
PLCTP-A1- 38	Shield	
PLCTP-A1- 39	Black	Well Pump #1 VFD Speed Return Signal AO-1000
PLCTP-A1- 40	White	
PLCTP-A1- 41	Shield	
PLCTP-A1- 42	Black	Well Pump #2 VFD Speed VReturn Signal AO-1001
PLCTP-A1- 43	White	
PLCTP-A1- 44	Shield	
PLCTP-A1- 45	Black	Well Pump #3 VFD Speed Return Signal
PLCTP-A1- 46	White	
PLCTP-A1- 47	Shield	
PLCTP-A1- 48	Black	Train #1 HP Pump VFD Speed Return Signal AO-3100
PLCTP-A1- 49	White	
PLCTP-A1- 50	Shield	
PLCTP-A1- 51	Black	Train #2 HP Pump VFD Speed Return Signal AO-3114
PLCTP-A1- 52	White	
PLCTP-A1- 53	Shield	
PLCTP-A1- 54	Black	Train #1 ER Boost Pump VFD Speed Return Signal AO-3312
PLCTP-A1- 55	White	
PLCTP-A1- 56	Shield	
PLCTP-A1- 57	Black	Train #2 ER Boost Pump VFD Speed Return Signal
PLCTP-A1- 58	White	
PLCTP-A1- 59	Shield	
PLCTP-A1- 60	Black	Product Pump # VFD Speed Return Signal AO-5301
PLCTP-A1- 61	White	
PLCTP-A1- 62	Shield	
PLCTP-A1- 63	Black	Product Pump #2 VFD Speed Return Signal AO-5306
PLCTP-A1- 64	White	
PLCTP-A1- 65	Shield	
PLCTP-A1- 66	Black	Calcite Dosing Pump VFD Speed Return Signal AO-5201
PLCTP-A1- 67	White	
PLCTP-A1- 68	Shield	
PLCTP-A1- 69	Black	Spare
PLCTP-A1- 70	White	
PLCTP-A1- 71	Shield	
PLCTP-A1- 72	Black	Spare
PLCTP-A1- 73	White	
PLCTP-A1- 74	Shield	

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CONSOLIDATED WATER

Customer: Bermuda Government

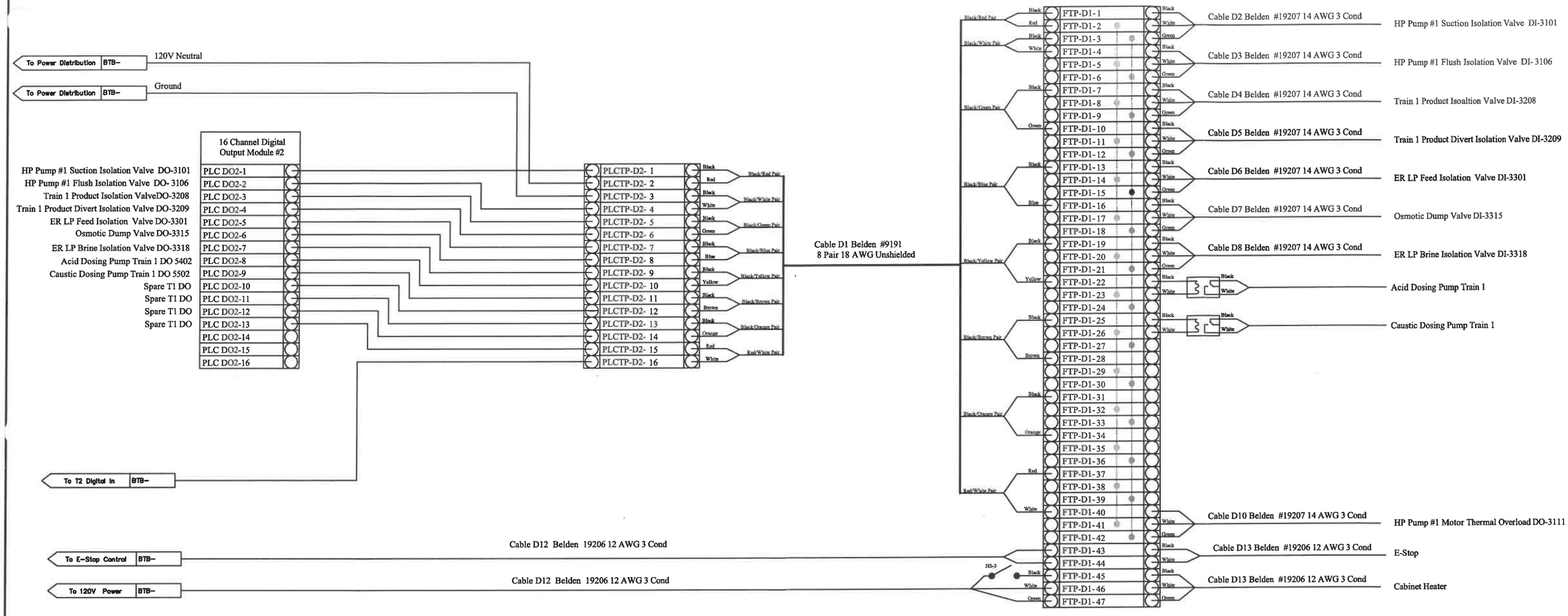
Project: Tynes Bay SWROD Plant

Drawn By: DMW | Checked: | Approved

Sheet No. 2 Of: | Scale: N/A

Title: Motor Analog I/O

Date: 31/05/07 | Drawing No. BTB–CS1200 | Rev: 00



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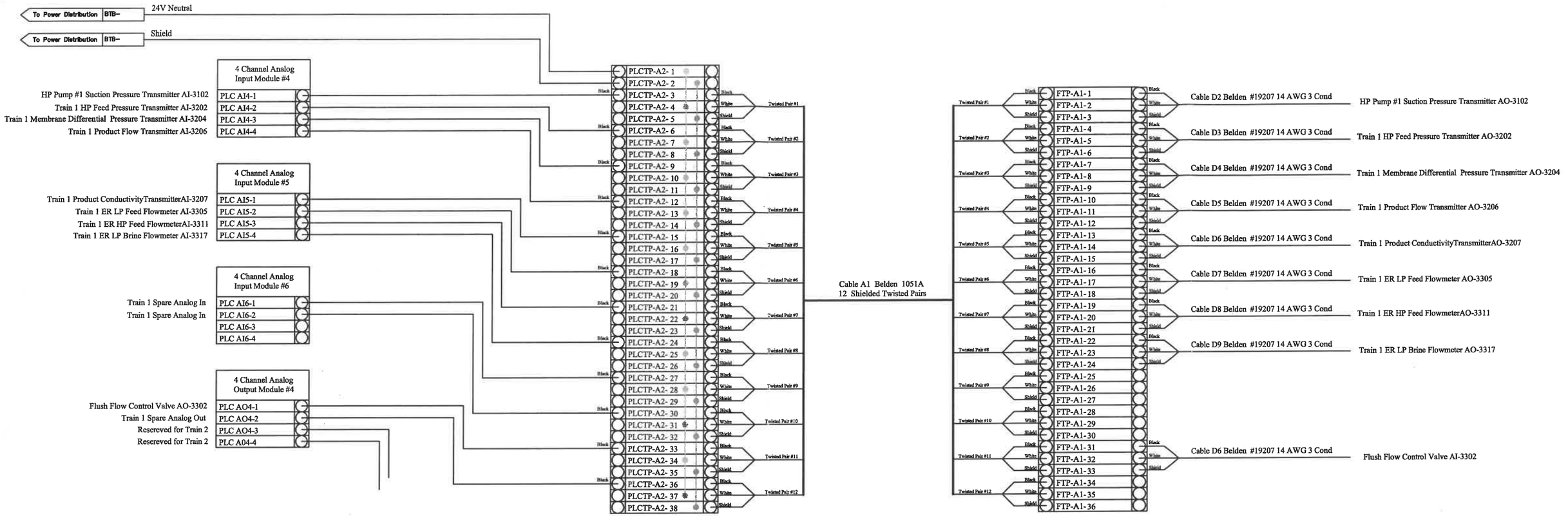
CONSOLIDATED WATER

Customer: Bermuda Government			
Project: Tynes Bay SWROD Plant			
Drawn By: DMW	Checked:	Approved	
Sheet No. 2 Of: 24		Scale: N/A	
Title: RO Train #1 Digital I/O			
Date: 31/05/07	Drawing No. BTB–CS3100		Rev: 00



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CONSOLIDATED WATER

Customer: Bermuda Government		
Project: Tynes Bay SWROD Plant		
Drawn By: DMW	Checked:	Approved
Sheet No. 2 Of:	Scale: N/A	
Title: RO Train #1 Analog I/O		
Date: 31/05/07	Drawing No. BTB–CS3200	Rev: 00

To Power Distribution BTB– 120V Neutral

To Power Distribution BTB– Ground

16 Channel Digital Output Module #3

HP Pump #2 Suction Isolation Valve DO-3110
HP Pump #2 Flush Isolation Valve DO- 3116

PLC DO3-1	PLCTP-D3- 1	Black
PLC DO3-2	PLCTP-D3- 2	Red (Black/Red Pair)
PLC DO3-3	PLCTP-D3- 3	Black
PLC DO3-4	PLCTP-D3- 4	White (Black/White Pair)
PLC DO3-5	PLCTP-D3- 5	Black
PLC DO3-6	PLCTP-D3- 6	Green (Black/Green Pair)
PLC DO3-7	PLCTP-D3- 7	Black
PLC DO3-8	PLCTP-D3- 8	Blue (Black/Blue Pair)
PLC DO3-9	PLCTP-D3- 9	Black
PLC DO3-10	PLCTP-D3- 10	Yellow (Black/Yellow Pair)
PLC DO3-11	PLCTP-D3- 11	Black
PLC DO3-12	PLCTP-D3- 12	Brown (Black/Brown Pair)
PLC DO3-13	PLCTP-D3- 13	Black
PLC DO3-14	PLCTP-D3- 14	Orange (Black/Orange Pair)
PLC DO3-15	PLCTP-D3- 15	Red
PLC DO3-16	PLCTP-D3- 16	White (Red/White Pair)

Cable D1 Belden #9191
8 Pair 18 AWG Unshielded

FTP-D2-1	Black (Black/Red Pair)	
FTP-D2-2	Red (Black/Red Pair)	
FTP-D2-3	Black (Black/White Pair)	
FTP-D2-4	White (Black/White Pair)	
FTP-D2-5	Black	
FTP-D2-6	Green (Black/Green Pair)	
FTP-D2-7	Black	
FTP-D2-8	Blue (Black/Blue Pair)	
FTP-D2-9	Black	
FTP-D2-10	Yellow (Black/Yellow Pair)	
FTP-D2-11	Black	
FTP-D2-12	Brown (Black/Brown Pair)	
FTP-D2-13	Black	
FTP-D2-14	Orange (Black/Orange Pair)	
FTP-D2-15	Red	
FTP-D2-16	White (Red/White Pair)	
FTP-D2-17		
FTP-D2-18		
FTP-D2-19		
FTP-D2-20		
FTP-D2-21		
FTP-D2-22		
FTP-D2-23		
FTP-D2-24		
FTP-D2-25		
FTP-D2-26		
FTP-D2-27		
FTP-D2-28		
FTP-D2-29		
FTP-D2-30		
FTP-D2-31		
FTP-D2-32		
FTP-D2-33		
FTP-D2-34		
FTP-D2-35		
FTP-D2-36		
FTP-D2-37		
FTP-D2-38		
FTP-D2-39		
FTP-D2-40		
FTP-D2-41		
FTP-D2-42		
FTP-D2-43		
FTP-D2-44		
FTP-D2-45		
FTP-D2-46		
FTP-D2-47		

Cable D2 Belden #19207 14 AWG 3 Cond (Black, White, Green) → HP Pump #2 Suction Isolation Valve DI-3110

Cable D3 Belden #19207 14 AWG 3 Cond (Black, White, Green) → HP Pump #2 Flush Isolation Valve DI- 3116

16 Channel Digital Input Module #2

HP Pump #1 Motor Thermal Overload DI-3111
HP Pump #2 Motor Thermal Overload DI-3115

PLC DI2-1
PLC DI2-2
PLC DI2-3
PLC DI2-4
PLC DI2-5
PLC DI2-6
PLC DI2-7
PLC DI2-8
PLC DI2-9
PLC DI2-10
PLC DI2-11
PLC DI2-12
PLC DI2-13
PLC DI2-14
PLC DI2-15
PLC DI2-16

BTB– From T1 PLC T Strip

Cable D10 Belden #19207 14 AWG 3 Cond (White, Green) → HP Pump #2 Motor Thermal Overload DO-3115

Cable D12 Belden 19206 12 AWG 3 Cond → To E–Stop Control BTB–

Cable D13 Belden #19206 12 AWG 3 Cond (Black, White) → E-Stop

HS-3 (Black, White, Green)

Cable D12 Belden 19206 12 AWG 3 Cond → To 120V Power BTB–

Cable D13 Belden #19206 12 AWG 3 Cond (Black, White, Green) → Cabinet Heater

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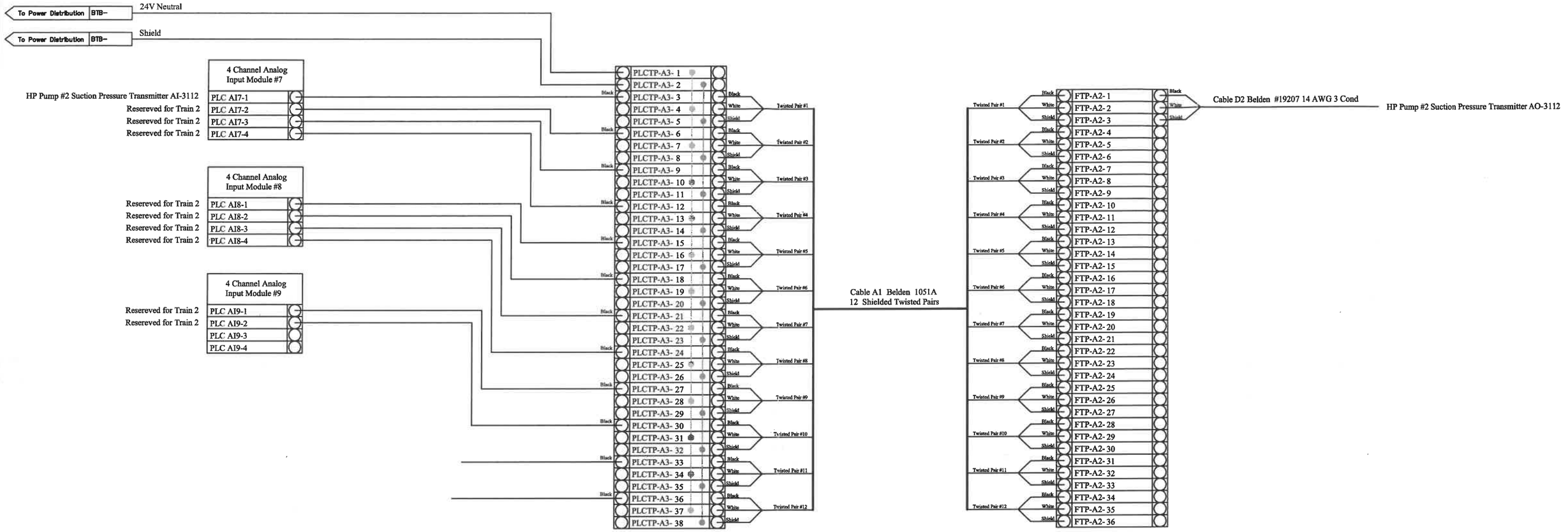
Customer: Bermuda Government			
Project: Tynes Bay SWROD Plant			
Drawn By: DMW	Checked:	Approved	
Sheet No. 2 Of:		Scale: N/A	
Title: Train #2 Digital I/O			
Date: 31/05/07	Drawing No. BTB–CS–3300		Rev: 00



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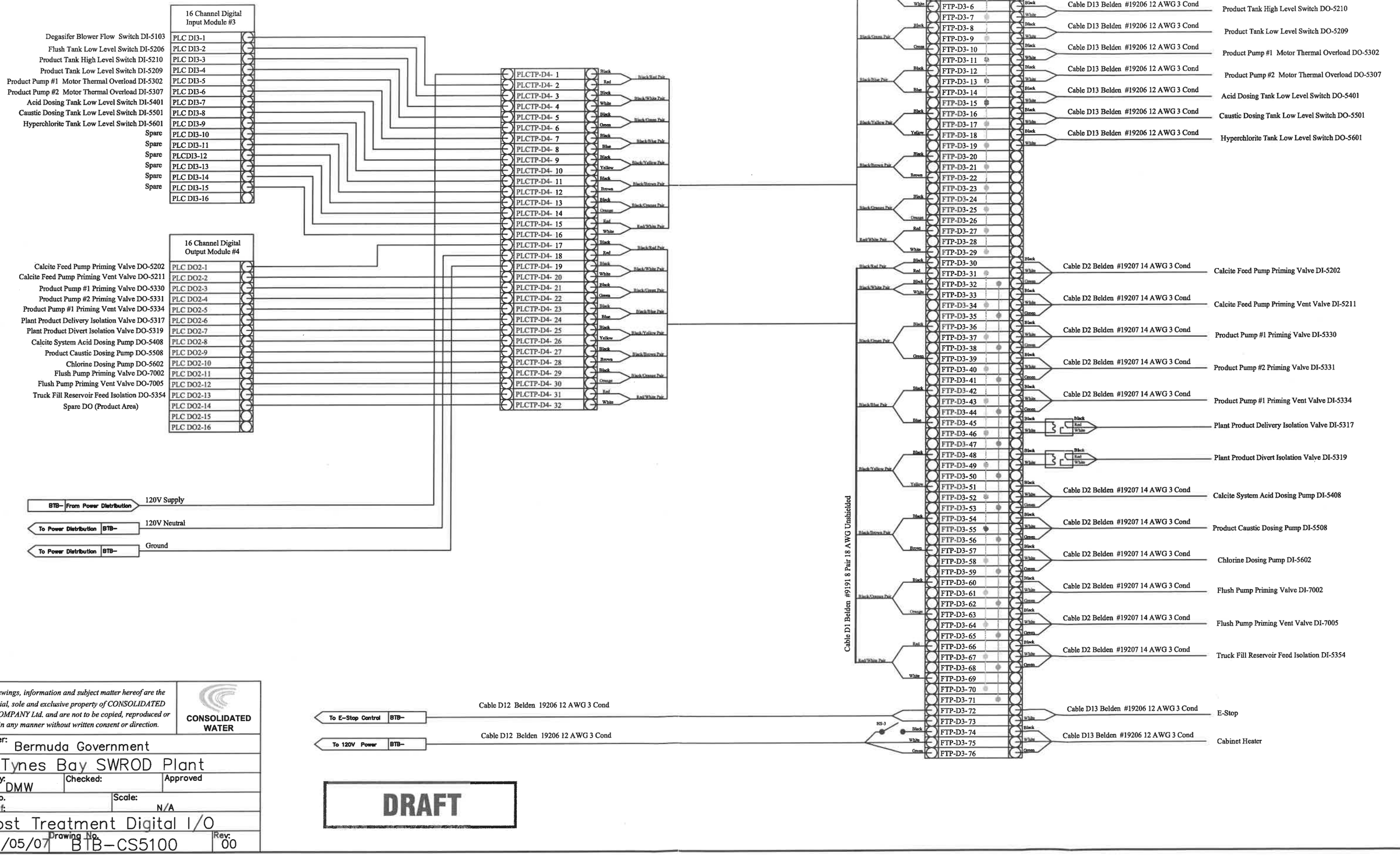
Customer: Bermuda Government		
Project: Tynes Bay SWROD Plant		
Drawn By: DMW	Checked:	Approved
Sheet No. 2 Of:	Scale: N/A	
Title: Train #2 Analog I/O		
Date: 31/05/07	Drawing No. BTB–CS–3400	Rev: 00



CONSOLIDATED WATER

Customer: Bermuda Government		
Project: Tynes Bay SWROD Plant		
Drawn By: DMW	Checked:	Approved
Sheet No. 2 Of:	Scale: N/A	
Title: Post Treatment Digital I/O		
Date: 31/05/07	Drawing No. BTB–CS5100	Rev: 00

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To Power Distribution BTB–

24V Neutral

To Power Distribution BTB–

Shield

4 Channel Analog Input Module #10

- Plant Raw Feed Pressure Transmitter AI-2101 — PLC AI10-1
- Plant Raw Feed Flow Transmitter AI-2301 — PLC AI10-2
- Cartridge Filter Differential Pressure Transmitter AI-2308 — PLC AI10-3
- Filtered Feed Pressure Transmitter AI-2312 — PLC AI10-4

4 Channel Analog Input Module #11

- Flush Tank Level Transmitter AI-5202 — PLC AI11-1
- Product Tank Level transmitter AI-5208 — PLC AI11-2
- Calcite Pump Discharge pH Transmitter AI-5203 — PLC AI11-3
- Calcite Feed Flow Transmitter AI-5204 — PLC AI11-4

4 Channel Analog Input Module #12

- Degasifier Feed pH Transmitter AI-5101 — PLC AI12-1
- Scrubber pH Transmitter AI-5113 — PLC AI12-2
- Prospect Reservoir Flow Meter AI-5320 — PLC AI12-3
- Spare — PLC AI12-4

4 Channel Analog Input Module #13

- Plant Product pH Transmitter AI-5326 — PLC AI13-1
- Plant Product Conductivity Meter AI-5327 — PLC AI13-2
- Plant Product Chlorine Transmitter AI-5328 — PLC AI13-3
- Plant Product Hardness Transmitter AI-5329 — PLC AI13-4

PLCTP-A4- 1 … PLCTP-A4- 50

Twisted Pair #1: Black, White, Shield
Twisted Pair #2: Black, White, Shield
Twisted Pair #3: Black, White, Shield
Twisted Pair #4: Black, White, Shield
Twisted Pair #5: Black, White, Shield
Twisted Pair #6: Black, White, Shield
Twisted Pair #7: Black, White, Shield
Twisted Pair #8: Black, White, Shield

Cable A1 Belden 1050A
8 Shielded Twisted Pairs

Cable A1 Belden 1050A
8 Shielded Twisted Pairs

FTP-A3-1 … FTP-A3-48

FTP-A3-1	Cable D2 Belden #19207 14 AWG 3 Cond — Plant Raw Feed Pressure Transmitter AO-2101
FTP-A3-4	Cable D2 Belden #19207 14 AWG 3 Cond — Plant Raw Feed Flow Transmitter AO-2301
FTP-A3-7	Cable D2 Belden #19207 14 AWG 3 Cond
FTP-A3-10	Cable D2 Belden #19207 14 AWG 3 Cond — Filtered Feed Pressure Transmitter AO-2312
FTP-A3-13	Cable D2 Belden #19207 14 AWG 3 Cond — Flush Tank Level Transmitter AO-5102
FTP-A3-16	Cable D2 Belden #19207 14 AWG 3 Cond — Product Tank Level transmitter AO-5104
FTP-A3-19	Cable D2 Belden #19207 14 AWG 3 Cond — Calcite Pump Discharge pH Transmitter AO-5101
FTP-A3-22	Cable D2 Belden #19207 14 AWG 3 Cond — Calcite Feed Flow Transmitter AO-5101
FTP-A3-25	Cable D2 Belden #19207 14 AWG 3 Cond — Degasifier Feed pH Transmitter AO-5101
FTP-A3-28	Cable D2 Belden #19207 14 AWG 3 Cond — Scrubber pH Transmitter AO-5113
FTP-A3-31	Cable D2 Belden #19207 14 AWG 3 Cond — Prospect Reservoir Flow Meter AO-5320
FTP-A3-34	Cable D2 Belden #19207 14 AWG 3 Cond — Spare
FTP-A3-37	Cable D2 Belden #19207 14 AWG 3 Cond — Plant Product pH Transmitter AO-5326
FTP-A3-40	Cable D2 Belden #19207 14 AWG 3 Cond — Plant Product Conductivity Meter AO-5327
FTP-A3-43	Cable D2 Belden #19207 14 AWG 3 Cond — Plant Product Chlorine Transmitter AO-5328
FTP-A3-46	Cable D2 Belden #19207 14 AWG 3 Cond — Plant Product Hardness Transmitter AO-5329

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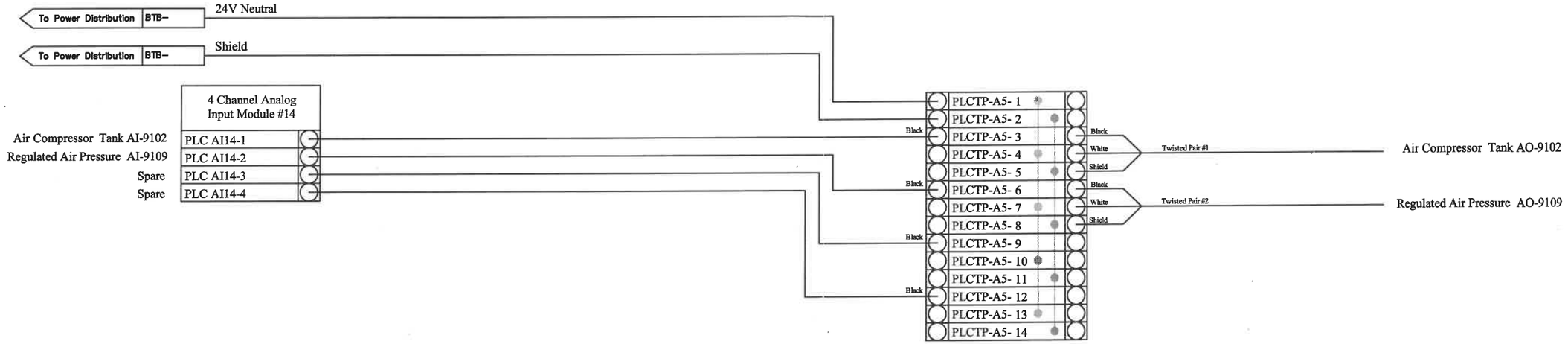
CONSOLIDATED WATER

Customer: Bermuda Government			
Project: Tynes Bay SWROD Plant			
Drawn By: DMW	Checked:	Approved	
Sheet No. 2 Of:	Scale: N/A		
Title: Post Treatment Analog I/O			
Date: 31/05/07	Drawing No. BTB–CS5200	Rev: 00	



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CONSOLIDATED WATER

Customer: Bermuda Government		
Project: Tynes Bay SWROD Plant		
Drawn By: DMW	Checked:	Approved
Sheet No. 2 Of:	Scale: N/A	
Title: Facility Analog I/O		
Date: 31/05/07	Drawing No. BTB–9100	Rev: 00

Appendix A.3 Screen Shots

Index

Tynes Bay
Sea Water Reverse Osmosis Plant

PLANT DATA | RUN OPTIONS | ALARM SUMMARY

TRAIN #1 SUMMARY | TRAIN #2 SUMMARY | POST TREATMENT

COMMON ALARMS | TRAIN #1 ALARMS | TRAIN #2 ALARMS

PLANT PID CONTROL | CHEMICAL DOSING | RO PID CONTROL

PRODUCT DELIVERY | TRENDS & REPORTS | CLOSE HMI

Automation & Control Engineering

Plant Summary

Main Menu | Train #1 Alarms | Train #2 Alarms

Wells

Well #1	AUTO
Well #2	AUTO
Well #3	AUTO

PreTreatment

Cartridge Filter dPress.(PSI)	2
Media Filter Feed Pressure	36
Plant Feed Pressure	30

Train Data

	T1	T2	
Run Hours	315.6	0.1	
Cumulative Run Hours	5435	2041	
Membrane PSI	747	0	
Membrane dPSI	17	0	
Conversion	39.1	46.2	
HP ER Brine Flow	529	0	
LP ER Feed Flow	595	0	
LP ER Brine Flow	628	0	
Total Product	339	0	
Product Feed Conductivity	644	0	
Degasifier pH	5.9	4.0	
Degas. Dosing Pump Speed	28	28	%

High Pressure Pump Data

	HP1	HP2
HP Pump	AUTO	AUTO
HP Pump Run		
Suction Pressure	29	0
Discharge Pressure	747	0
Pump Speed	90	88
Pump Bearing Flush Flow		

Post Treatment System

Degasifier Blower	AUTO	
Degasifier dPress Sw.		
Scrubber Motor	AUTO	
Scrubber Recirc. pH	14.0	
Scrbbr Caustic Dosing Speed	70	%
Calcite Pump	AUTO	
Calcite Pump Run		
Calcite Pump Speed	60	%
Calcite Pump Motor Temp.		
Calcite System pH	5.0	
Calcite System Flow	220	
Product Water Flush Tank Level	100	

ER System Data

	T1	T2
Boost Pump	AUTO	AUTO
Boost Pump Run		
Pump Speed	73	0
Low Press. Feed Flow	595	0
High Press. Brine Flow	529	0
Low Press. Brine Flow	628	0

Treated Water System

Product Water Tank Level	81	%
Product Pump #1	AUTO	
Product Pump #1 Speed	0	
Product Pump #1 Motor Temp.		
Product Pump #2	AUTO	
Product Pump #2 Speed	0	
Product Pump #2 Motor Temp.		
Treated Water Flow	319	
Treated Water pH	0.8	
Treated Water Conductivity	1000	
Treated Water Chlorine	2	
Treated Water Hardness	100	
Caustic Dosing Pump Speed	4.5	%
Chlorine Dosing Pump Speed	16.0	%
Prospect Reservoir #1 Level	0.00	
Prospect Reservoir #2 Level	18.09	

RUN OPTIONS

Well Selection

	1	2	3
Train #1	●	●	○
Train #2	●	●	○

High Pressure Pump

	1	2
R.O. #1	●	○
R.O. #2		●

Product Pumps

	#1	#2
Primary	○	●

Main Menu

RO #1

RO #2

SUMMARY

TRAIN #1

START | STOP | IDLE | ALARMS

State

IDLE
PREFLUSH
FLUSH

TIME 49
HP START
ONLINE
SHUTDOWN

Sequence

- Starting
- Well Pump — Set 30 Act. 30 PSI
- ER Cycle Enable — Set 530 Act. 527 GPM
- HP Suction Pressure — Set 30 Act. 29 PSI
- HP Pump Start
- Degas. Blower Sw.
- Conductivity — Set 950 Act. 637 uS/cm
- Flush Tank Fill 0 SEC
- Calcite Flow
- Product Pump
- Water Quality
- Deliver Water
- Plant Product Flow — Act. 334 GPM

TRAIN #2

START | STOP | IDLE | ALARMS

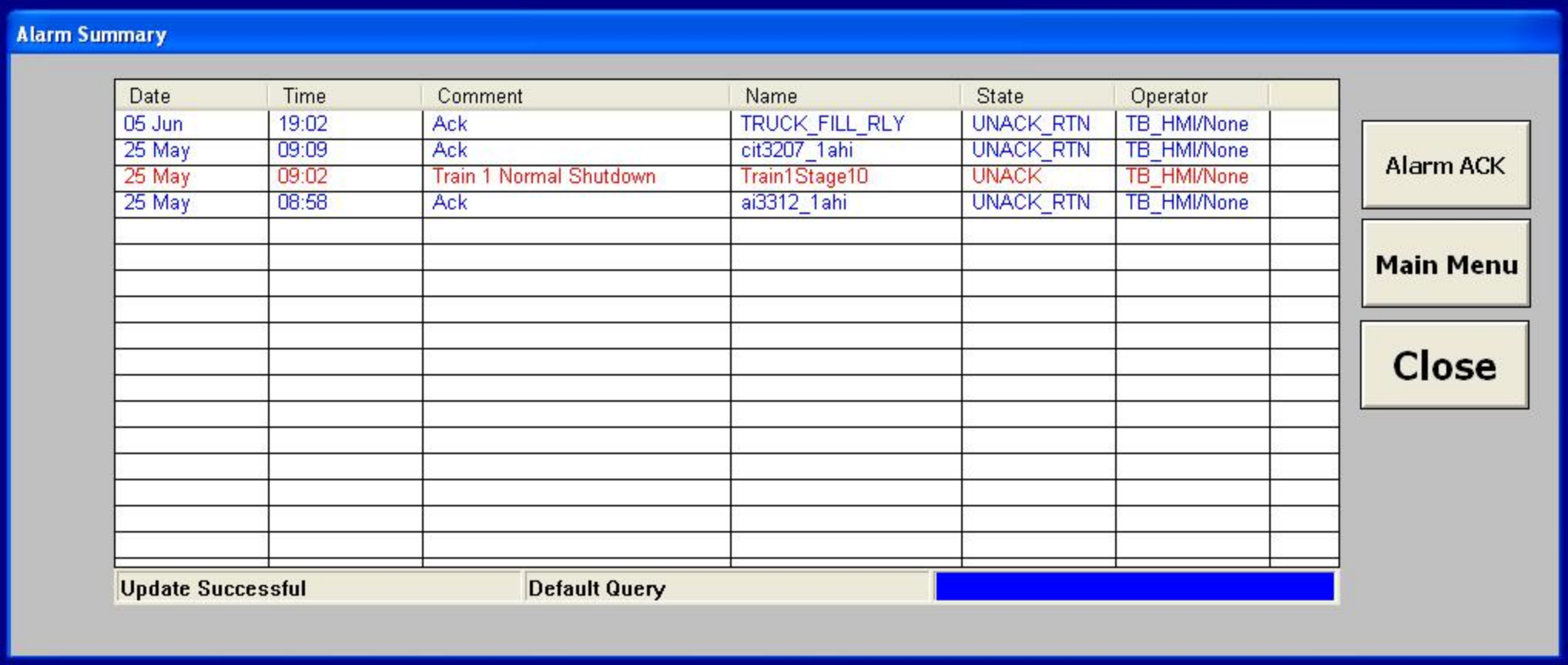
State

IDLE
PREFLUSH
FLUSH

TIME 60
HP START
ONLINE
SHUTDOWN

Sequence

- Starting
- Well Pump — Set 30 Act. 30 PSI
- ER Cycle Enable — Set 450 Act. 0 GPM
- HP Suction Pressure — Set 0 Act. 0 PSI
- HP Pump Start
- Degas. Blower Sw.
- Conductivity — Set 995 Act. 0 uS/cm
- Flush Tank Fill 0 SEC
- Calcite Flow
- Product Pump
- Water Quality
- Deliver Water
- Plant Product Flow — Act. 334 GPM


Alarm Summary
Date
Time
Comment
Name
State
Operator
05 Jun
19:02
Ack
TRUCK_FILL_RLY
UNACK_RTN
TB_HMI/None
25 May
09:09
Ack
cit3207_1ahi
UNACK_RTN
TB_HMI/None
25 May
09:02
Train 1 Normal Shutdown
Train1Stage10
UNACK
TB_HMI/None
25 May
08:58
Ack
ai3312_1ahi
UNACK_RTN
TB_HMI/None
Update Successful
Default Query
Alarm ACK
Main Menu
Close

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Main Menu

RO Train 1

Train #1 Alarms

E-STOP

From Train 2

PET-3112 0

V 3110 C A/M AUTO

V 3106 A/M AUTO C

From Flush System

PET-2101 36 Media Filters

PU-3114 A/M AUTO Speed 88 %

FS3123

PU-3104 A/M AUTO Speed 90 %

FS3122

PET-3102 29

V 3101 O A/M AUTO

PET-2312 30

FIT-3305 590

V 3301 O A/M AUTO

PET-3202 746

CIT-3207 644

FIT-3206 338

V 3208 A/M CLOSE MANUAL O

To Post Treatment

V 3209 C MANUAL A/M OPEN

To Brine Disposal

17 dPET-3204

PID PU-3312 AUTO A/M

A/M AUTO V 3315 C

FIT-3311 530

A/M AUTO V 3318 O

To Brine Disposal

621 FIT-3317

PU-1000 AUTO A/M PU-1001 AUTO A/M PU-1002 AUTO A/M

Well Pumps PID

Cartridge Filter

2 dPET-2308

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File Logic Special

Development!

Main Menu

RO Train 2

Train #2 Alarms

E-STOP

From Train 2

CIT-3207 0

V 3208 A/M OPEN MANUAL C

To Post Treatment

FIT-3206 0

V 3209 C

To Brine Disposal

MANUAL A/M OPEN

V 3116 A/M AUTO C

From Flush System

PET-2101 36

Media Filters

PU-3114 A/M AUTO

PET-3202 0

Speed 88 %

FS3123

PET-3112 0

V 3110 C A/M AUTO

PET-2312 30

FIT-3305 0

V 3301 C A/M AUTO

Cartridge Filter

2 dPET-2308

PU-1000 PU-1001 PU-1002 AUTO A/M

Well Pumps

PID

0 dPET-3204

PID PU-3312 AUTO A/M

A/M AUTO V 3315 C

FIT-3311 0

A/M AUTO V 3318 C

To Brine Disposal

0 FIT-3317

Main Menu

Post Treatment

Acid Dosing
AIT-5101
pH 5.9
Degassifier
Scrubber
From Calcite Pump
Caustic Dosing
Chlorine Dosing
From RO
T1
T2
pH 4.1
AIT-5102
Acid Dosing
DPS-5103
AIT-5113
14.0 pH
Caustic Dosing
To Containerized RO
To Product Pump #1
To Product Pump #2
PU-5112 AUTO
A/M
BL-5102
AUTO
A/M
Acid Dosing
Speed
60 %
PU-5201
A/M AUTO
AIT-5203
pH 4.7
FIT-5204
219
GPM
Calcite Tank
Flush Tank
PET-5202
100 %
Product Tank
PET-5208
80 %
To Scrubber

Common Alarms

Main Menu | Train #1 Alarms | Train #2 Alarms | Alarm History

	Enabled	LL	L	Actual	H	HH
Wells						
Well #1(Hz)	D	0	0	49	0	0
Well #2(Hz)	D	0	0	49	0	0
Well #3(Hz)	D	0	0	0	0	0
Cartridge Filter dPress.(PSI)	D			2	0	0
Air System						
Air Dist. Pressure(PSI)	D	0	0	0	0	0
Plant and PostTreatment						
Plant LPress. Feed Header(PSI)	E	12	19	30		
Degasifier Feed pH	D		0	59	0	
Scrubber Recirc pH	D	0	0	140	0	0
Calcite Pump Speed (RPM)	D	0	0	0		
Flush Tank Level(%)	D	0	0	100		
Calcite Dosing pH	D	0	0	48	0	0
Product Water Tank Level(%)	D	0	0	80		
Treated Water Flow(GPM)	D	0	0	0		
Treated Water pH	D	0	0	8	0	0
Treated Water Chlorine(ppm)	D	0	0	48	0	0
Treated Water Conductivity (uS)	D			100	40	0
Treated Water Hardness	D	0	0	100	0	0
Prospect Resvr #1 Level	D			0	0	0
Prospect Resvr #2 Level	D			1.81	0	0

Product Water Flush Tank Low Level	D	
Product Water Tank Low Level	D	
Product Water Tank High Level	D	
Acid Dosing Tank Low Level	D	
Caustic Dosing Tank Low Level	D	
Treated Water Chlorine Dosing Tank Low Level	D	
Plant Trench High Level	D	

E-Stops

- Main Panel
- RO Panel #1
- RO Panel #2
- Post Treatment #1
- Post Treatment #2
- Chemical Panel
- MCC Room
- Plant - North Wall
- Lower Office

Train #1 Alarms

Main Menu | Common Alarms | Train #2 Alarms | Alarm History

	Enabled	LL	L	Actual	H	HH
High Pressure Pump						
Suction Pressure	E	12	18	29	35	38
Speed Control (%)				90		
R.O.						
Membrane Feed Header Pressure (PSI)	E	600	630	747	850	870
Membrane Feed/Brine Diff. Pressure (PSI)	E	6	7	17	27	30
Product Flow	E	200	260	343	450	470
Product Conductivity	E			0642	800	850
E.R.						
Low Pressure Feed Flow	E	400	450	594		
High Pressure Brine Flow	E	400	450	531	680	690
Boost Pump Speed	D	0	0	42	61	62
Low Pressure Brine Flow	D	490	500	626		

High Pressure Pump #1 Bearing Flush Flow Switch	E	
Product Pump #1 Motor Winding Thermostat	D	

Train #2 Alarms

Main Menu | Common Alarms | Train #1 Alarms | Alarm History

	Enabled	LL	L	Actual	H	HH
High Pressure Pump						
Suction Pressure	E	12	18	0	35	38
Speed Control (%)				88		
R.O.						
Membrane Feed Header Pressure (PSI)	E	500	550	0	850	870
Membrane Feed/Brine Diff. Pressure (PSI)	E	6	7	0	27	30
Product Flow	E	200	260	0	450	470
Product Conductivity	E			0000	900	999
E.R.						
Low Pressure Feed Flow	E	380	450	0		
High Pressure Brine Flow	E	350	450	0	680	690
Boost Pump Speed	E	0	0	0	61	62
Low Pressure Brine Flow	E	490	500	0		

High Pressure Pump #2 Bearing Flush Flow Switch	E	
Product Pump #2 Motor Winding Thermostat	D	

Main Menu

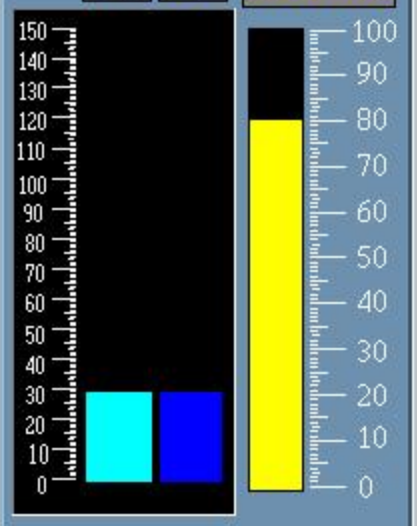
Previous

PLANT CONTROLLERS

PET-2312

SC-1000

PV SP OUT %



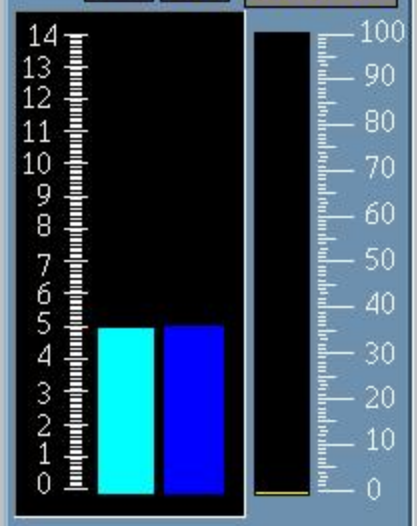
SET	30	
ACTUAL	30	
OUTPUT	80	%
AUTO		%

Plant Low Pressure Feed Header

AIT-5203

SC-5408

PV SP OUT %



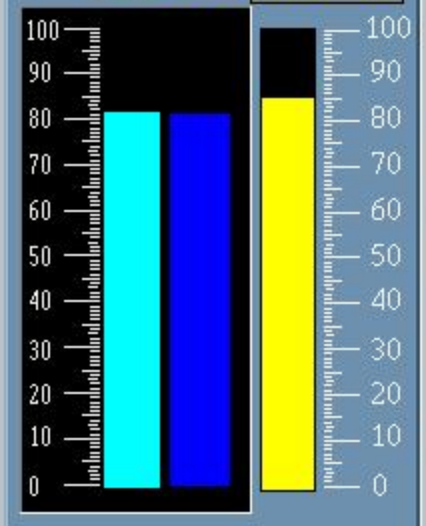
SET	5.0
ACTUAL	5.0
OUTPUT	0
AUTO	

Calcite Dosing System pH

PET-5208

SC-5301/6

PV SP OUT %



SET	80
ACTUAL	81
OUTPUT	85
AUTO	

Treated Water Tank Level

Control Engineering

Main Menu

Chemical Dosing

Acid Tank

PU-5402
Speed 2.8 %
AUTO
A/M
To 1st Pass RO at Degas. Inlet T1

PU-5410
Speed 2.8 %
AUTO
A/M
To 1st Pass RO at Degas. Inlet T2

PU-5408
To Calcite Pump Outlet
A/M
AUTO

PID

LS-5401

Caustic Tank

PU-5502
Speed 7.0 %
AUTO
A/M
To Scrubber Recirc.

PU-5508
To Product Delivery Tank
Speed 4.5 %
A/M
AUTO

LS-5501

Hyperchlorite Tank

PU-5602
Speed 16.0 %
AUTO
A/M
To Product Delivery Tank

LS-5601

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RO_Controllers

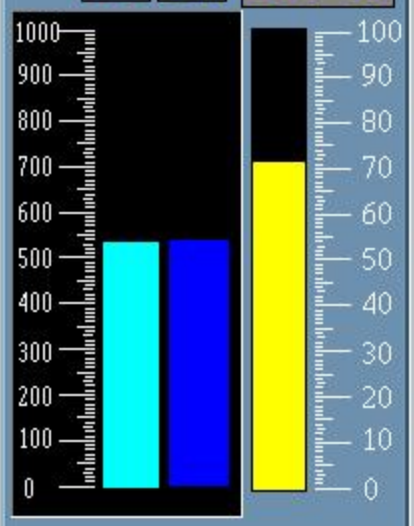
Main Menu

Previous

RO CONTROLLERS

FIT-3311_1

SC-3312_1

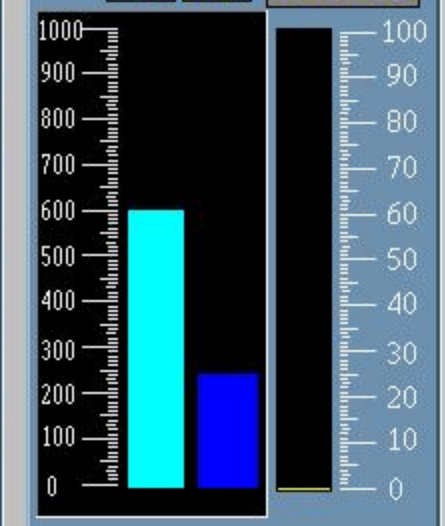


SET	530
ACTUAL	528
OUTPUT	71
AUTO	

ER1 High Pressure Brine Flow

FIT-3305_1

V-3302_1

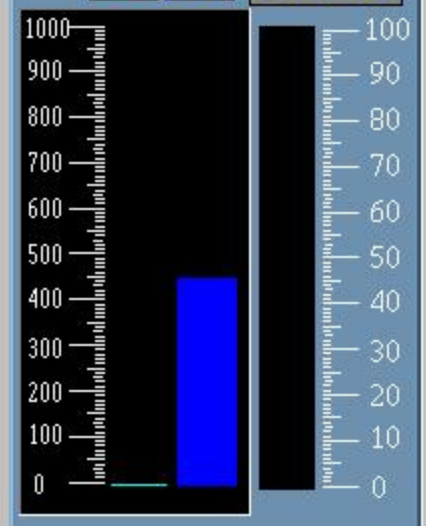


SET	250
ACTUAL	599
OUTPUT	0
AUTO	

ER1 Low Pressure Feed Flow (Flush)

FIT-3311_2

SC-3312_2

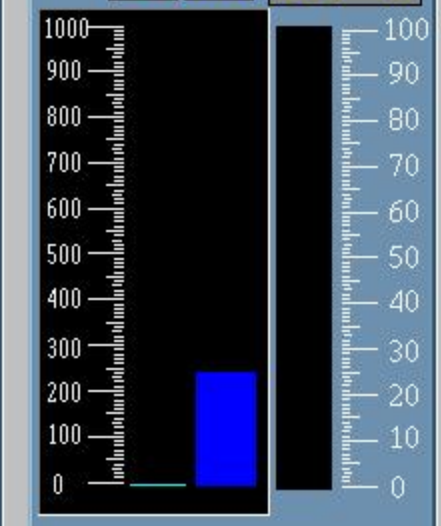


SET	450
ACTUAL	0
OUTPUT	0
AUTO	

ER2 High Pressure Brine Flow

FIT-3305_2

V-3302_2



SET	250
ACTUAL	0
OUTPUT	0
AUTO	

ER2 Low Pressure Feed Flow (Flush)

Control Engineering

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Product Delivery

Main Menu

Product Delivery

AIT-5326 0.8
CIT-5327 1000
AIT-5328 2.00
AIT-5329 100.0

To Flush System

To Product Tank

V 5330 A/M AUTO C

A/M AUTO C V 5334

V 5317 A/M MANUAL OPEN CLOSE

PUMP #1 PU-5301

From Product Tank

334 FQIT-5320

AUTO A/M

V 5331 A/M AUTO C

V 5319 A/M AUTO CLOSED

PUMP #2 PU-5306

From Product Tank

AUTO A/M

To Brine Disposal

AUTO V 5708 A/M CLOSED

To Truck Fill Station

Reservoir #1

Reservoir #2

PET-5701 0

PET-5702 18.07

PROSPECT LEVEL (FT.)

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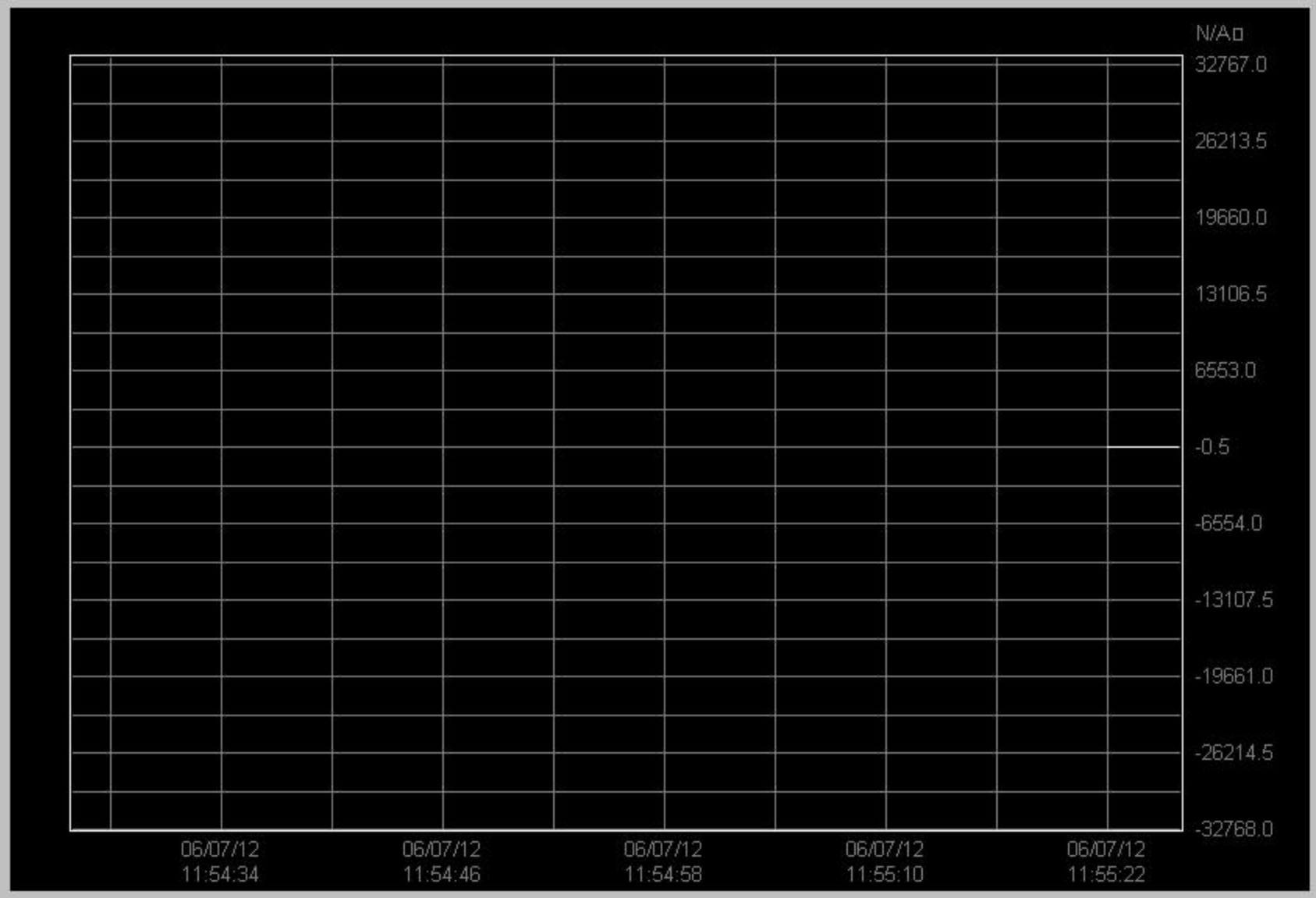
Trending

Main Menu

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SN: 965885
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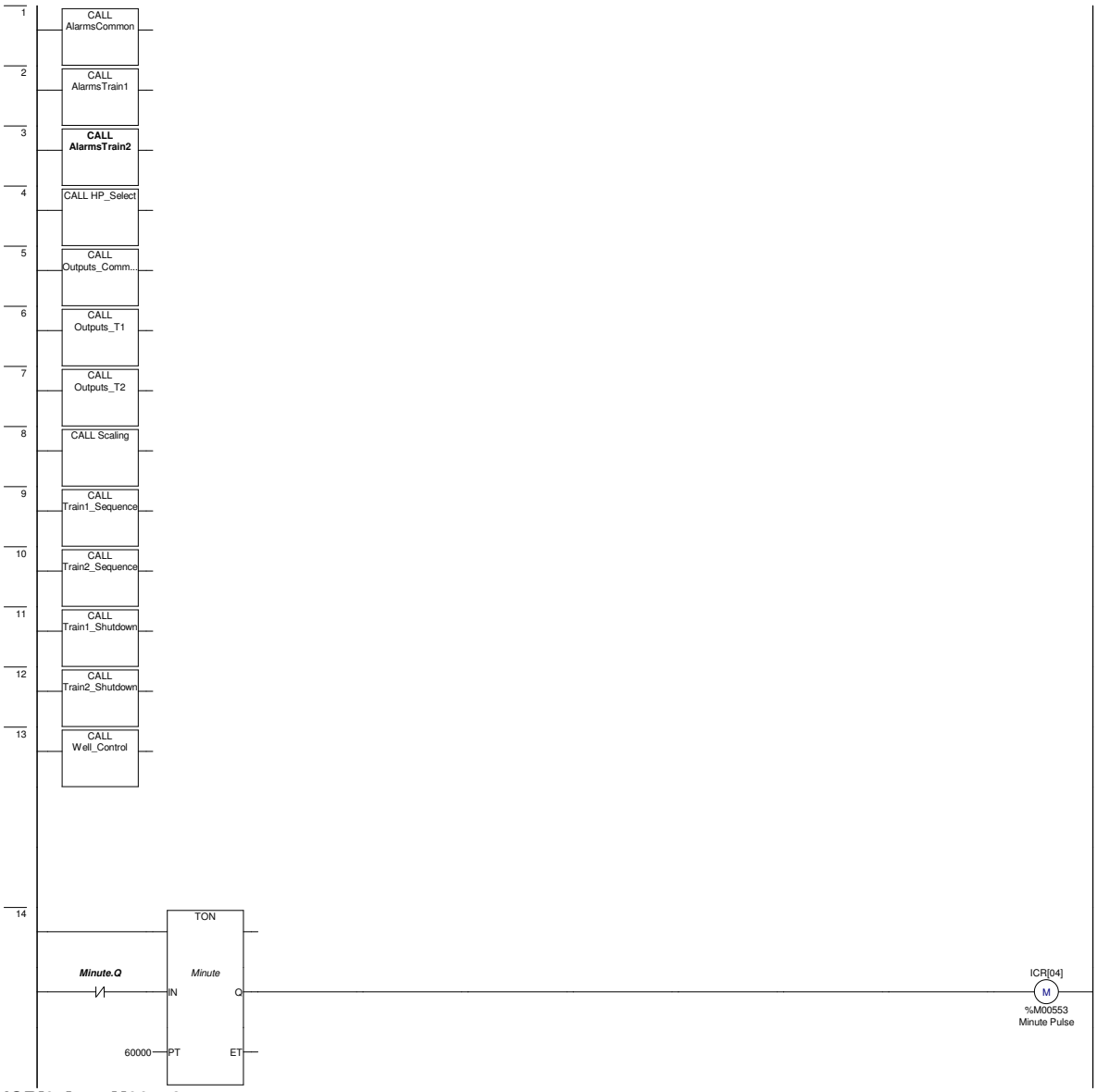
Appendix A.4 Control Programs

Index

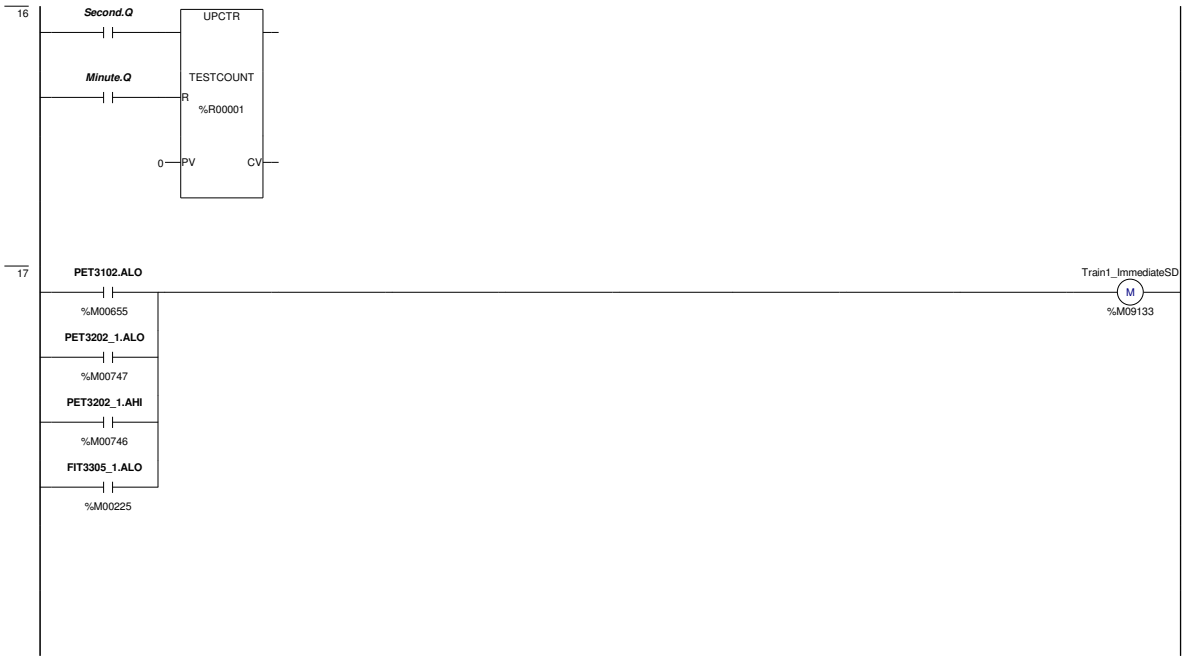


ICR[04] %M00553

LD Block,'Train2_Sequence': NOCON 00007, 00058;
LD Block,'Train1_Sequence': NOCON 00007, 00058;
LD Block,'_MAIN': NOCON 00023; COIL 00014;
LD Block,'AlarmsTrain1': NOCON 00016;

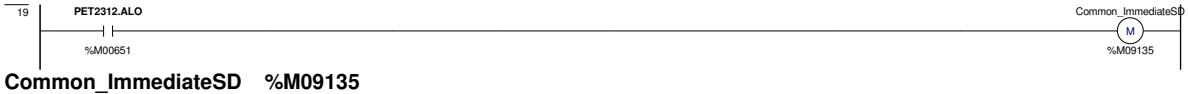
ICR[05] %M00554

LD Block,'Train2_Sequence': NOCON 00019, 00032, 00044;
LD Block,'Train1_Shutdown': NOCON 00010, 00031, 00032, 00033;
LD Block,'Train1_Sequence': NOCON 00019, 00032, 00044;
LD Block,'_MAIN': COIL 00015;
LD Block,'Train2_Shutdown': NOCON 00010, 00031, 00032, 00033;

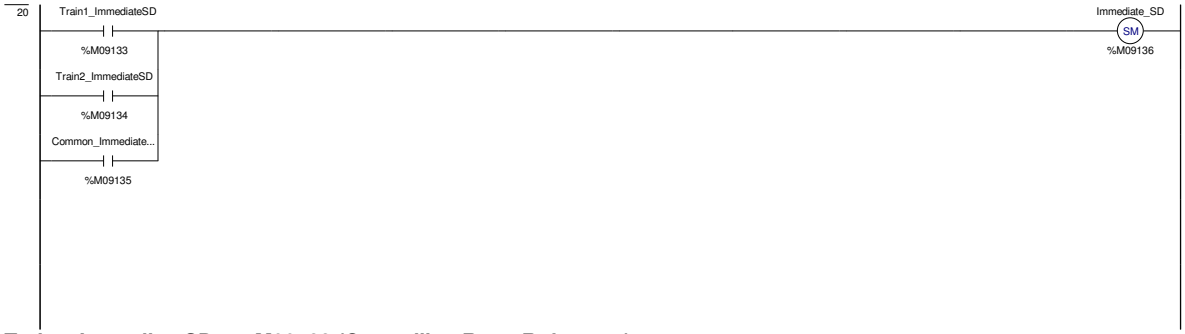


Train1_ImmediateSD %M09133
LD Block,'_MAIN': NOCON 00020; COIL 00017;

Train2_ImmediateSD %M09134
LD Block,'_MAIN': NOCON 00020; COIL 00018;

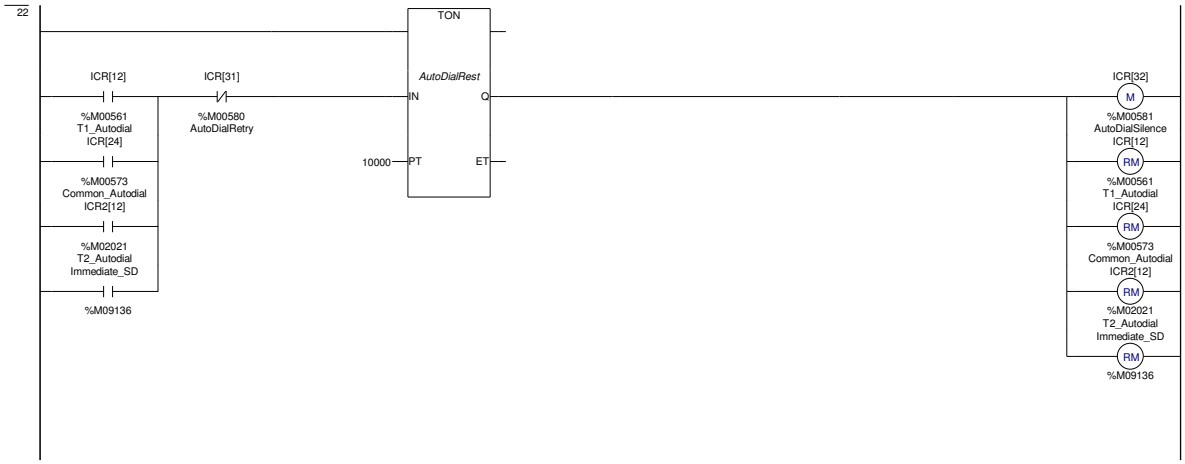


Common_ImmediateSD %M09135
LD Block,'_MAIN': NOCON 00020; COIL 00019;

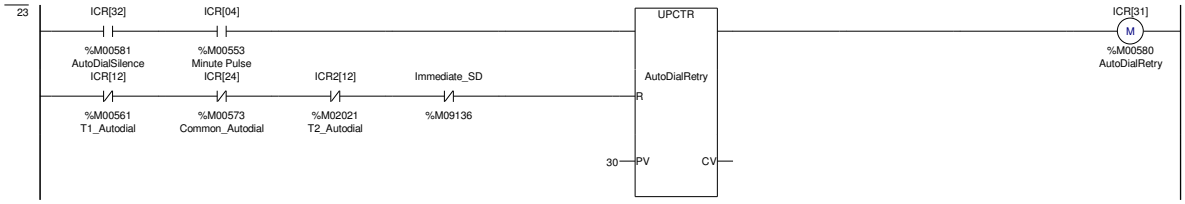


Train1_ImmediateSD %M09133 (Controlling Rung Reference)
LD Block,'_MAIN': COIL 00017;
Immediate_SD %M09136
LD Block,'_MAIN': RESETCOIL 00022; SETCOIL 00020; NCCON 00023; NOCON 00021, 00022;
Train2_ImmediateSD %M09134 (Controlling Rung Reference)
LD Block,'_MAIN': COIL 00018;
Common_ImmediateSD %M09135 (Controlling Rung Reference)
LD Block,'_MAIN': COIL 00019;

AutoDialer %Q00088
LD Block,'_MAIN': COIL 00021;
Immediate_SD %M09136 (Controlling Rung Reference)
LD Block,'_MAIN': SETCOIL 00020;

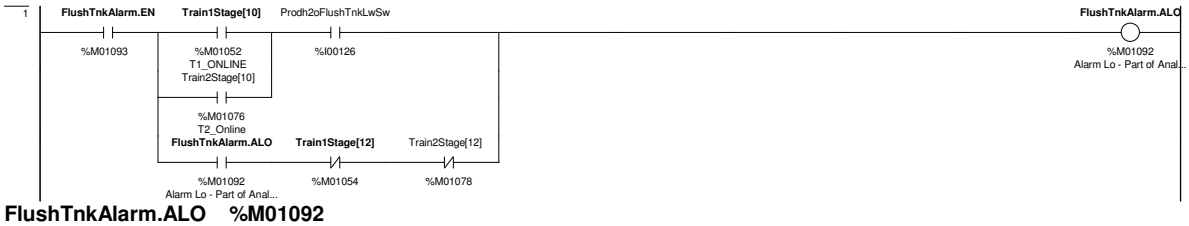


ICR[32] %M00581
LD Block,'_MAIN': NCCON 00021; NOCON 00023; COIL 00022;
ICR[12] %M00561
LD Block,'_MAIN': RESETCOIL 00022; NCCON 00023; NOCON 00021, 00022;
LD Block,'AlarmsTrain1': SETCOIL 00029; NOCON 00030;
ICR[24] %M00573
LD Block,'_MAIN': RESETCOIL 00022; NCCON 00023; NOCON 00021, 00022;
LD Block,'AlarmsCommon': SETCOIL 00053;
Immediate_SD %M09136 (Controlling Rung Reference)
LD Block,'_MAIN': SETCOIL 00020;
ICR2[12] %M02021
LD Block,'AlarmsTrain2': SETCOIL 00031; NOCON 00032;
LD Block,'_MAIN': RESETCOIL 00022; NCCON 00023; NOCON 00021, 00022;
Immediate_SD %M09136
LD Block,'_MAIN': RESETCOIL 00022; SETCOIL 00020; NCCON 00023; NOCON 00021, 00022;



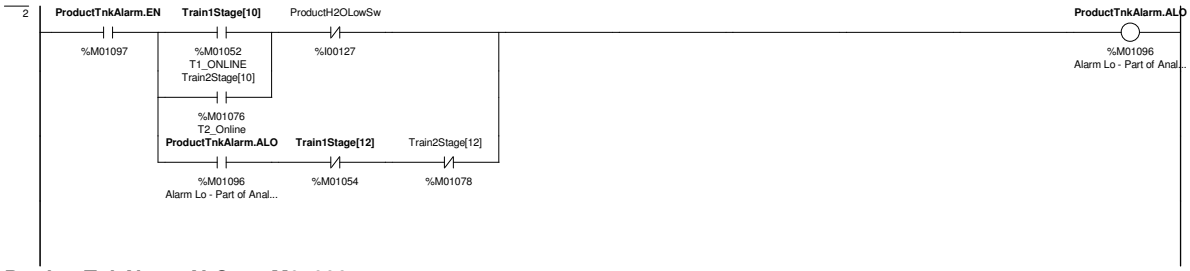
ICR[32] %M00581 (Controlling Rung Reference)
LD Block,'_MAIN': COIL 00022;
ICR[04] %M00553 (Controlling Rung Reference)
LD Block,'_MAIN': COIL 00014;
ICR[31] %M00580
LD Block,'_MAIN': NCCON 00022; COIL 00023;
ICR[12] %M00561 (Controlling Rung Reference)
LD Block,'_MAIN': RESETCOIL 00022;
ICR[24] %M00573 (Controlling Rung Reference)
LD Block,'_MAIN': RESETCOIL 00022;
ICR2[12] %M02021 (Controlling Rung Reference)
LD Block,'_MAIN': RESETCOIL 00022;
Immediate_SD %M09136 (Controlling Rung Reference)

LD Block,'_MAIN': RESETCOIL 00022;



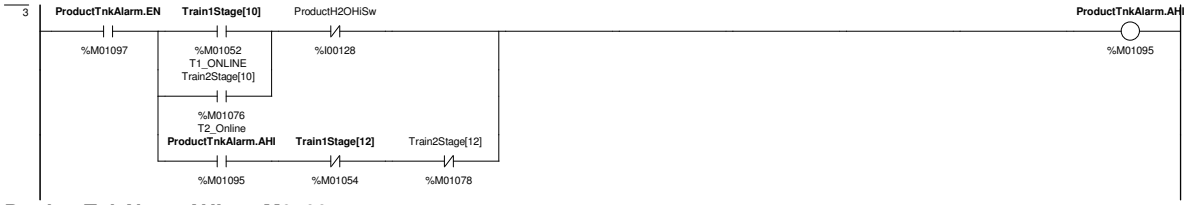
FlushTnkAlarm.ALO %M01092

LD Block,'AlarmsCommon': NOCON 00001, 00050; COIL 00001;



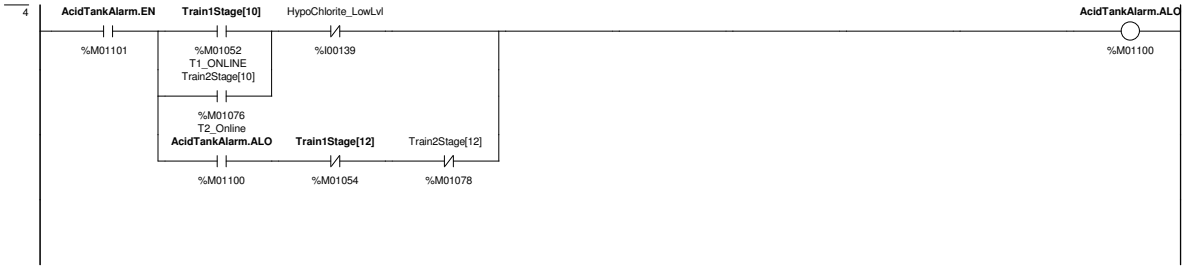
ProductTnkAlarm.ALO %M01096

LD Block,'AlarmsCommon': NOCON 00002, 00050; COIL 00002;



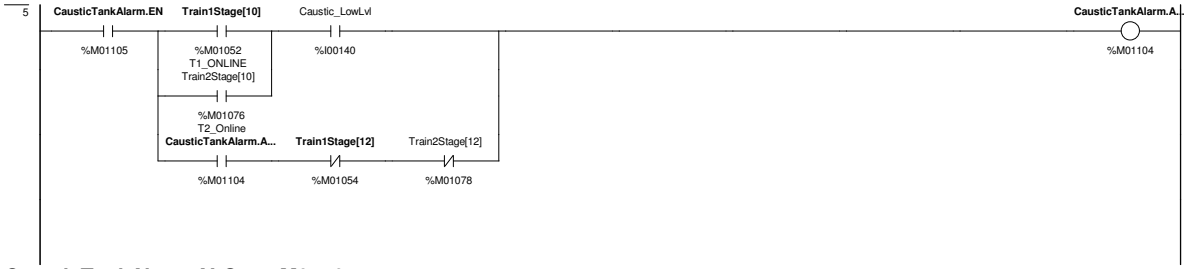
ProductTnkAlarm.AHI %M01095

LD Block,'AlarmsCommon': NOCON 00003, 00050; COIL 00003;



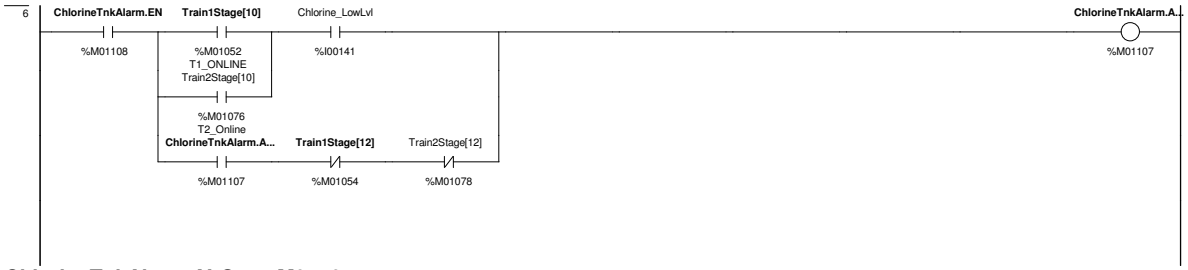
AcidTankAlarm.ALO %M01100

LD Block,'AlarmsCommon': NOCON 00004, 00050; COIL 00004;



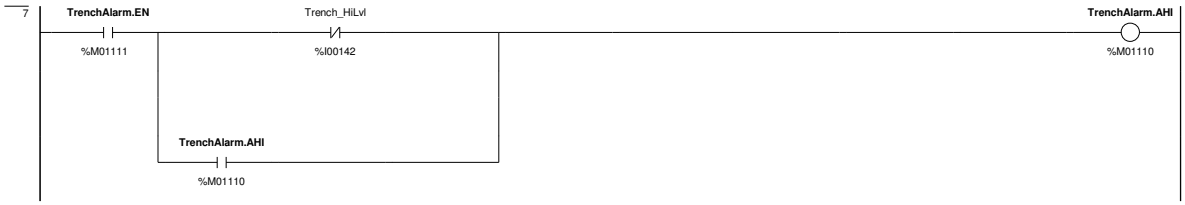
CausticTankAlarm.ALO %M01104

LD Block,'AlarmsCommon': NOCON 00005, 00050; COIL 00005;

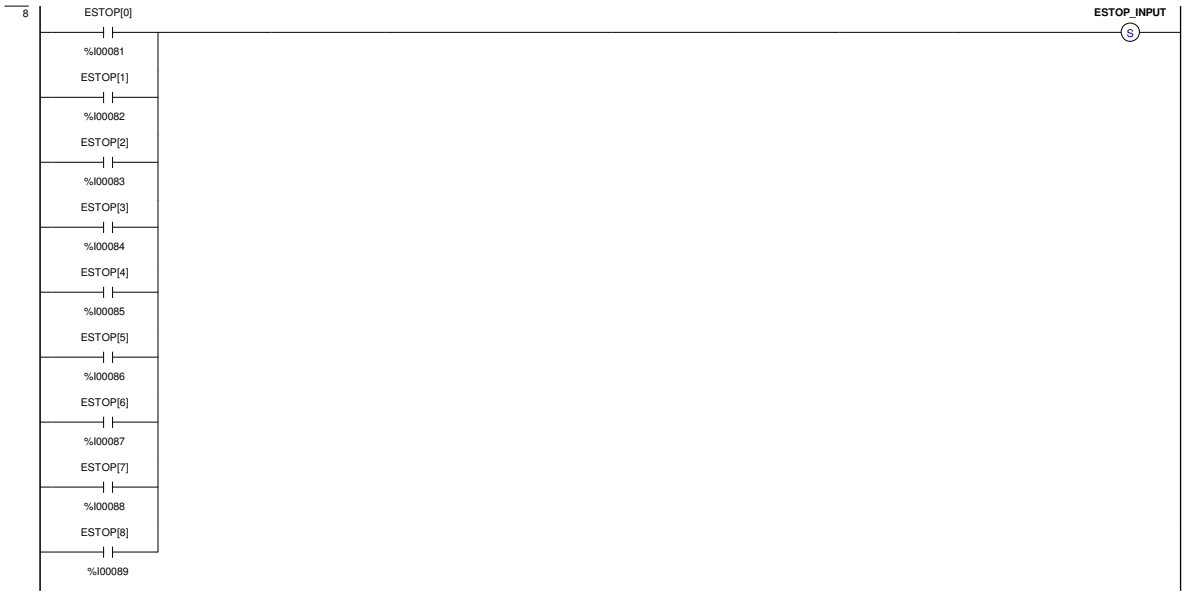


ChlorineTnkAlarm.ALO %M01107

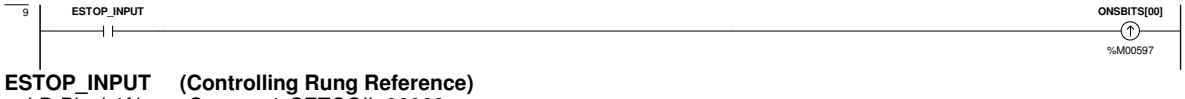
LD Block,'AlarmsCommon': NOCON 00006, 00050; COIL 00006;



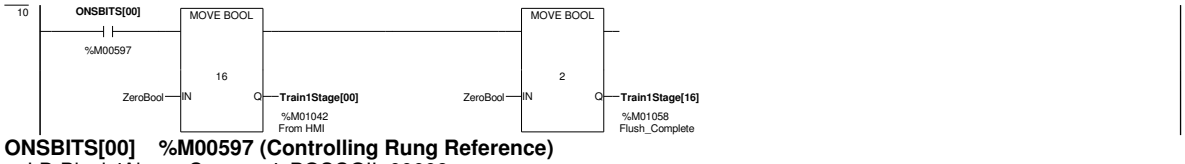
TrenchAlarm.AHI %M01110
LD Block,'AlarmsCommon': NOCON 00007, 00050; COIL 00007;



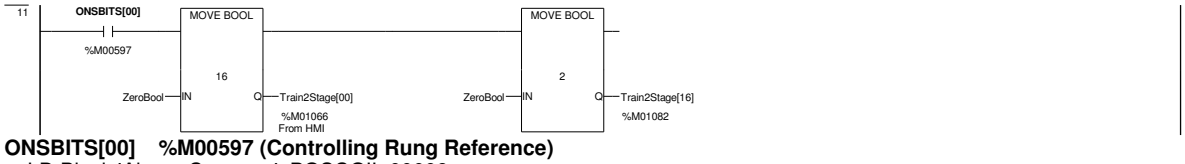
ESTOP_INPUT
LD Block,'AlarmsCommon': SETCOIL 00008; NOCON 00009;



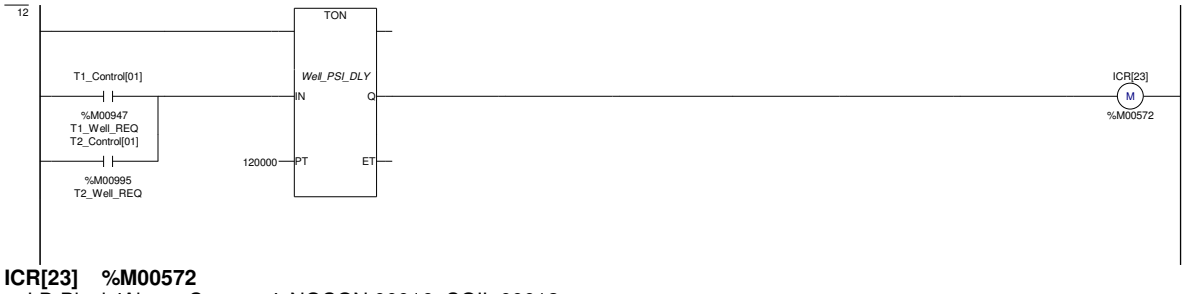
ESTOP_INPUT (Controlling Rung Reference)
LD Block,'AlarmsCommon': SETCOIL 00008;
ONSBITS[00] %M00597
LD Block,'AlarmsCommon': POSCOIL 00009; NOCON 00010, 00011;



ONSBITS[00] %M00597 (Controlling Rung Reference)
LD Block,'AlarmsCommon': POSCOIL 00009;



ONSBITS[00] %M00597 (Controlling Rung Reference)
LD Block,'AlarmsCommon': POSCOIL 00009;

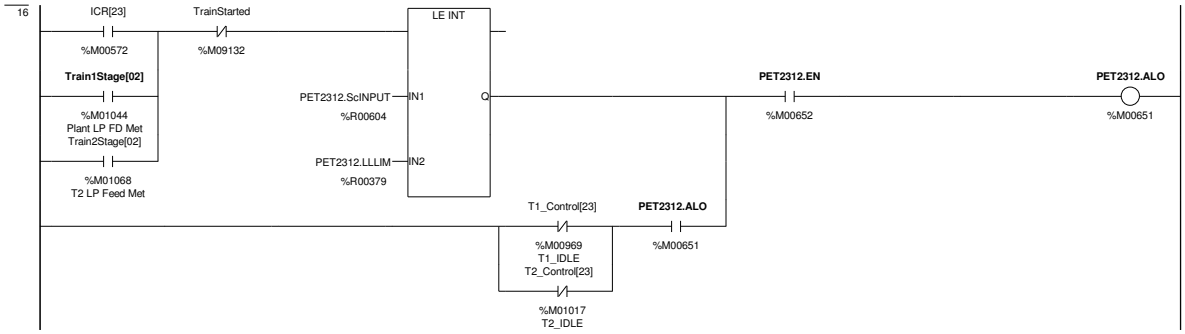


ICR[23] %M00572
LD Block,'AlarmsCommon': NOCON 00016; COIL 00012;

TrainStarted %M09132
LD Block,'AlarmsCommon': NCCON 00016, 00018, 00021; COIL 00013;
LD Block,'AlarmsTrain1': NCCON 00003;

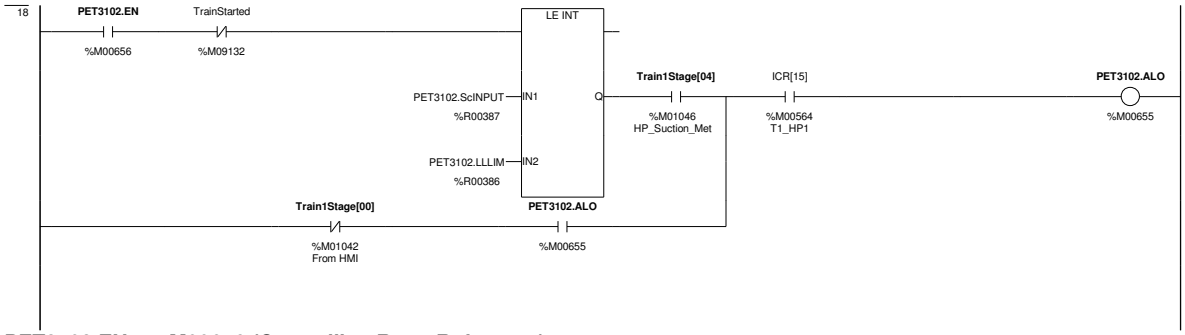
Trains_Idle_1S %M09131
LD Block,'AlarmsCommon': POSCOIL 00014; NOCON 00015;

Trains_Idle_1S %M09131 (Controlling Rung Reference)
LD Block,'AlarmsCommon': POSCOIL 00014;
PET2312.EN %M00652
LD Block,'AlarmsCommon': SETCOIL 00015; NOCON 00016;



ICR[23] %M00572 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00012;
TrainStarted %M09132 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00013;
PET2312.EN %M00652 (Controlling Rung Reference)
LD Block,'AlarmsCommon': SETCOIL 00015;
PET2312.ALO %M00651
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'_MAIN': NOCON 00019;
LD Block,'AlarmsCommon': NOCON 00016; COIL 00016;

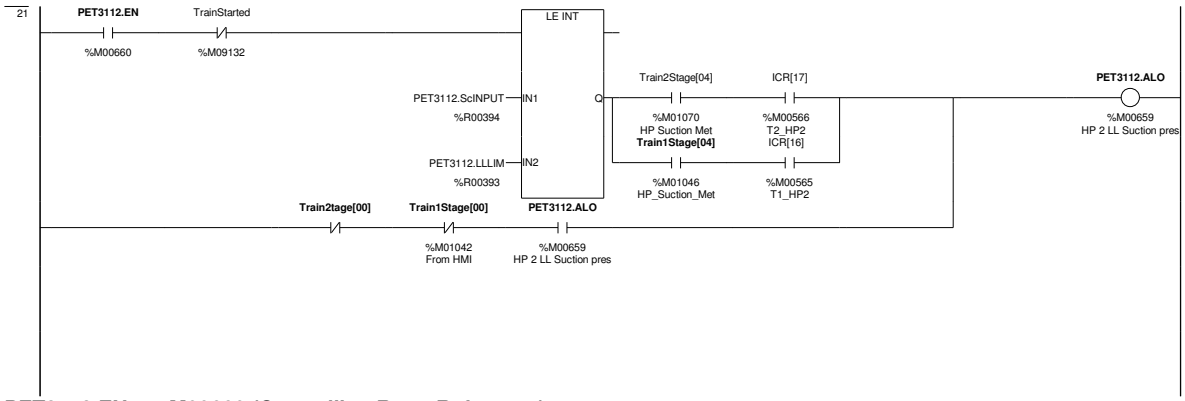
PET3102.EN %M00656
LD Block,'AlarmsCommon': SETCOIL 00017; NOCON 00018;



PET3102.EN %M00656 (Controlling Rung Reference)
LD Block,'AlarmsCommon': SETCOIL 00017;
TrainStarted %M09132 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00013;
PET3102.ALO %M00655
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'_MAIN': NOCON 00017;
LD Block,'AlarmsCommon': NOCON 00018; COIL 00018;

PET3112.EN %M00660

LD Block,'AlarmsCommon': SETCOIL 00020; NOCON 00021;



PET3112.EN %M00660 (Controlling Rung Reference)

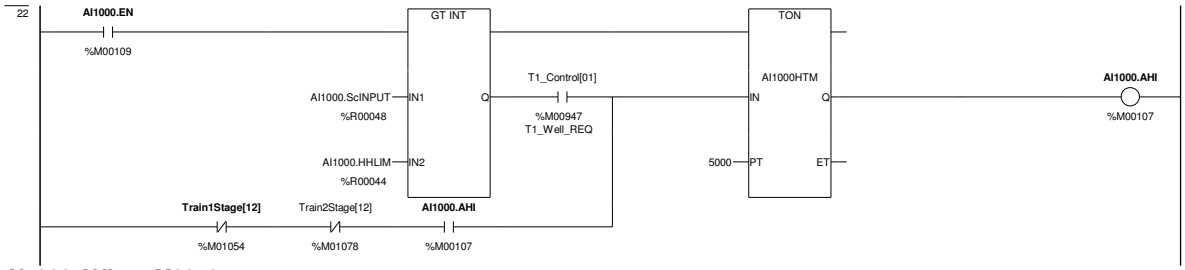
LD Block,'AlarmsCommon': SETCOIL 00020;

TrainStarted %M09132 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00013;

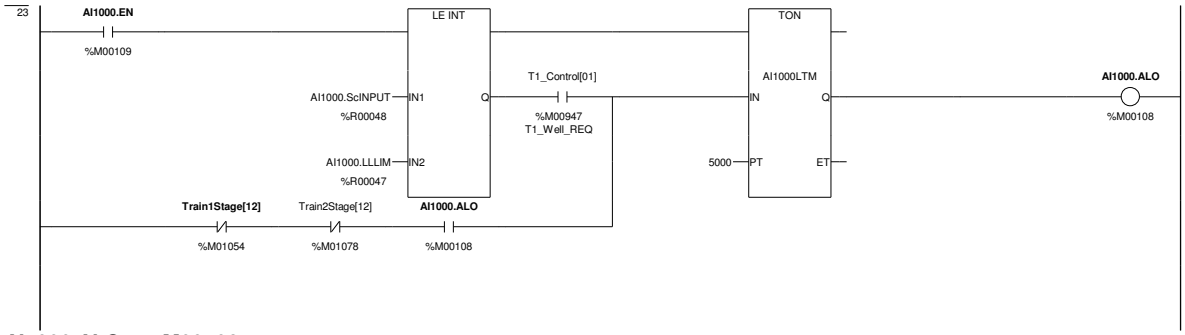
PET3112.ALO %M00659

LD Block,'AlarmsTrain2': NOCON 00031;
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'_MAIN': NOCON 00018;
LD Block,'AlarmsCommon': NOCON 00021; COIL 00021;
LD Block,'Train2_Shutdown': NOCON 00035;



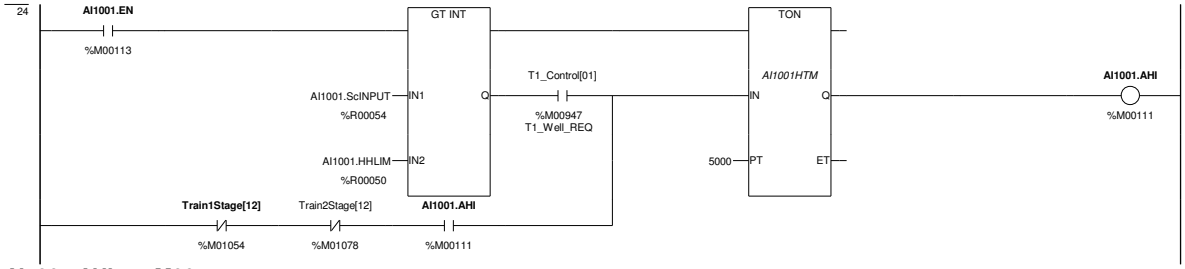
AI1000.AHI %M00107

LD Block,'AlarmsCommon': NOCON 00022, 00050, 00052; COIL 00022;



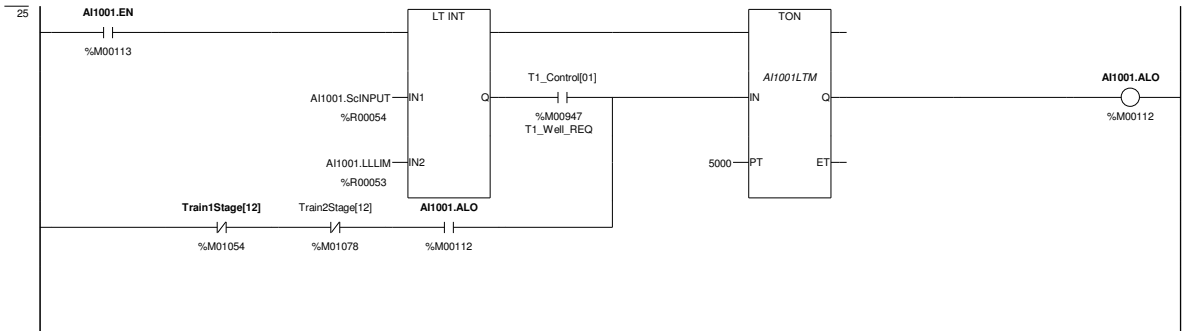
AI1000.ALO %M00108

LD Block,'AlarmsCommon': NOCON 00023, 00052; COIL 00023;



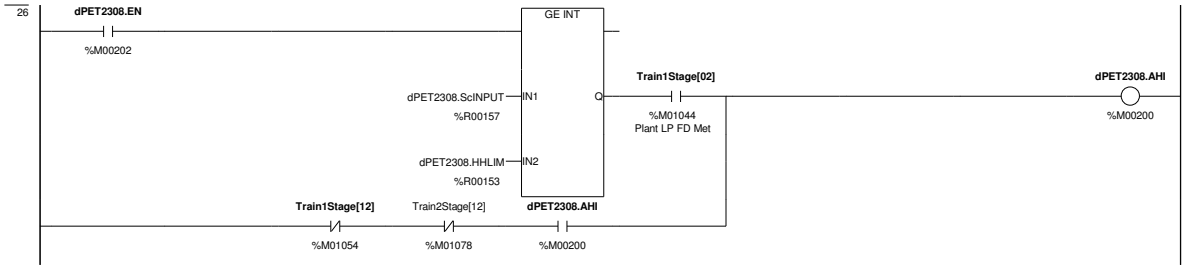
AI1001.AHI %M00111

LD Block,'AlarmsCommon': NOCON 00024, 00052; COIL 00024;



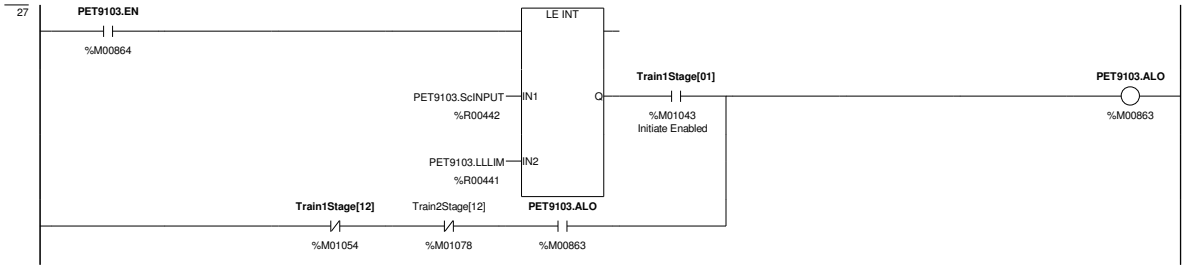
AI1001.ALO %M00112

LD Block,'AlarmsCommon': NOCON 00025, 00052; COIL 00025;



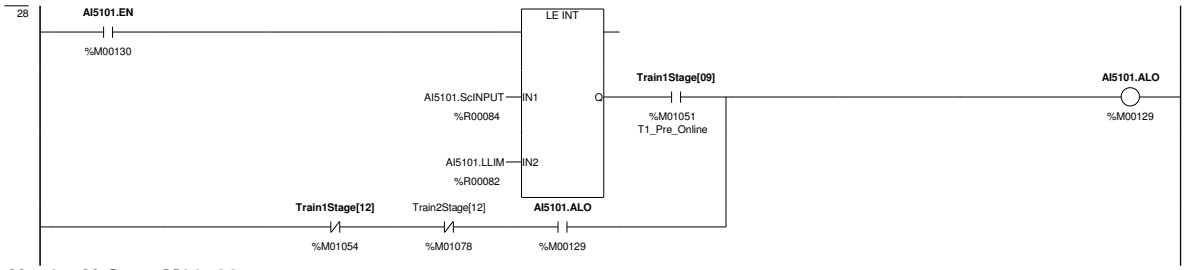
dPET2308.AHI %M00200

LD Block,'AlarmsCommon': NOCON 00026, 00052; COIL 00026;



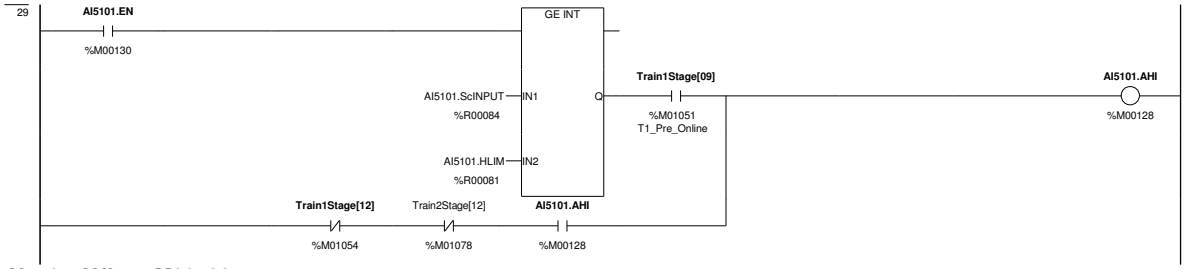
PET9103.ALO %M00863

LD Block,'AlarmsCommon': NOCON 00027, 00052; COIL 00027;



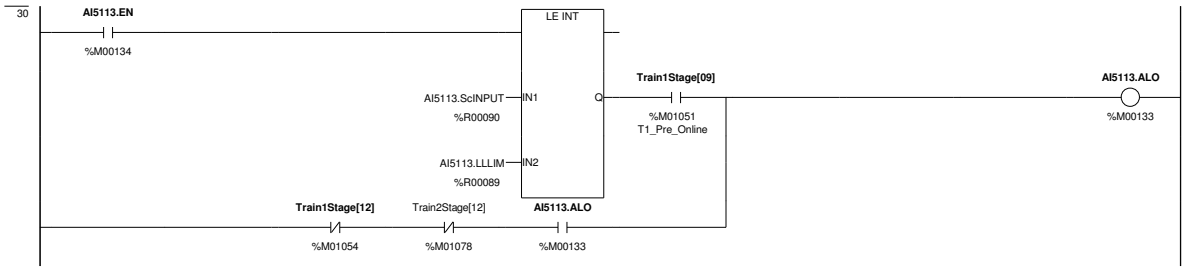
AI5101.ALO %M00129

LD Block,'AlarmsCommon': NOCON 00028; COIL 00028;



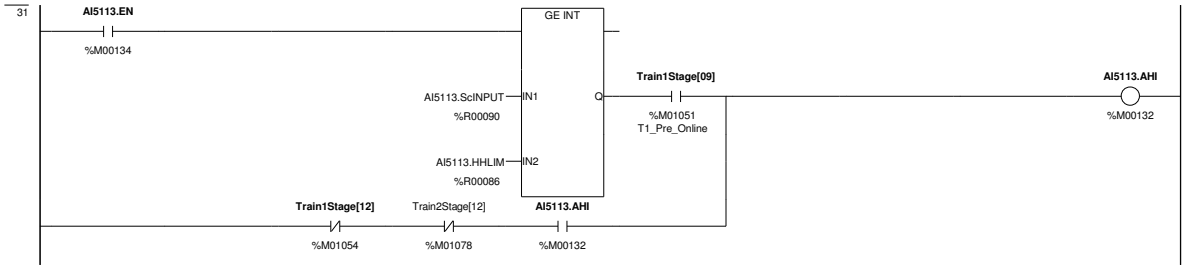
AI5101.AHI %M00128

LD Block,'AlarmsCommon': NOCON 00029; COIL 00029;



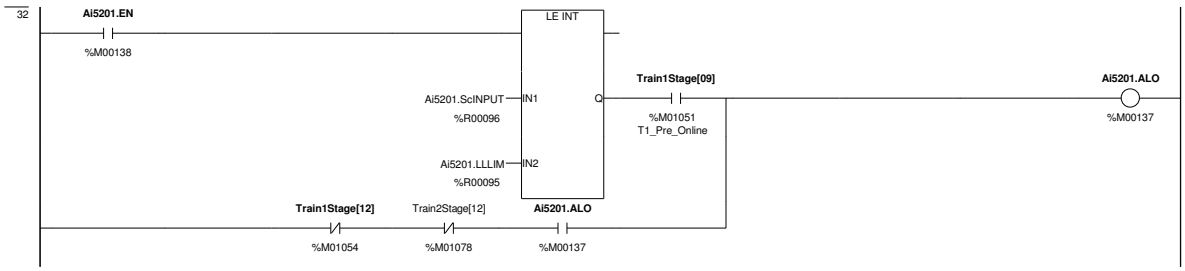
AI5113.ALO %M00133

LD Block,'AlarmsCommon': NOCON 00030, 00052; COIL 00030;



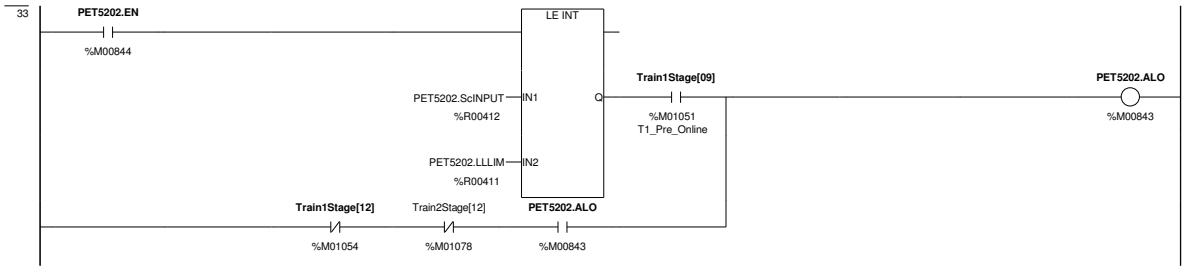
AI5113.AHI %M00132

LD Block,'AlarmsCommon': NOCON 00031, 00052; COIL 00031;



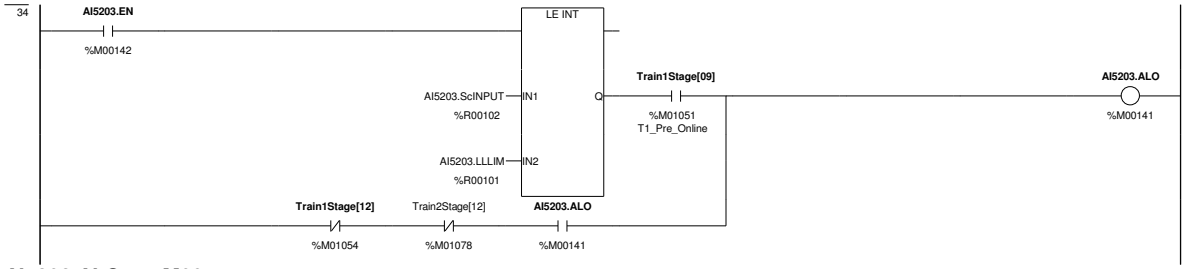
Ai5201.ALO %M00137

LD Block,'AlarmsCommon': NOCON 00032, 00052; COIL 00032;



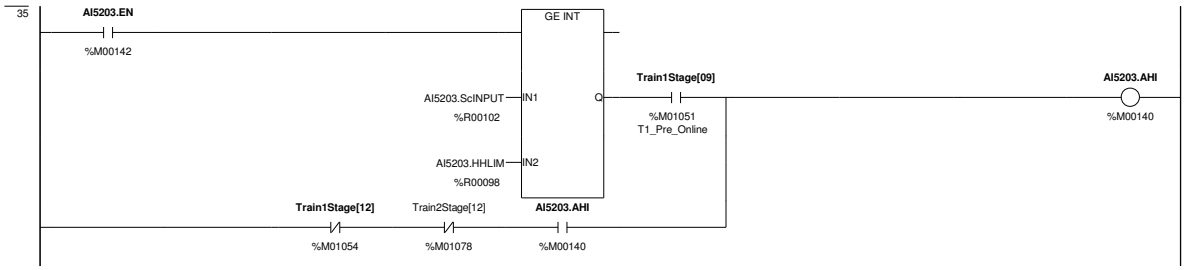
PET5202.ALO %M00843

LD Block,'AlarmsCommon': NOCON 00033, 00051, 00052; COIL 00033;

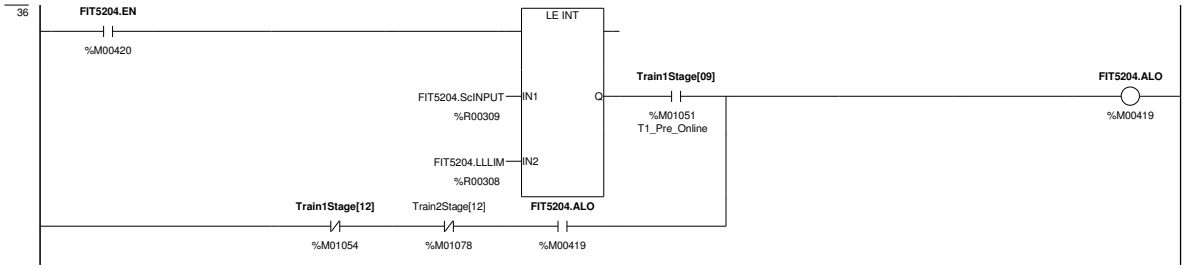


AI5203.ALO %M00141

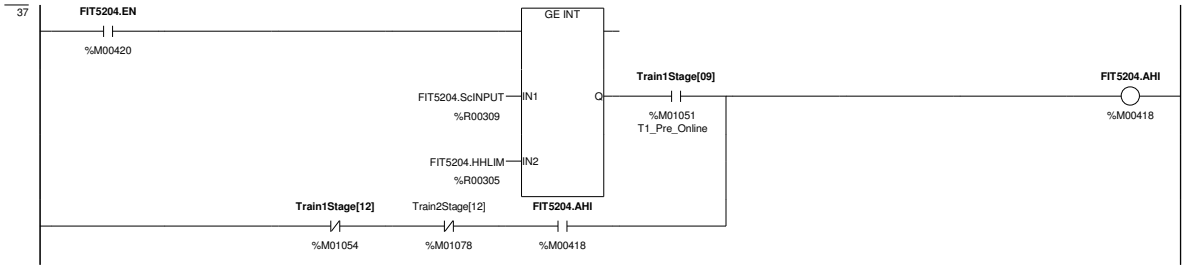
LD Block,'AlarmsCommon': NOCON 00034, 00051; COIL 00034;



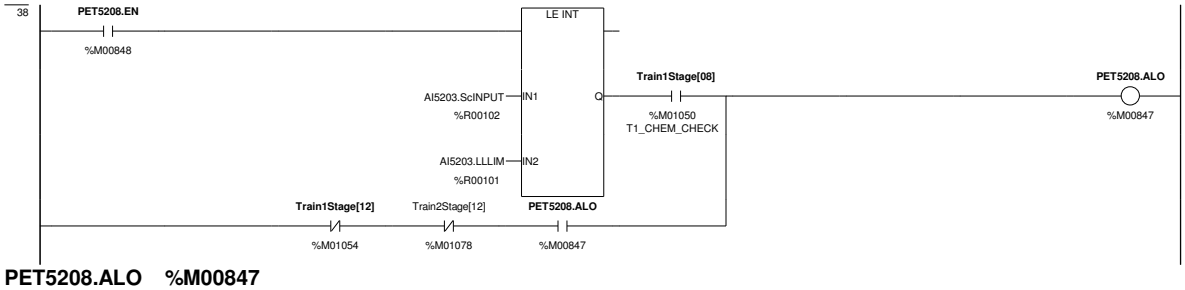
AI5203.AHI %M00140
LD Block,'AlarmsCommon': NOCON 00035, 00051; COIL 00035;



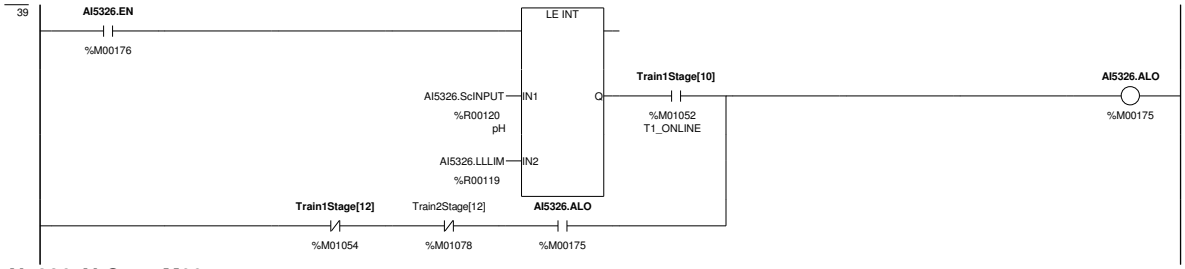
FIT5204.ALO %M00419
LD Block,'AlarmsCommon': NOCON 00036, 00051; COIL 00036;



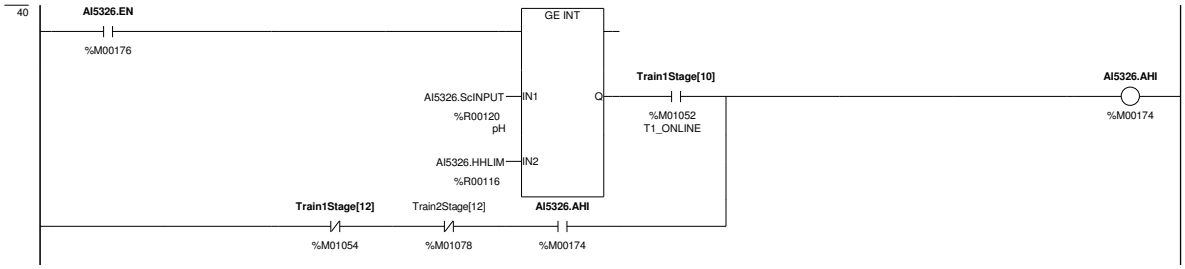
FIT5204.AHI %M00418
LD Block,'AlarmsCommon': NOCON 00037, 00051; COIL 00037;



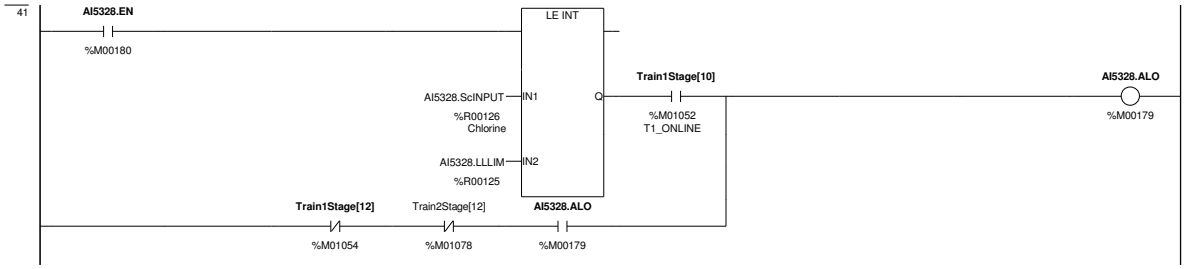
PET5208.ALO %M00847
LD Block,'AlarmsCommon': NOCON 00038, 00051; COIL 00038;



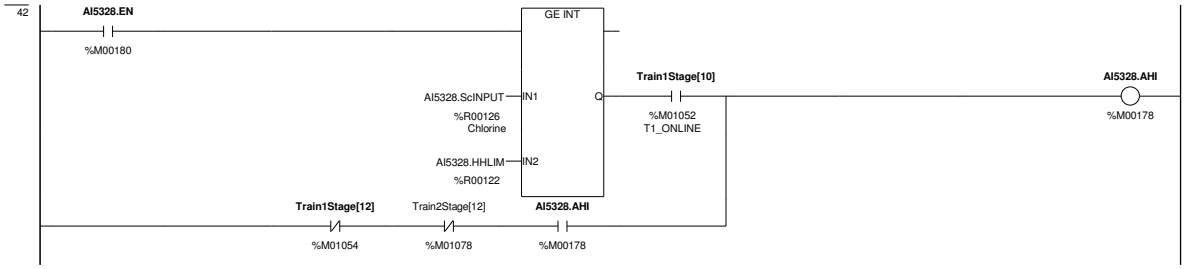
AI5326.ALO %M00175
LD Block,'AlarmsCommon': NOCON 00039, 00052; COIL 00039;



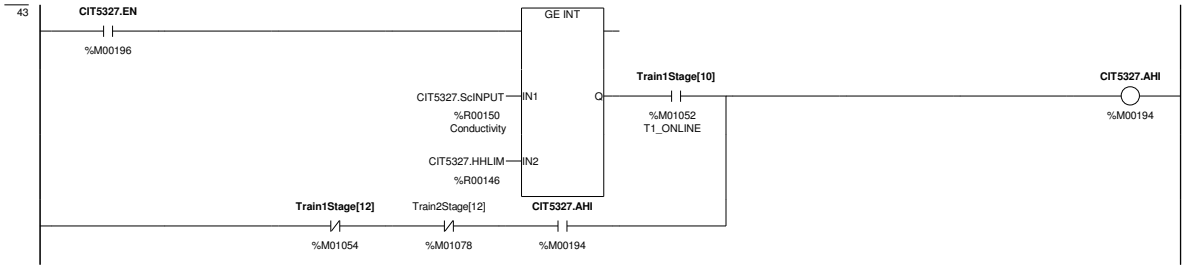
AI5326.AHI %M00174
LD Block,'AlarmsCommon': NOCON 00040, 00052; COIL 00040;



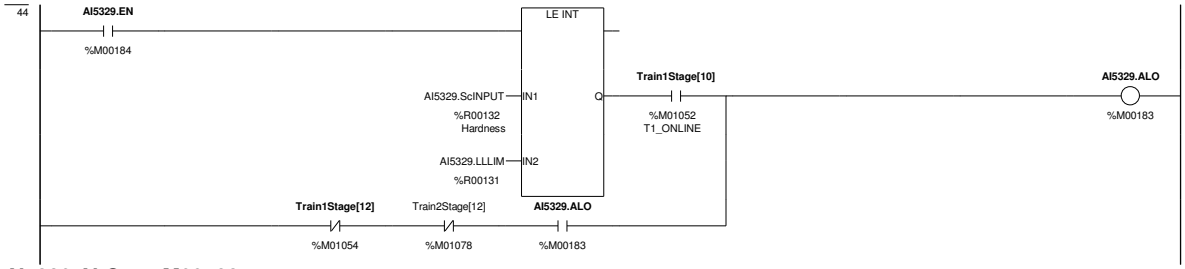
AI5328.ALO %M00179
LD Block,'AlarmsCommon': NOCON 00041, 00052; COIL 00041;



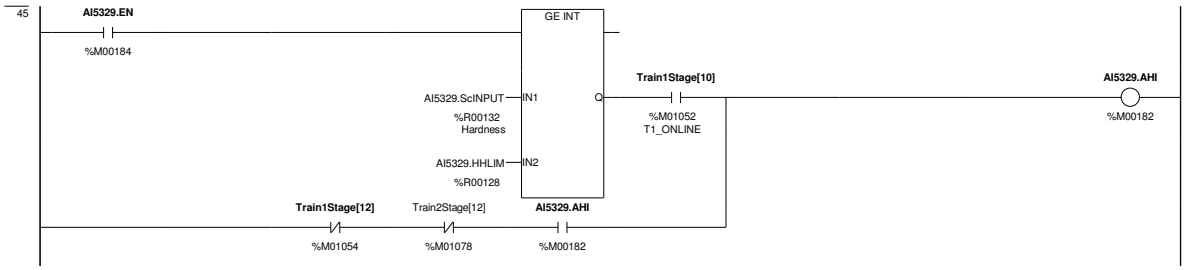
AI5328.AHI %M00178
LD Block,'AlarmsCommon': NOCON 00042, 00052; COIL 00042;



CIT5327.AHI %M00194
LD Block,'AlarmsCommon': NOCON 00043, 00052; COIL 00043;

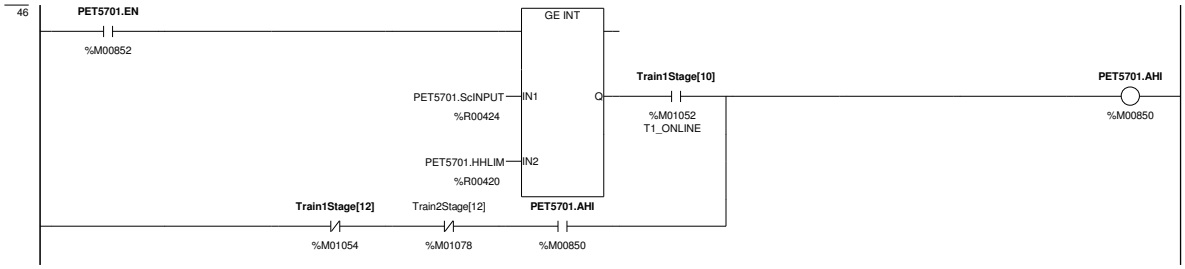


AI5329.ALO %M00183
LD Block,'AlarmsCommon': NOCON 00044, 00052; COIL 00044;



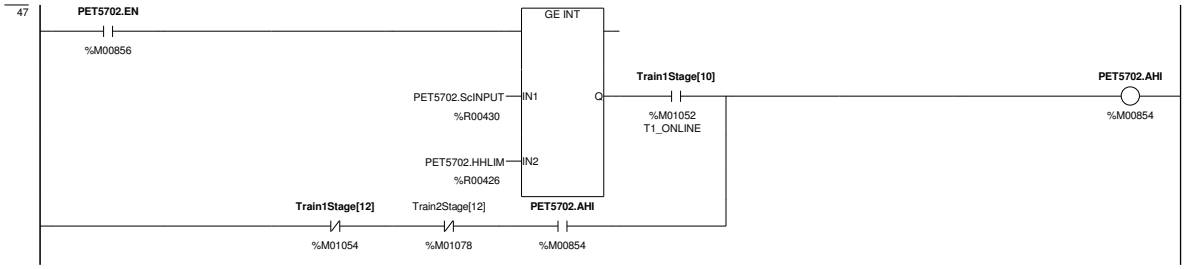
AI5329.AHI %M00182

LD Block,'AlarmsCommon': NOCON 00045, 00052; COIL 00045;



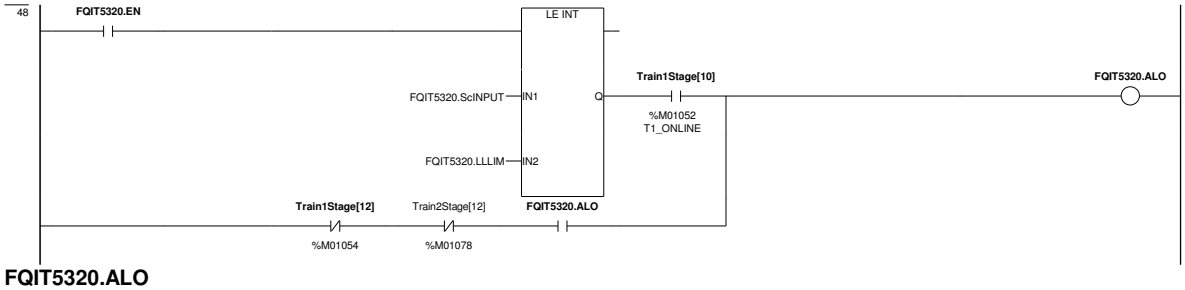
PET5701.AHI %M00850

LD Block,'AlarmsCommon': NOCON 00046, 00052; COIL 00046;



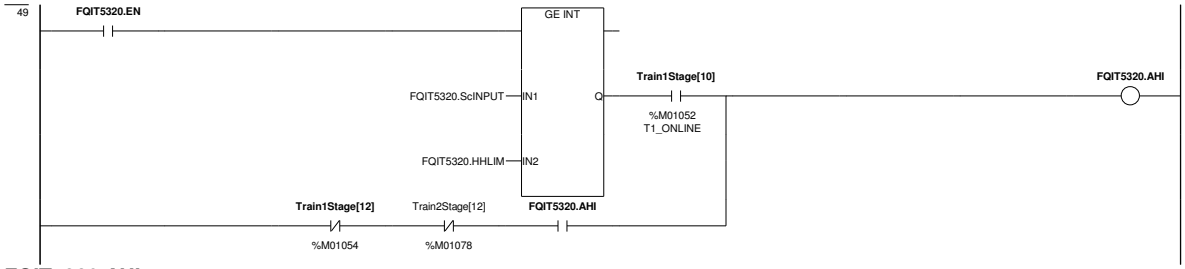
PET5702.AHI %M00854

LD Block,'AlarmsCommon': NOCON 00047, 00052; COIL 00047;



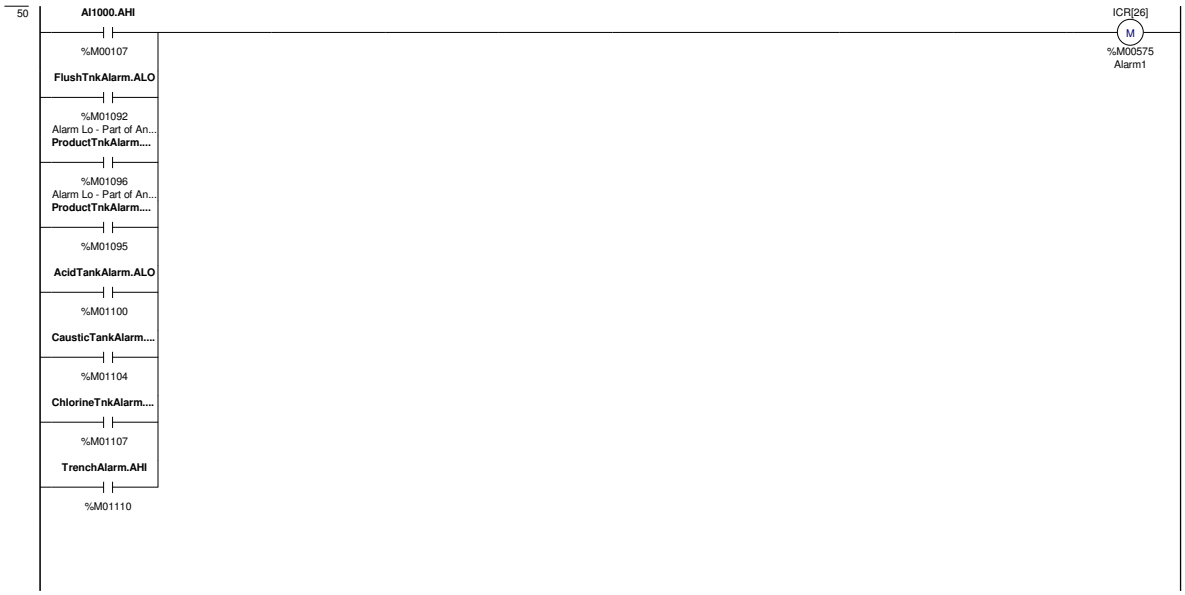
FQIT5320.ALO

LD Block,'AlarmsCommon': NOCON 00048, 00051; COIL 00048;

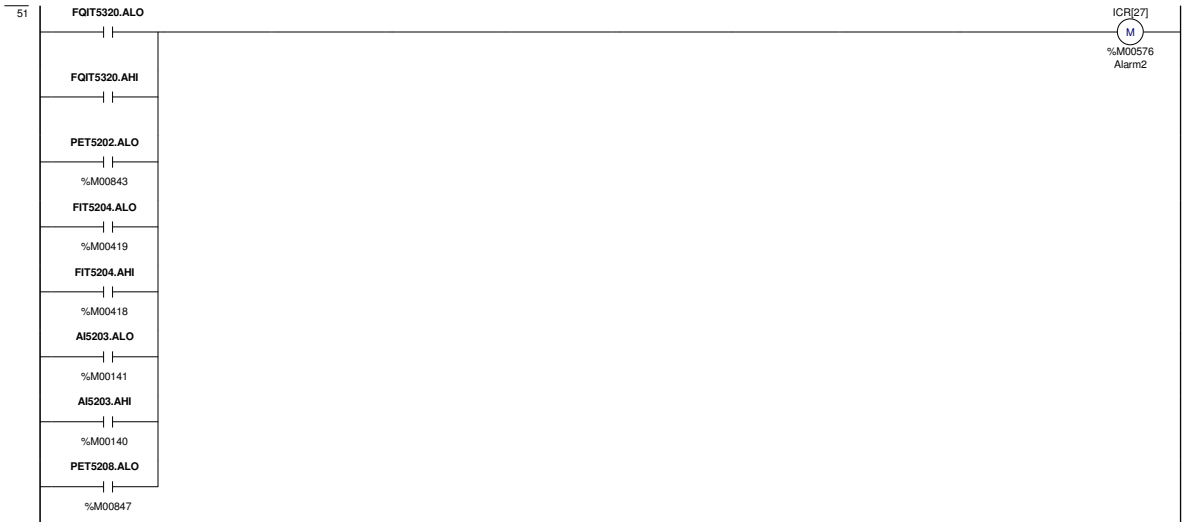


FQIT5320.AHI

LD Block,'AlarmsCommon': NOCON 00049, 00051; COIL 00049;

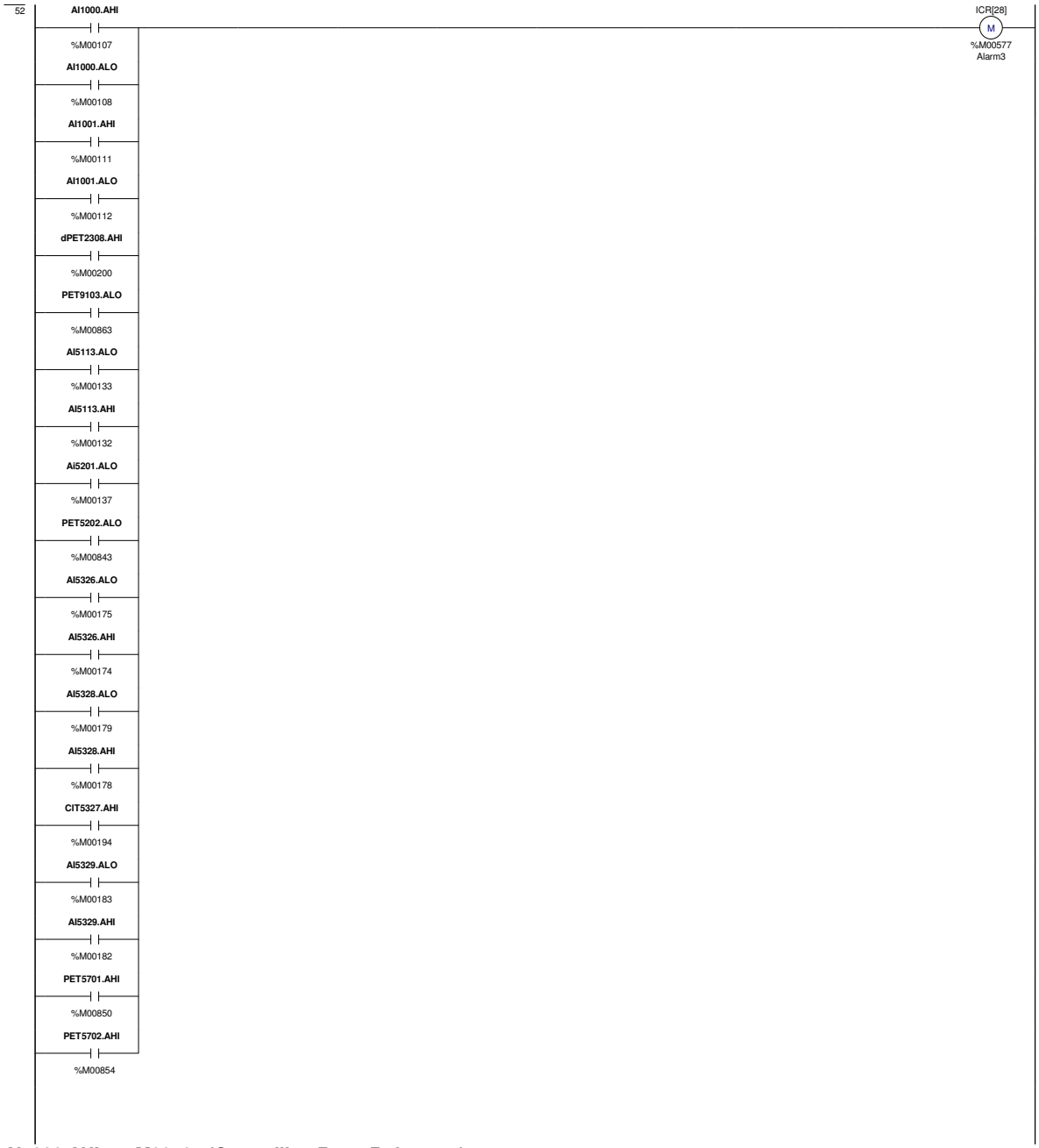


AI1000.AHI %M00107 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00022;
ICR[26] %M00575
LD Block,'AlarmsCommon': NOCON 00053, 00054; COIL 00050;
FlushTnkAlarm.ALO %M01092 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00001;
ProductTnkAlarm.ALO %M01096 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00002;
ProductTnkAlarm.AHI %M01095 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00003;
AcidTankAlarm.ALO %M01100 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00004;
CausticTankAlarm.ALO %M01104 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00005;
ChlorineTnkAlarm.ALO %M01107 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00006;
TrenchAlarm.AHI %M01110 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00007;



FQIT5320.ALO (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00048;
ICR[27] %M00576
LD Block,'AlarmsCommon': NOCON 00053, 00054; COIL 00051;
FQIT5320.AHI (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00049;
PET5202.ALO %M00843 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00033;
FIT5204.ALO %M00419 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00036;
FIT5204.AHI %M00418 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00037;
AI5203.ALO %M00141 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00034;
AI5203.AHI %M00140 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00035;
PET5208.ALO %M00847 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00038;



AI1000.AHI %M00107 (Controlling Rung Reference)
LD Block,'AlarmsCommon': COIL 00022;
ICR[28] %M00577
LD Block,'AlarmsCommon': NOCON 00053, 00054; COIL 00052;
AI1000.ALO %M00108 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00023;

AI1001.AHI %M00111 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00024;

AI1001.ALO %M00112 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00025;

dPET2308.AHI %M00200 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00026;

PET9103.ALO %M00863 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00027;

AI5113.ALO %M00133 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00030;

AI5113.AHI %M00132 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00031;

Ai5201.ALO %M00137 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00032;

PET5202.ALO %M00843 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00033;

AI5326.ALO %M00175 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00039;

AI5326.AHI %M00174 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00040;

AI5328.ALO %M00179 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00041;

AI5328.AHI %M00178 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00042;

CIT5327.AHI %M00194 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00043;

AI5329.ALO %M00183 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00044;

AI5329.AHI %M00182 (Controlling Rung Reference)

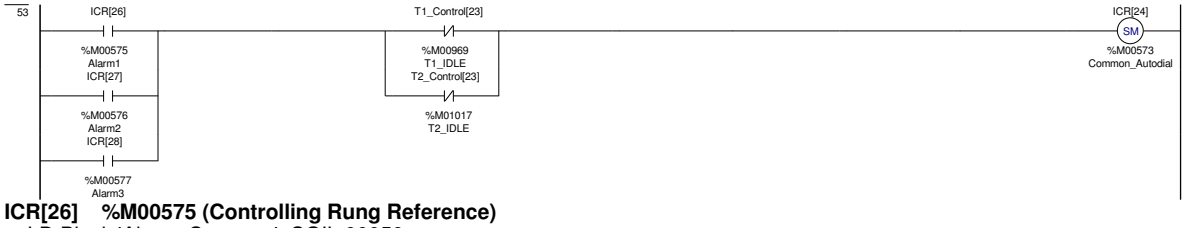
LD Block,'AlarmsCommon': COIL 00045;

PET5701.AHI %M00850 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00046;

PET5702.AHI %M00854 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00047;



ICR[26] %M00575 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00050;

ICR[24] %M00573

LD Block,'_MAIN': RESETCOIL 00022; NCCON 00023; NOCON 00021, 00022;

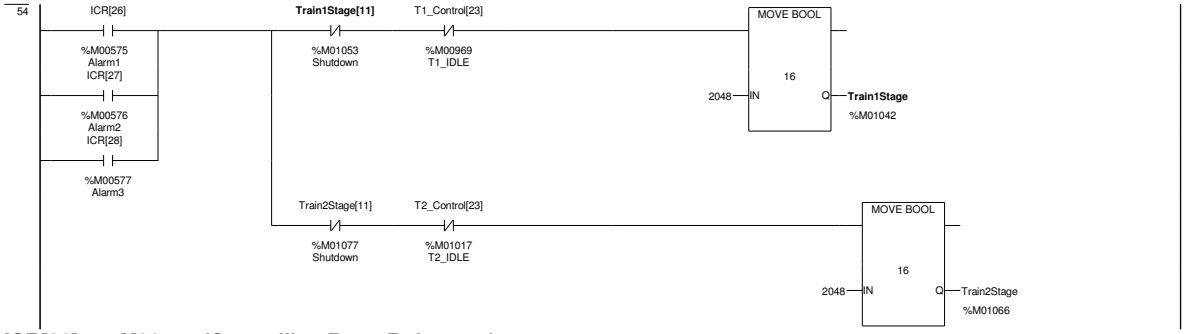
LD Block,'AlarmsCommon': SETCOIL 00053;

ICR[27] %M00576 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00051;

ICR[28] %M00577 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00052;



ICR[26] %M00575 (Controlling Rung Reference)

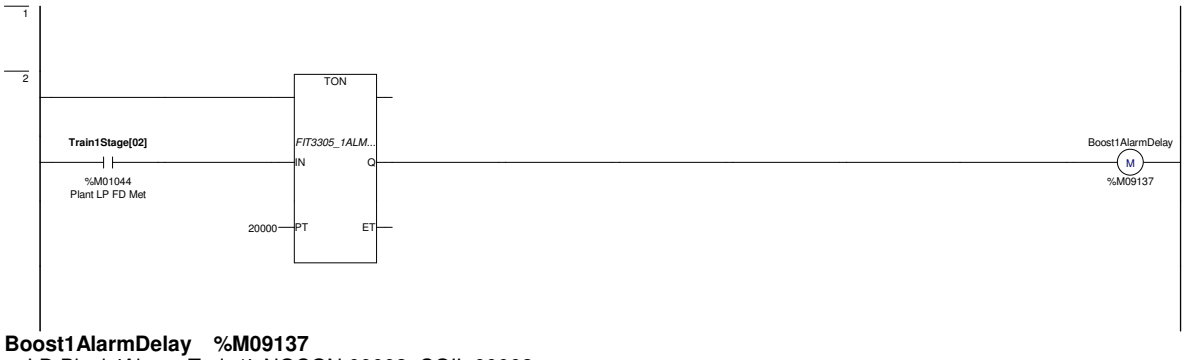
LD Block,'AlarmsCommon': COIL 00050;

ICR[27] %M00576 (Controlling Rung Reference)

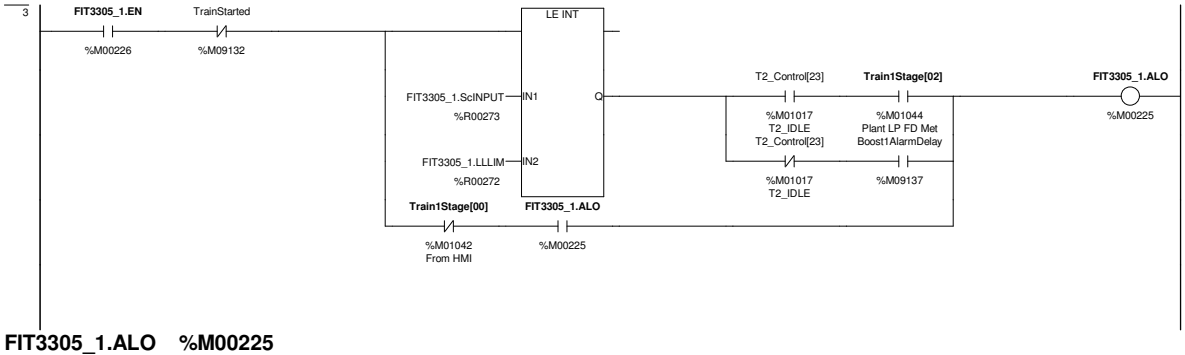
LD Block,'AlarmsCommon': COIL 00051;

ICR[28] %M00577 (Controlling Rung Reference)

LD Block,'AlarmsCommon': COIL 00052;

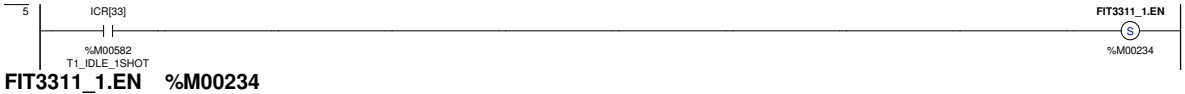


Boost1AlarmDelay %M09137
LD Block,'AlarmsTrain1': NOCON 00003; COIL 00002;

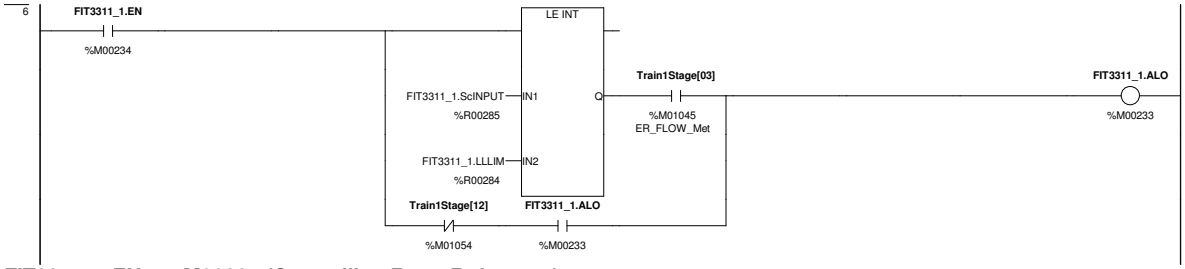


FIT3305_1.ALO %M00225
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'_MAIN': NOCON 00017;
LD Block,'AlarmsTrain1': NOCON 00003; COIL 00003;
Boost1AlarmDelay %M09137 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00002;

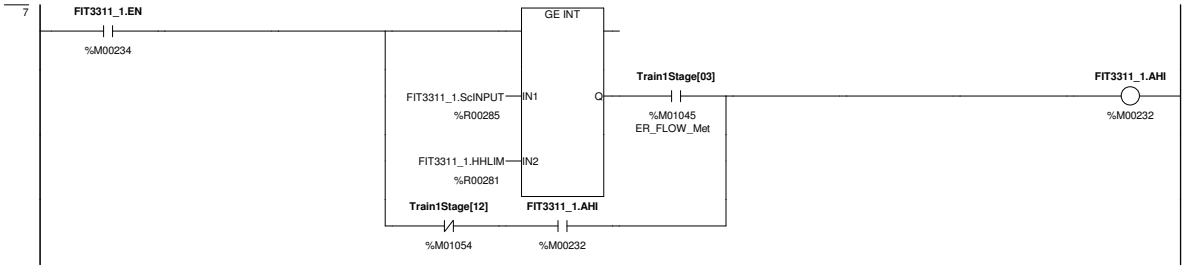
FIT3305_1.EN %M00226
LD Block,'AlarmsTrain1': SETCOIL 00004; NOCON 00003;



FIT3311_1.EN %M00234
LD Block,'AlarmsTrain1': SETCOIL 00005; NOCON 00006, 00007;

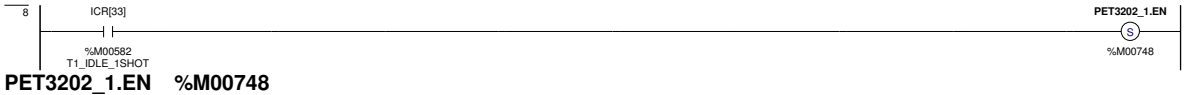


FIT3311_1.EN %M00234 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00005;
FIT3311_1.ALO %M00233
LD Block,'AlarmsTrain1': NOCON 00006, 00029; COIL 00006;

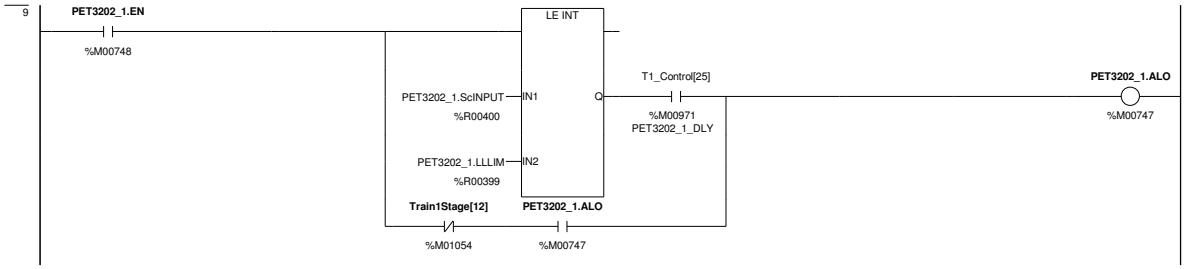


FIT3311_1.EN %M00234 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00005;

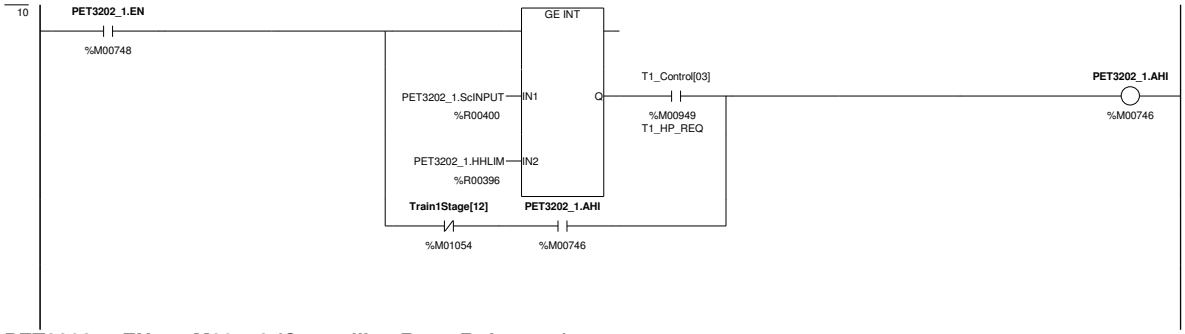
FIT3311_1.AHI %M00232
LD Block,'AlarmsTrain1': NOCON 00007, 00029; COIL 00007;



PET3202_1.EN %M00748
LD Block,'AlarmsTrain1': SETCOIL 00008; NOCON 00009, 00010;

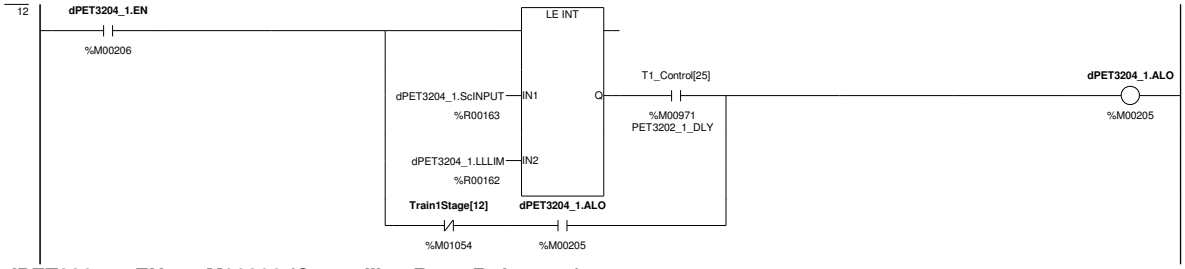


PET3202_1.EN %M00748 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00008;
PET3202_1.ALO %M00747
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'_MAIN': NOCON 00017;
LD Block,'AlarmsTrain1': NOCON 00009; COIL 00009;

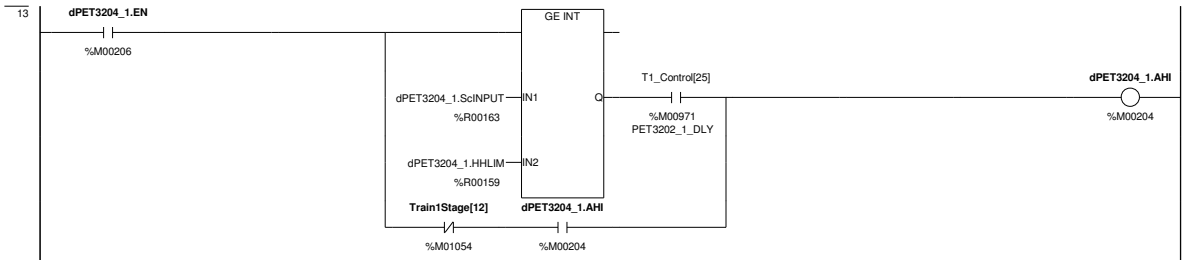


PET3202_1.EN %M00748 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00008;
PET3202_1.AHI %M00746
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'_MAIN': NOCON 00017;
LD Block,'AlarmsTrain1': NOCON 00010; COIL 00010;

dPET3204_1.EN %M00206
LD Block,'AlarmsTrain1': SETCOIL 00011; NOCON 00012, 00013;

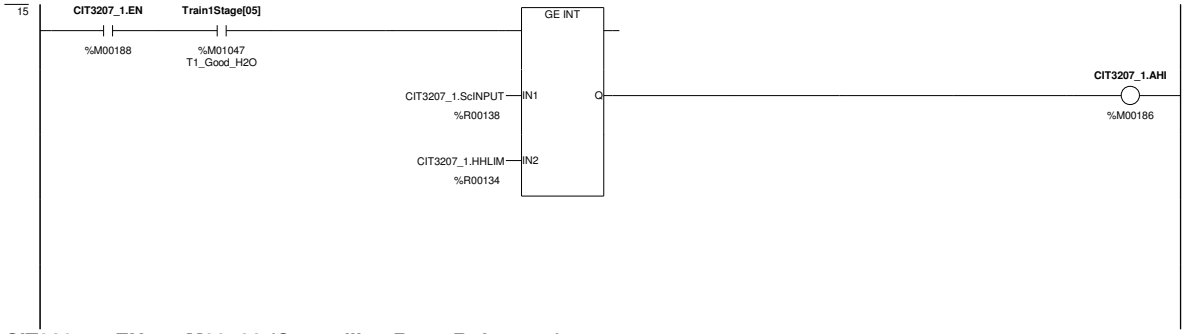


dPET3204_1.EN %M00206 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00011;
dPET3204_1.ALO %M00205
LD Block,'AlarmsTrain1': NOCON 00012; COIL 00012;

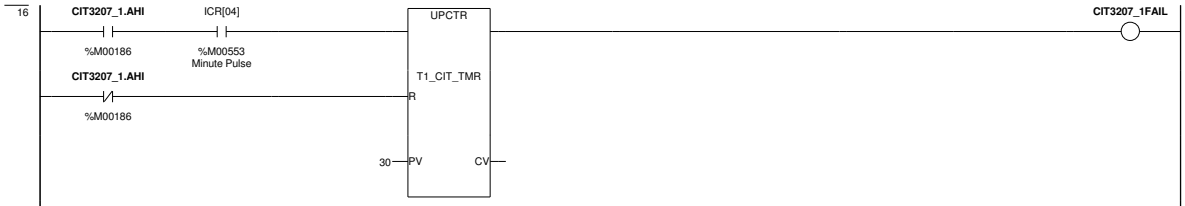


dPET3204_1.EN %M00206 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00011;
dPET3204_1.AHI %M00204
LD Block,'AlarmsTrain1': NOCON 00013, 00029; COIL 00013;

CIT3207_1.EN %M00188
LD Block,'AlarmsTrain1': SETCOIL 00014; NOCON 00015;

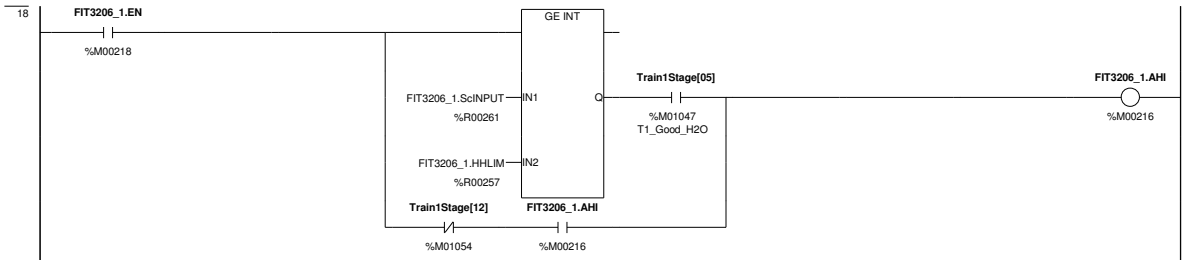


CIT3207_1.EN %M00188 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00014;
CIT3207_1.AHI %M00186
LD Block,'Train1_Sequence': NOCON 00025;
LD Block,'AlarmsTrain1': NCCON 00016; NOCON 00016; COIL 00015;



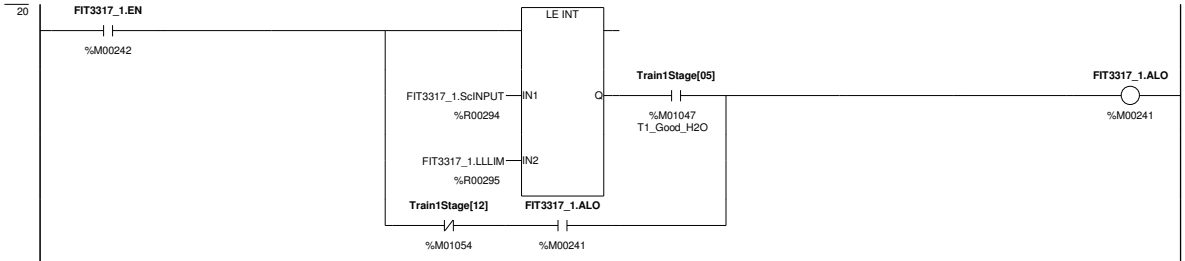
CIT3207_1.AHI %M00186 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00015;
CIT3207_1FAIL
LD Block,'AlarmsTrain1': NOCON 00029; COIL 00016;

FIT3206_1.EN %M00218
LD Block,'AlarmsTrain1': SETCOIL 00017; NOCON 00018;



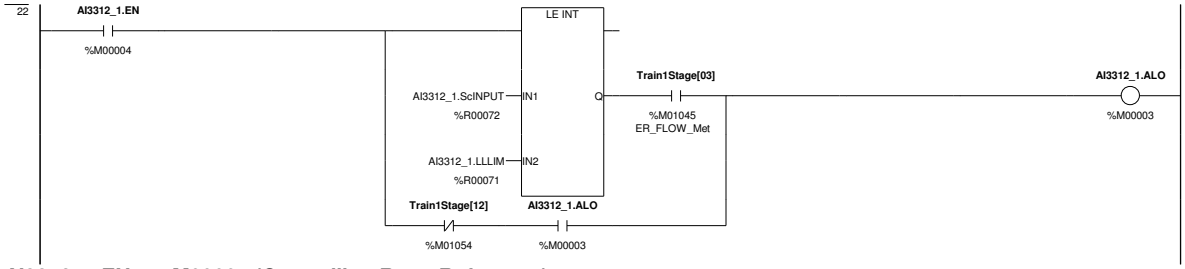
FIT3206_1.EN %M00218 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00017;
FIT3206_1.AHI %M00216
LD Block,'AlarmsTrain1': NOCON 00018, 00029; COIL 00018;

FIT3317_1.EN %M00242
LD Block,'AlarmsTrain1': SETCOIL 00019; NOCON 00020;

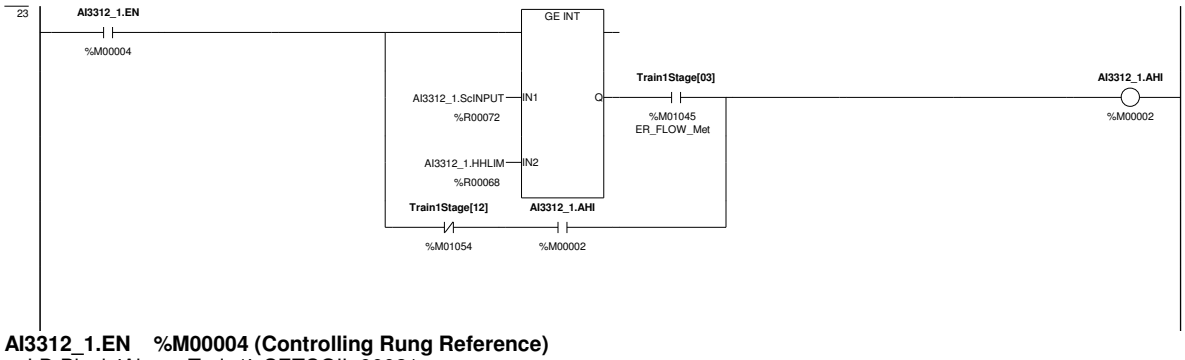


FIT3317_1.EN %M00242 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00019;
FIT3317_1.ALO %M00241
LD Block,'AlarmsTrain1': NOCON 00020, 00029; COIL 00020;

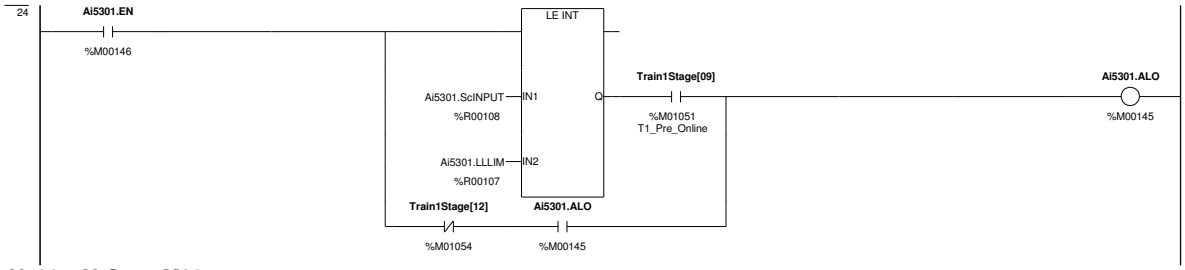
AI3312_1.EN %M00004
LD Block,'AlarmsTrain1': SETCOIL 00021; NOCON 00022, 00023;



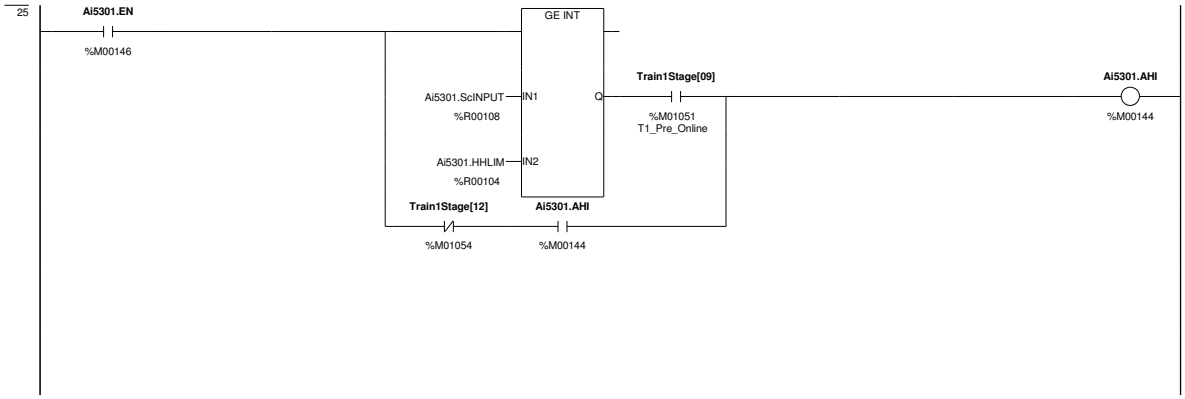
AI3312_1.EN %M00004 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00021;
AI3312_1.ALO %M00003
LD Block,'AlarmsTrain1': NOCON 00022; COIL 00022;



AI3312_1.EN %M00004 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00021;
AI3312_1.AHI %M00002
LD Block,'AlarmsTrain1': NOCON 00023; COIL 00023;

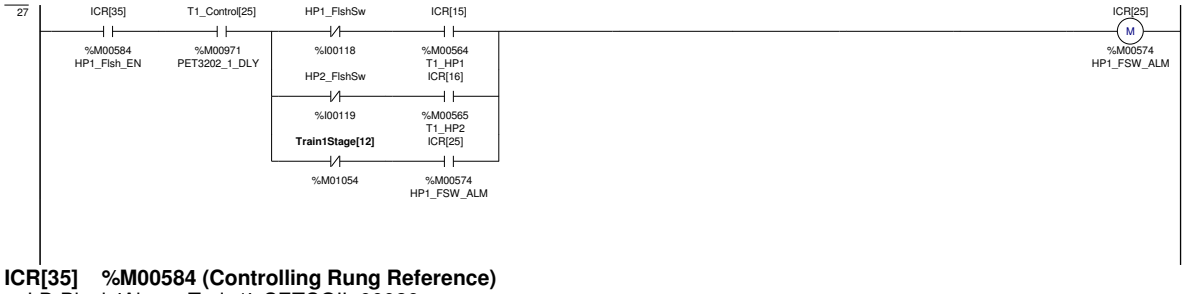


Ai5301.ALO %M00145
LD Block,'AlarmsTrain1': NOCON 00024; COIL 00024;



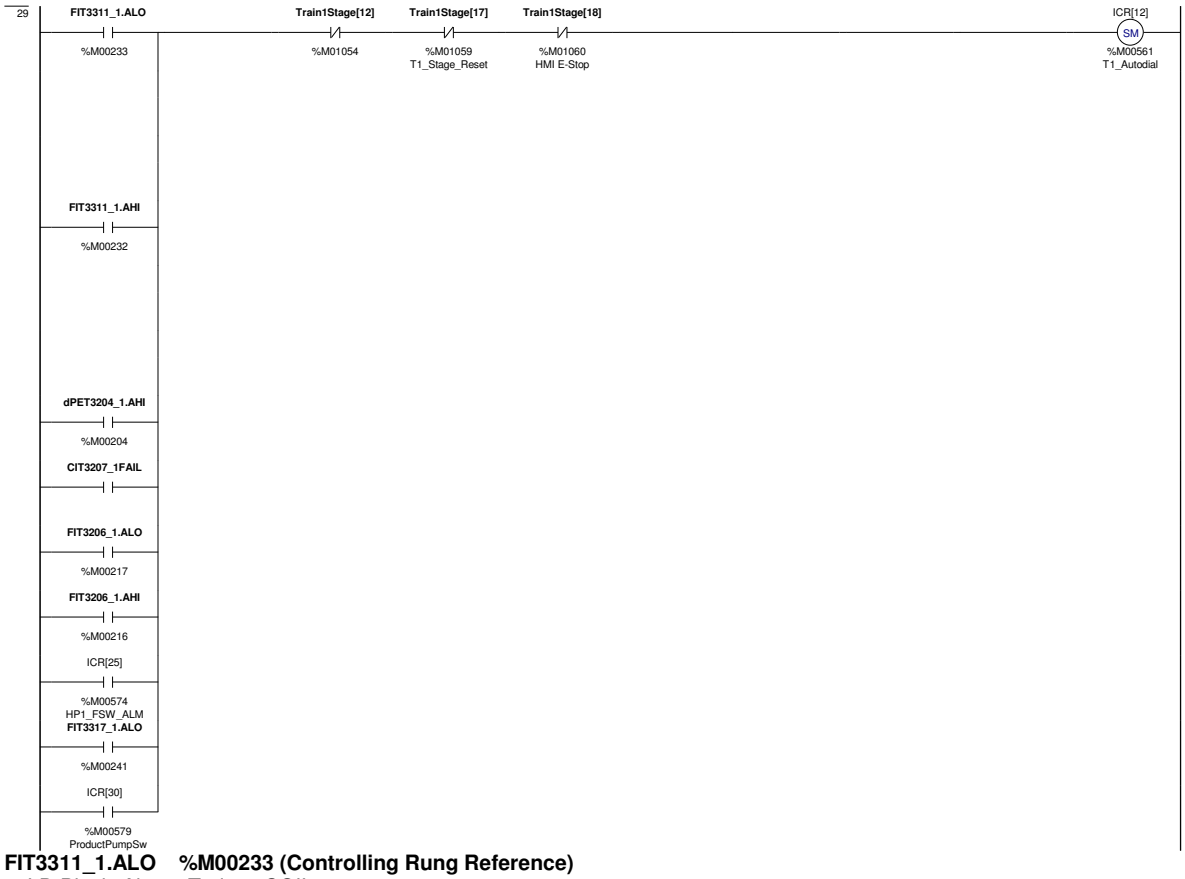
Ai5301.AHI %M00144
LD Block,'AlarmsTrain1': NOCON 00025; COIL 00025;

ICR[35] %M00584
LD Block,'AlarmsTrain1': SETCOIL 00026; NOCON 00027;

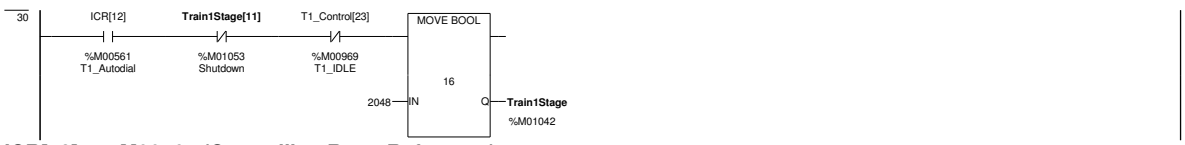


ICR[35] %M00584 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00026;
ICR[25] %M00574
LD Block,'AlarmsTrain1': NOCON 00027, 00029; COIL 00027;

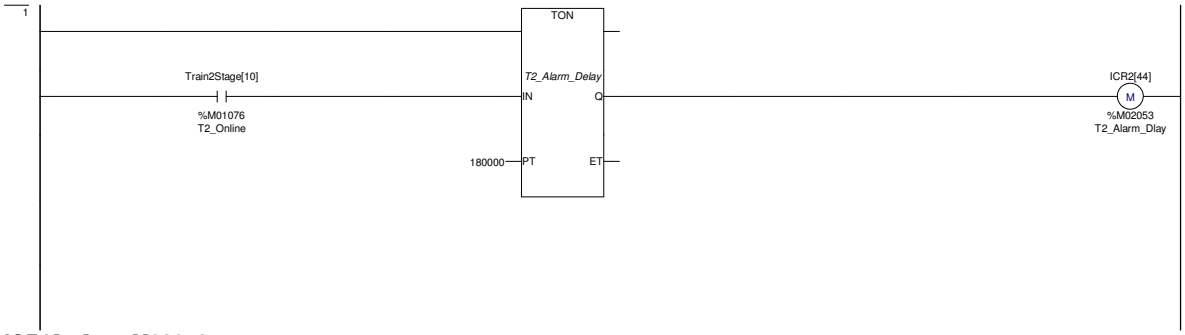
ICR[30] %M00579
LD Block,'AlarmsTrain1': NOCON 00029; COIL 00028;



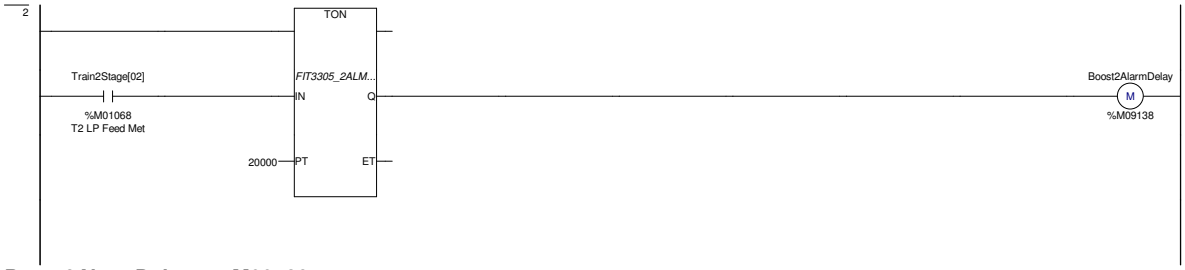
FIT3311_1.ALO %M00233 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00006;
ICR[12] %M00561
LD Block,'_MAIN': RESETCOIL 00022; NCCON 00023; NOCON 00021, 00022;
LD Block,'AlarmsTrain1': SETCOIL 00029; NOCON 00030;
FIT3311_1.AHI %M00232 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00007;
dPET3204_1.AHI %M00204 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00013;
CIT3207_1FAIL (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00016;
FIT3206_1.AHI %M00216 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00018;
ICR[25] %M00574 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00027;
FIT3317_1.ALO %M00241 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00020;
ICR[30] %M00579 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': COIL 00028;



ICR[12] %M00561 (Controlling Rung Reference)
LD Block,'AlarmsTrain1': SETCOIL 00029;

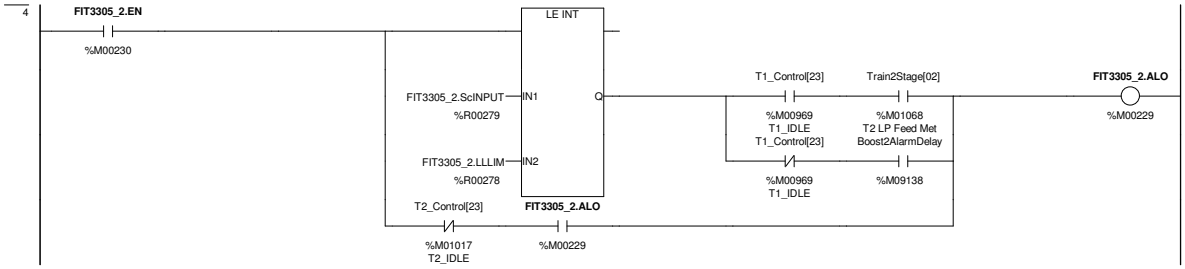


ICR2[44] %M02053
LD Block,'AlarmsTrain2': NOCON 00029; COIL 00001;



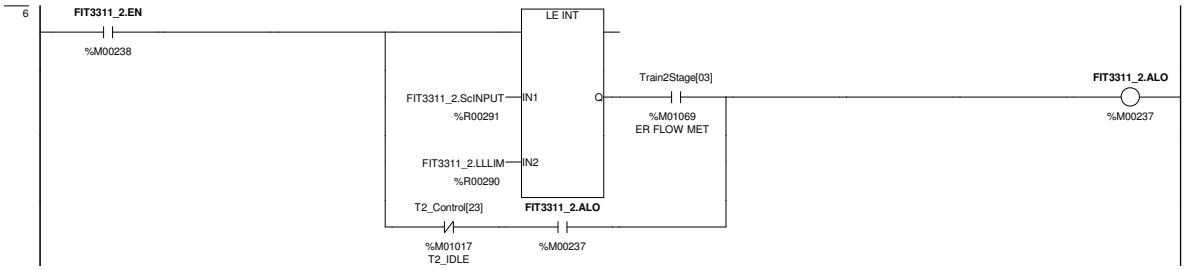
Boost2AlarmDelay %M09138
LD Block,'AlarmsTrain2': NOCON 00004; COIL 00002;

FIT3305_2.EN %M00230
LD Block,'AlarmsTrain2': SETCOIL 00003; NOCON 00004;

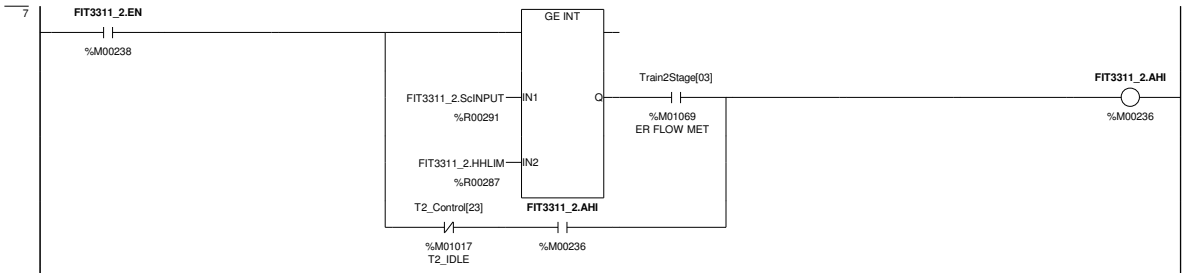


FIT3305_2.EN %M00230 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00003;
FIT3305_2.ALO %M00229
LD Block,'AlarmsTrain2': NOCON 00004; COIL 00004;
LD Block,'_MAIN': NOCON 00018;
LD Block,'Train2_Shutdown': NOCON 00035;
Boost2AlarmDelay %M09138 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00002;

FIT3311_2.EN %M00238
LD Block,'AlarmsTrain2': SETCOIL 00005; NOCON 00006, 00007;

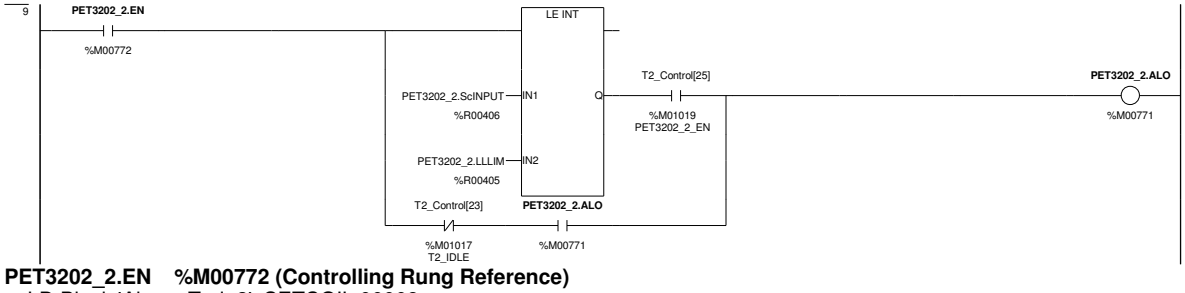


FIT3311_2.EN %M00238 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00005;
FIT3311_2.ALO %M00237
LD Block,'AlarmsTrain2': NOCON 00006, 00031; COIL 00006;

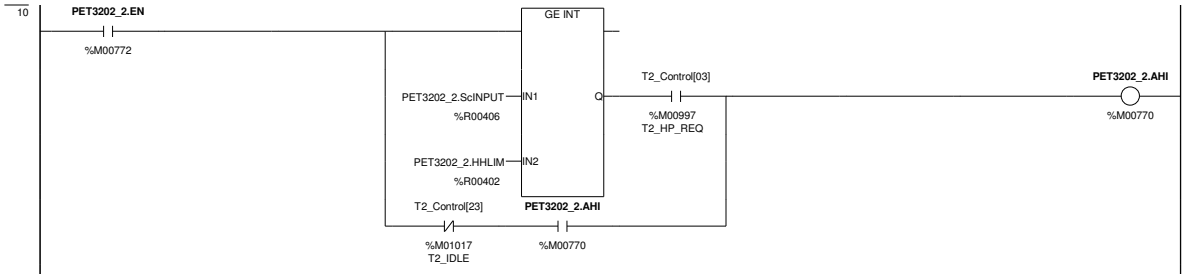


FIT3311_2.EN %M00238 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00005;
FIT3311_2.AHI %M00236
LD Block,'AlarmsTrain2': NOCON 00007, 00031; COIL 00007;

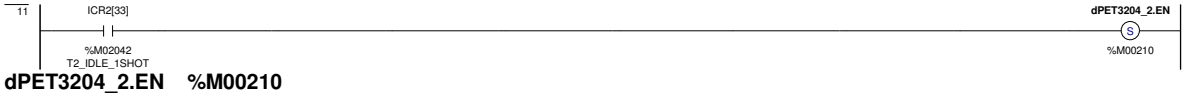
PET3202_2.EN %M00772
LD Block,'AlarmsTrain2': SETCOIL 00008; NOCON 00009, 00010;



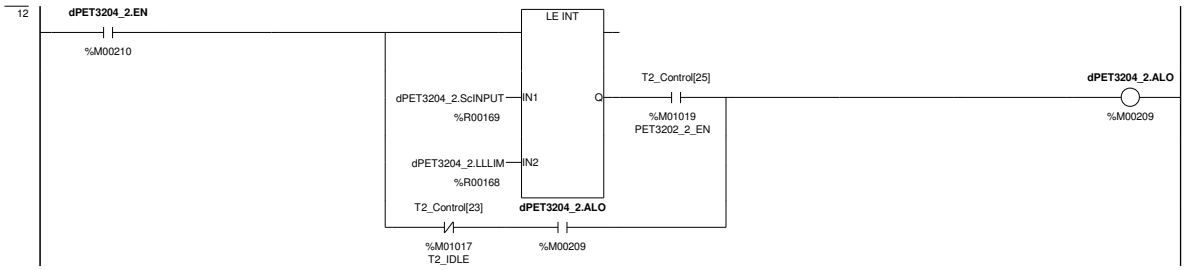
PET3202_2.EN %M00772 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00008;
PET3202_2.ALO %M00771
LD Block,'AlarmsTrain2': NOCON 00009; COIL 00009;
LD Block,'_MAIN': NOCON 00018;
LD Block,'Train2_Shutdown': NOCON 00035;



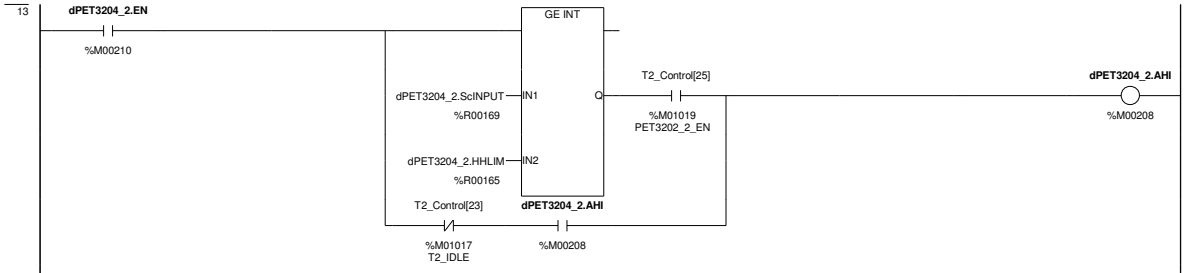
PET3202_2.EN %M00772 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00008;
PET3202_2.AHI %M00770
LD Block,'AlarmsTrain2': NOCON 00010; COIL 00010;
LD Block,'_MAIN': NOCON 00018;
LD Block,'Train2_Shutdown': NOCON 00035;



dPET3204_2.EN %M00210
LD Block,'AlarmsTrain2': SETCOIL 00011; NOCON 00012, 00013;

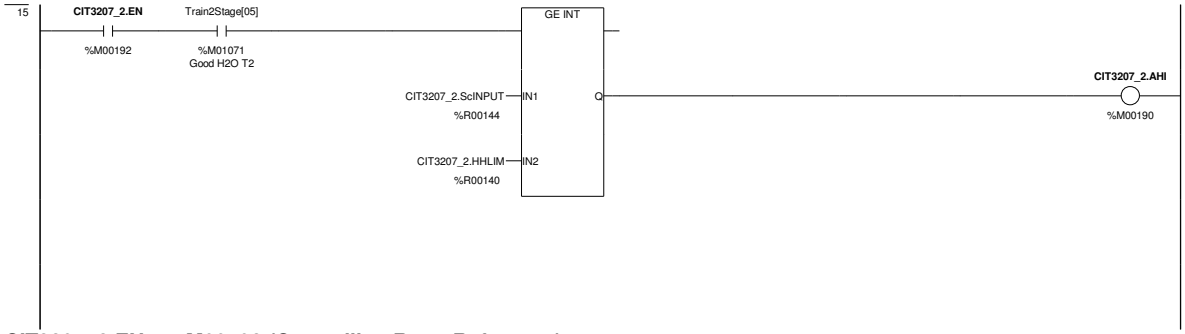


dPET3204_2.EN %M00210 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00011;
dPET3204_2.ALO %M00209
LD Block,'AlarmsTrain2': NOCON 00012; COIL 00012;

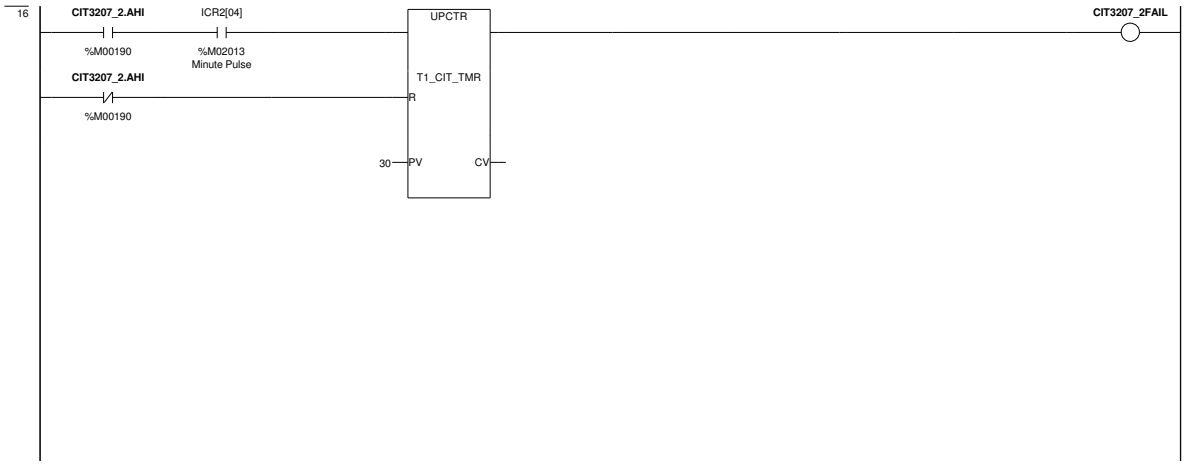


dPET3204_2.EN %M00210 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00011;
dPET3204_2.AHI %M00208
LD Block,'AlarmsTrain2': NOCON 00013, 00031; COIL 00013;

CIT3207_2.EN %M00192
LD Block,'AlarmsTrain2': SETCOIL 00014; NOCON 00015;

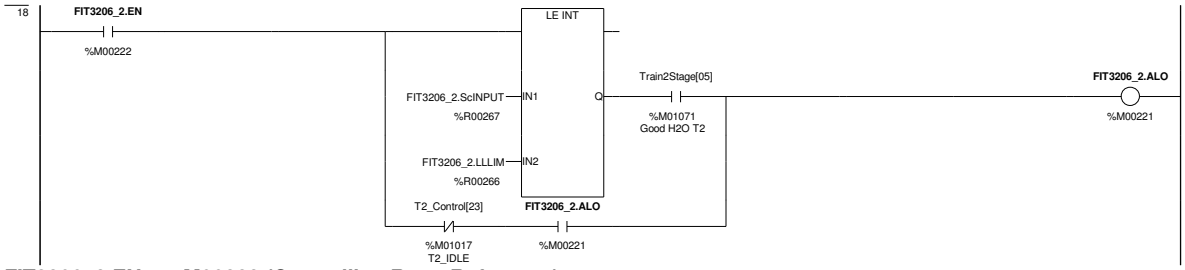


CIT3207_2.EN %M00192 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00014;
CIT3207_2.AHI %M00190
LD Block,'AlarmsTrain2': NCCON 00016; NOCON 00016; COIL 00015;
LD Block,'Train2_Sequence': NOCON 00025;

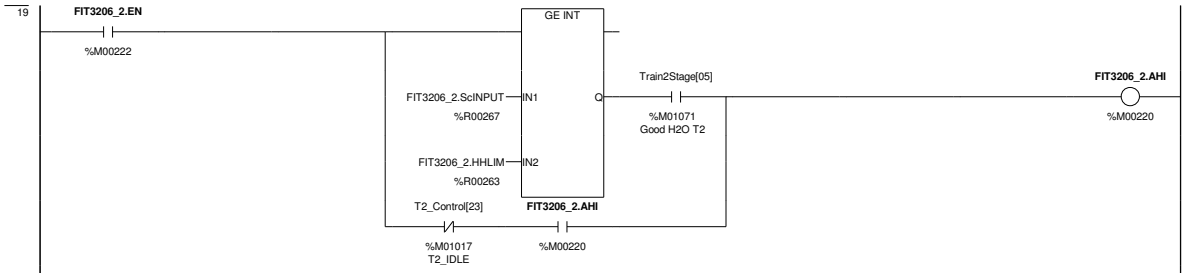


CIT3207_2.AHI %M00190 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00015;
CIT3207_2FAIL
LD Block,'AlarmsTrain2': NOCON 00031; COIL 00016;

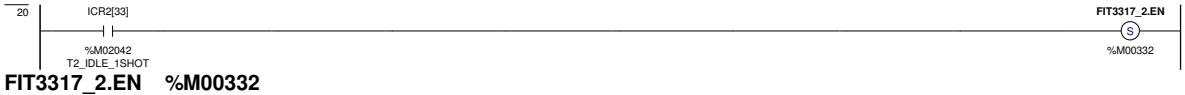
FIT3206_2.EN %M00222
LD Block,'AlarmsTrain2': SETCOIL 00017; NOCON 00018, 00019;



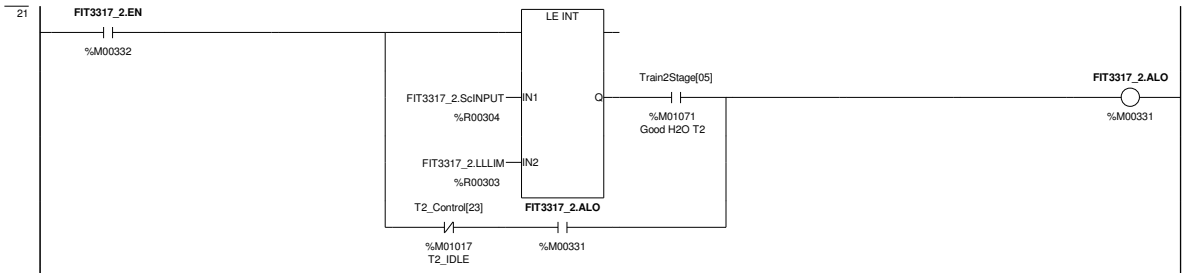
FIT3206_2.EN %M00222 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00017;
FIT3206_2.ALO %M00221
LD Block,'AlarmsTrain2': NOCON 00018, 00031; COIL 00018;



FIT3206_2.EN %M00222 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00017;
FIT3206_2.AHI %M00220
LD Block,'AlarmsTrain2': NOCON 00019, 00031; COIL 00019;

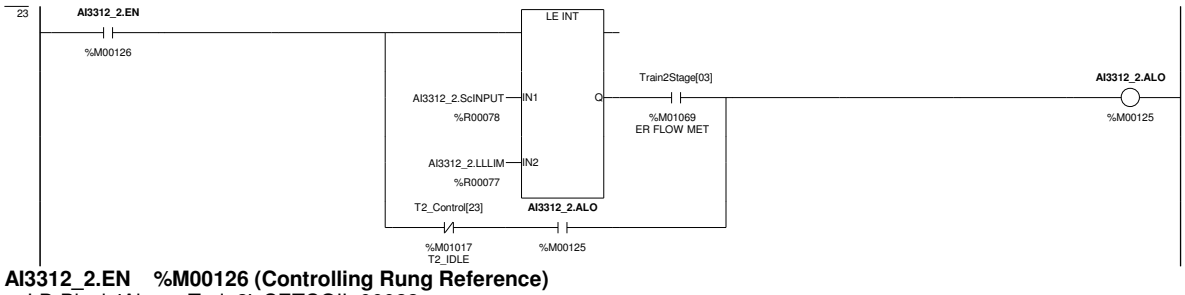


FIT3317_2.EN %M00332
LD Block,'AlarmsTrain2': SETCOIL 00020; NOCON 00021;

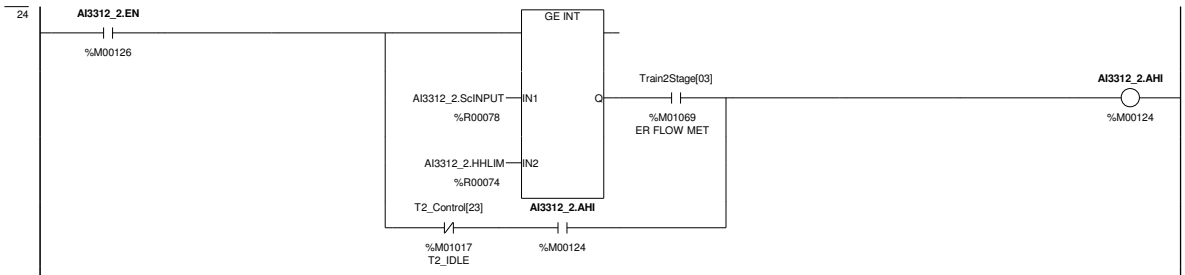


FIT3317_2.EN %M00332 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00020;
FIT3317_2.ALO %M00331
LD Block,'AlarmsTrain2': NOCON 00021, 00031; COIL 00021;

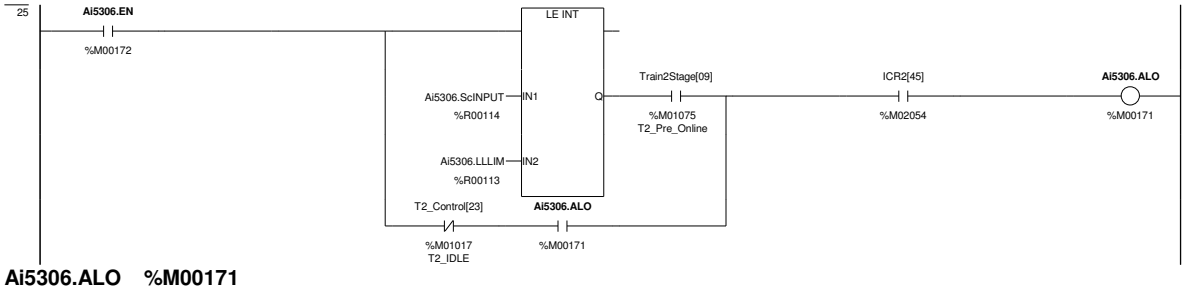
AI3312_2.EN %M00126
LD Block,'AlarmsTrain2': SETCOIL 00022; NOCON 00023, 00024;



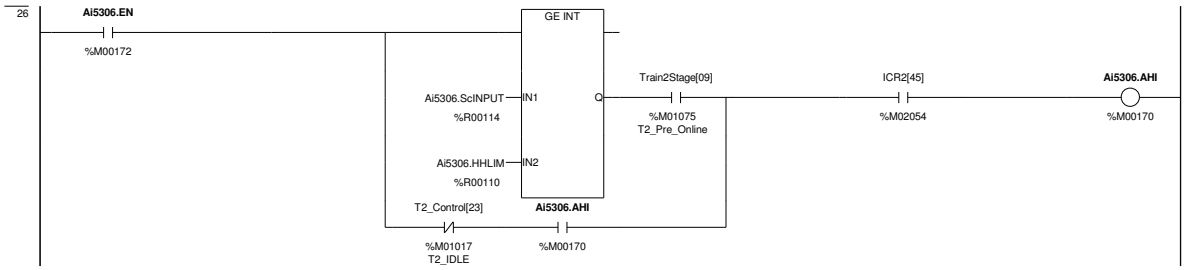
AI3312_2.EN %M00126 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00022;
AI3312_2.ALO %M00125
LD Block,'AlarmsTrain2': NOCON 00023; COIL 00023;



AI3312_2.EN %M00126 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00022;
AI3312_2.AHI %M00124
LD Block,'AlarmsTrain2': NOCON 00024; COIL 00024;



Ai5306.ALO %M00171
LD Block,'AlarmsTrain2': NOCON 00025; COIL 00025;

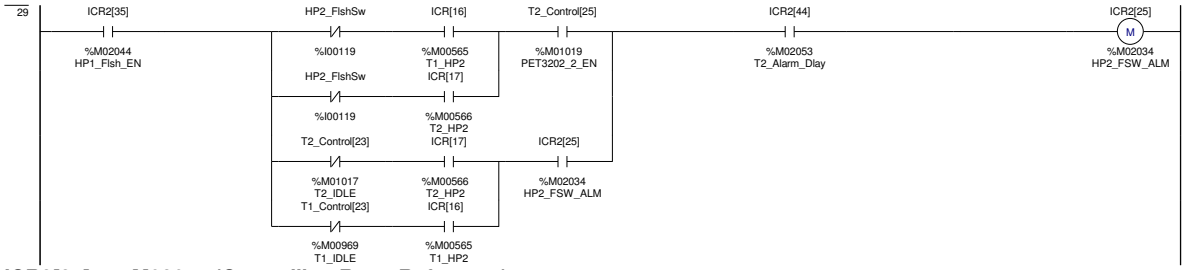


Ai5306.AHI %M00170

LD Block,'AlarmsTrain2': NOCON 00026; COIL 00026;

ICR2[35] %M02044

LD Block,'AlarmsTrain2': SETCOIL 00028; NOCON 00029;



ICR2[35] %M02044 (Controlling Rung Reference)

LD Block,'AlarmsTrain2': SETCOIL 00028;

ICR2[44] %M02053 (Controlling Rung Reference)

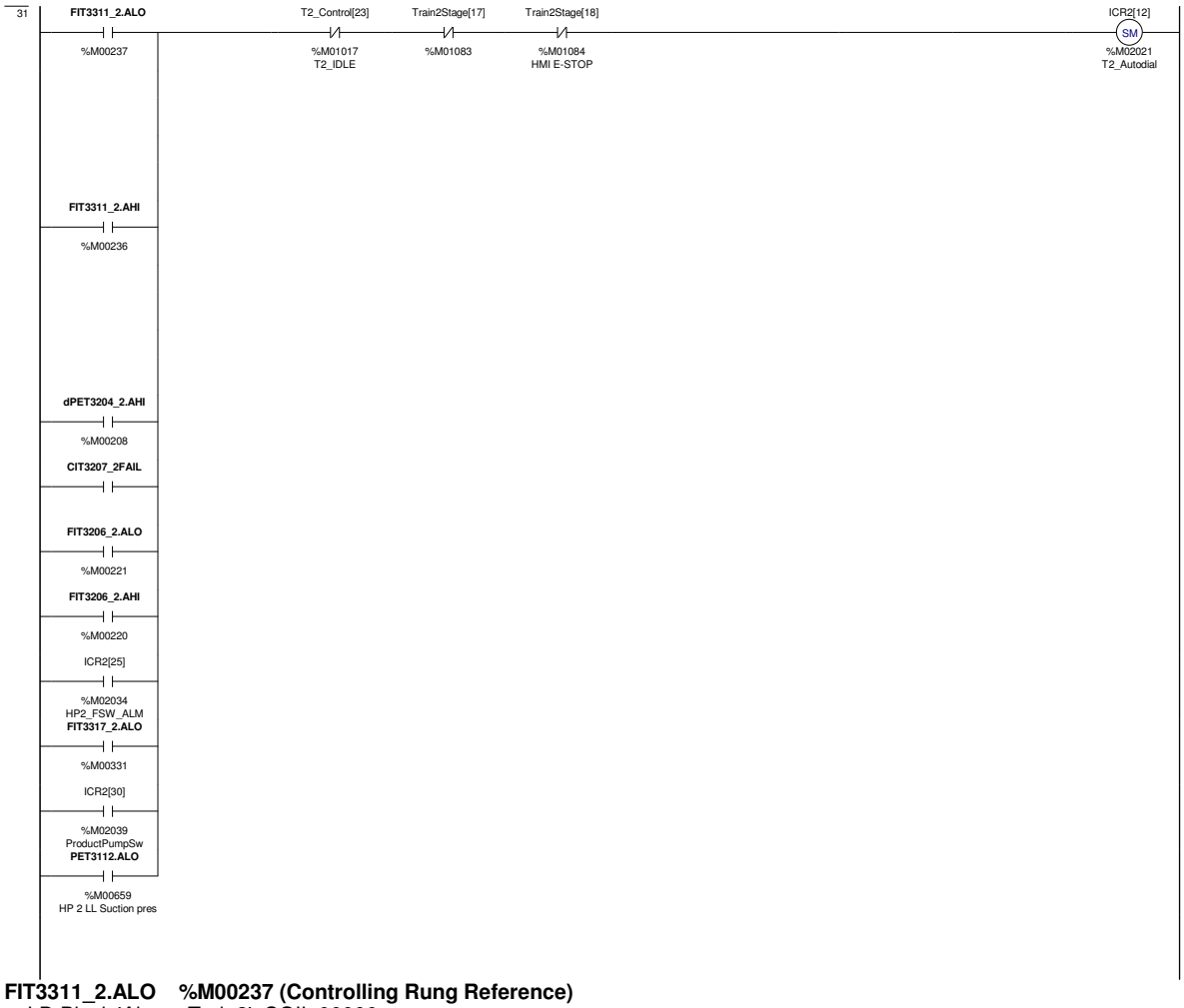
LD Block,'AlarmsTrain2': COIL 00001;

ICR2[25] %M02034

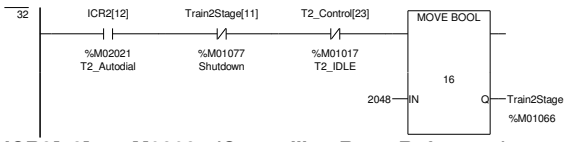
LD Block,'AlarmsTrain2': NOCON 00029, 00031; COIL 00029;

ICR2[30] %M02039

LD Block,'AlarmsTrain2': NOCON 00031; COIL 00030;

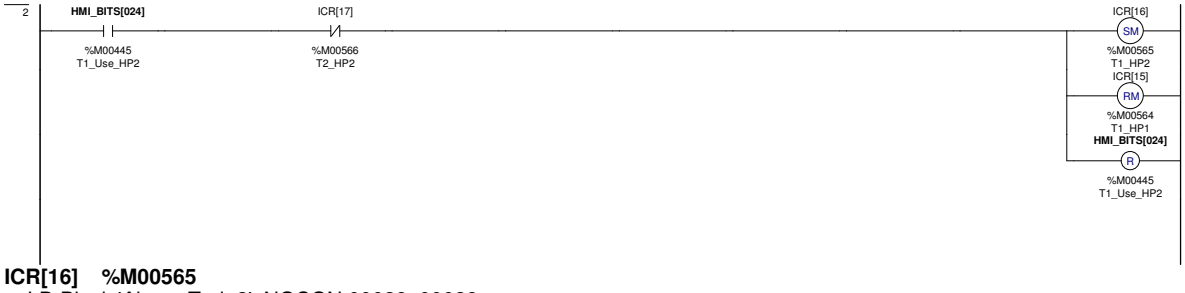


FIT3311_2.ALO %M00237 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00006;
ICR2[12] %M02021
LD Block,'AlarmsTrain2': SETCOIL 00031; NOCON 00032;
LD Block,'_MAIN': RESETCOIL 00022; NCCON 00023; NOCON 00021, 00022;
FIT3311_2.AHI %M00236 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00007;
dPET3204_2.AHI %M00208 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00013;
CIT3207_2FAIL (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00016;
FIT3206_2.ALO %M00221 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00018;
FIT3206_2.AHI %M00220 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00019;
ICR2[25] %M02034 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00029;
FIT3317_2.ALO %M00331 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00021;
ICR2[30] %M02039 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': COIL 00030;



ICR2[12] %M02021 (Controlling Rung Reference)
LD Block,'AlarmsTrain2': SETCOIL 00031;

ICR[15] %M00564
LD Block,'Outputs_T2': NOCON 00016;
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'Train1_Sequence': NOCON 00021;
LD Block,'AlarmsCommon': NOCON 00018;
LD Block,'AlarmsTrain1': NOCON 00027;
LD Block,'HP_Select': RESETCOIL 00002; SETCOIL 00001; NOCON 00005;
LD Block,'Outputs_T1': NOCON 00032;
ICR[16] %M00565
LD Block,'AlarmsTrain2': NOCON 00029, 00029;
LD Block,'Outputs_T2': NCCON 00016; NOCON 00015, 00016;
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'Train1_Sequence': NOCON 00021;
LD Block,'AlarmsCommon': NOCON 00021;
LD Block,'AlarmsTrain1': NOCON 00027;
LD Block,'HP_Select': SETCOIL 00002; RESETCOIL 00001; NCCON 00003; NOCON 00006;
LD Block,'Outputs_T1': NOCON 00015, 00032;
HMI_BITS[023] %M00444
LD Block,'HP_Select': RESETCOIL 00001; NOCON 00001;



ICR[16] %M00565
LD Block,'AlarmsTrain2': NOCON 00029, 00029;
LD Block,'Outputs_T2': NCCON 00016; NOCON 00015, 00016;
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'Train1_Sequence': NOCON 00021;
LD Block,'AlarmsCommon': NOCON 00021;
LD Block,'AlarmsTrain1': NOCON 00027;
LD Block,'HP_Select': SETCOIL 00002; RESETCOIL 00001; NCCON 00003; NOCON 00006;
LD Block,'Outputs_T1': NOCON 00015, 00032;
ICR[15] %M00564
LD Block,'Outputs_T2': NOCON 00016;
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'Train1_Sequence': NOCON 00021;
LD Block,'AlarmsCommon': NOCON 00018;
LD Block,'AlarmsTrain1': NOCON 00027;
LD Block,'HP_Select': RESETCOIL 00002; SETCOIL 00001; NOCON 00005;
LD Block,'Outputs_T1': NOCON 00032;
HMI_BITS[024] %M00445
LD Block,'HP_Select': RESETCOIL 00002; NOCON 00002;

ICR[16] %M00565 (Controlling Rung Reference)
LD Block,'HP_Select': SETCOIL 00002;
ICR[17] %M00566
LD Block,'AlarmsTrain2': NOCON 00029, 00029;
LD Block,'Train2_Sequence': NOCON 00021;
LD Block,'Outputs_T2': NCCON 00016; NOCON 00015, 00016, 00033;
LD Block,'AlarmsCommon': NOCON 00021;
LD Block,'HP_Select': RESETCOIL 00004; SETCOIL 00003; NCCON 00002; NOCON 00006;

ICR[17] %M00566

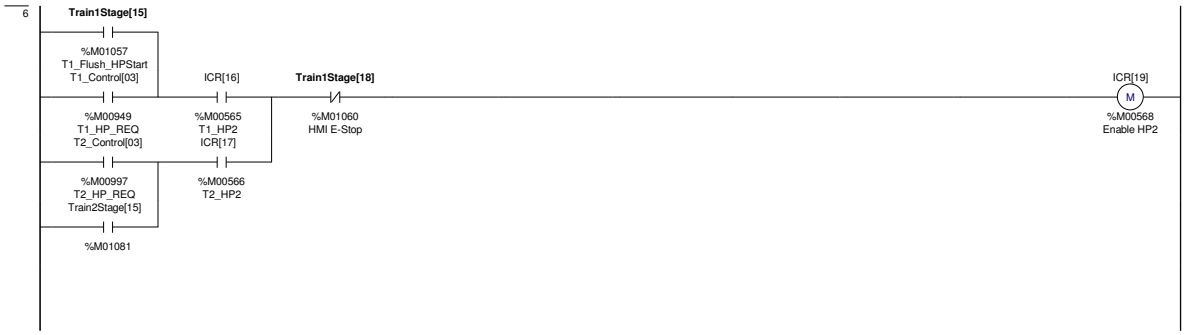
LD Block,'AlarmsTrain2': NOCON 00029, 00029;
LD Block,'Train2_Sequence': NOCON 00021;
LD Block,'Outputs_T2': NCCON 00016; NOCON 00015, 00016, 00033;
LD Block,'AlarmsCommon': NOCON 00021;
LD Block,'HP_Select': RESETCOIL 00004; SETCOIL 00003; NCCON 00002; NOCON 00006;

ICR[15] %M00564 (Controlling Rung Reference)

LD Block,'HP_Select': RESETCOIL 00002;

ICR[18] %M00567

LD Block,'HP_Select': COIL 00005;
LD Block,'Outputs_T1': NOCON 00019;



ICR[16] %M00565 (Controlling Rung Reference)

LD Block,'HP_Select': SETCOIL 00002;

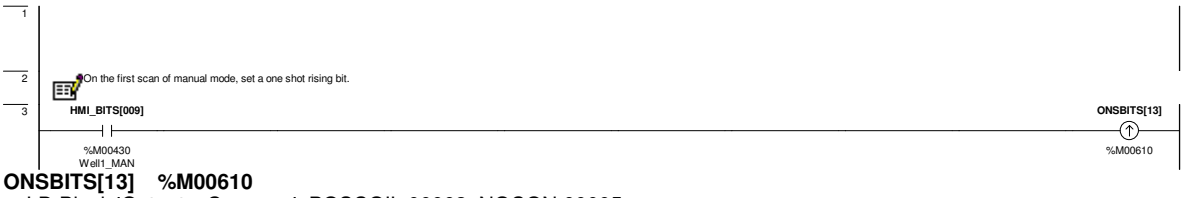
ICR[19] %M00568

LD Block,'Outputs_T2': NOCON 00020;
LD Block,'HP_Select': COIL 00006;

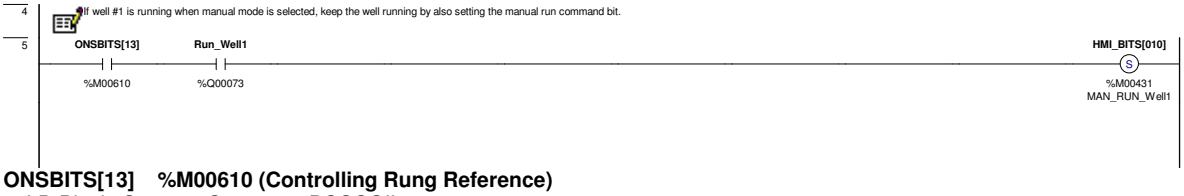
ICR[17] %M00566 (Controlling Rung Reference)

LD Block,'HP_Select': RESETCOIL 00004;

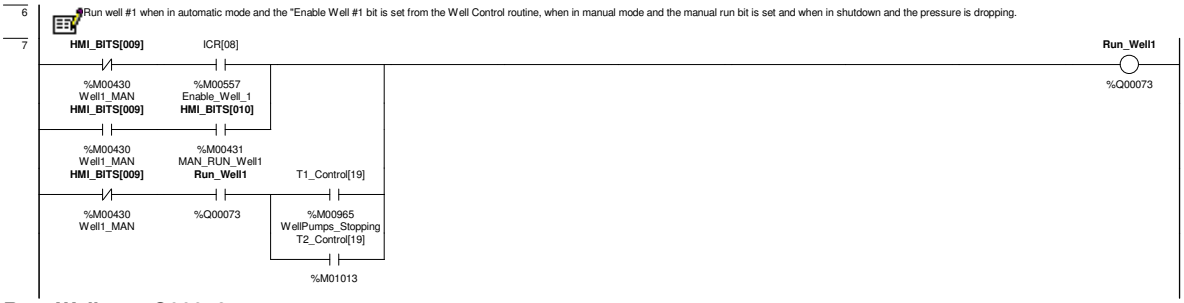

8
Run_HP2
%Q00076
SCALE INT
100
IHI
OUT
HP2_SPD
%QW0.13.0.3
0
ILO
32767
OHI
0
OLO
Ai3114.SETPOINT
%R00067
IN



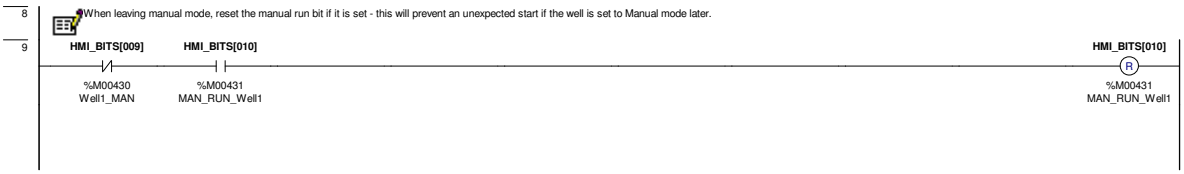
ONSBITS[13] %M00610
LD Block,'Outputs_Common': POSCOIL 00003; NOCON 00005;



ONSBITS[13] %M00610 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00003;
HMI_BITS[010] %M00431
LD Block,'Outputs_Common': RESETCOIL 00009; SETCOIL 00005; NOCON 00007, 00009, 00019;

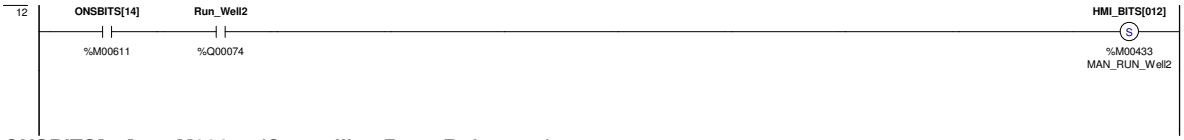


Run_Well1 %Q00073
LD Block,'Outputs_Common': NOCON 00005, 00007; COIL 00007;
HMI_BITS[010] %M00431 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00005;



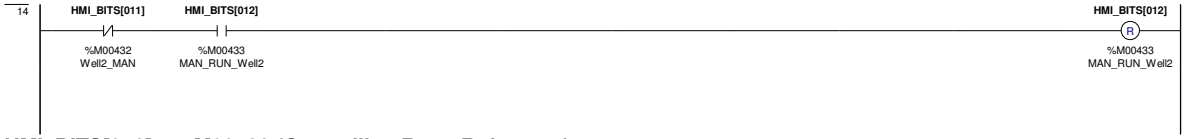
HMI_BITS[010] %M00431 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00005;
HMI_BITS[010] %M00431
LD Block,'Outputs_Common': RESETCOIL 00009; SETCOIL 00005; NOCON 00007, 00009, 00019;

ONSBITS[14] %M00611
LD Block,'Outputs_Common': POSCOIL 00011; NOCON 00012;



ONSBITS[14] %M00611 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00011;
HMI_BITS[012] %M00433
LD Block,'Outputs_Common': RESETCOIL 00014; SETCOIL 00012; NOCON 00013, 00014, 00019;

Run_Well2 %Q00074
LD Block,'Outputs_Common': NOCON 00012, 00013; COIL 00013;
HMI_BITS[012] %M00433 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00012;

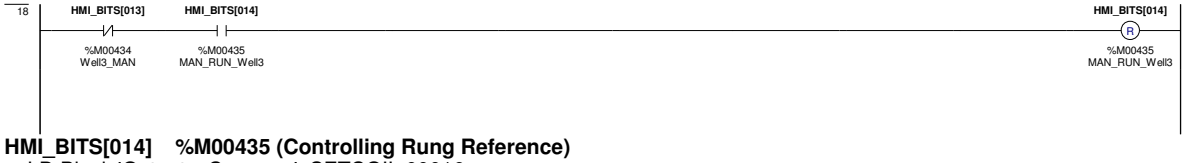


HMI_BITS[012] %M00433 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00012;
HMI_BITS[012] %M00433
LD Block,'Outputs_Common': RESETCOIL 00014; SETCOIL 00012; NOCON 00013, 00014, 00019;

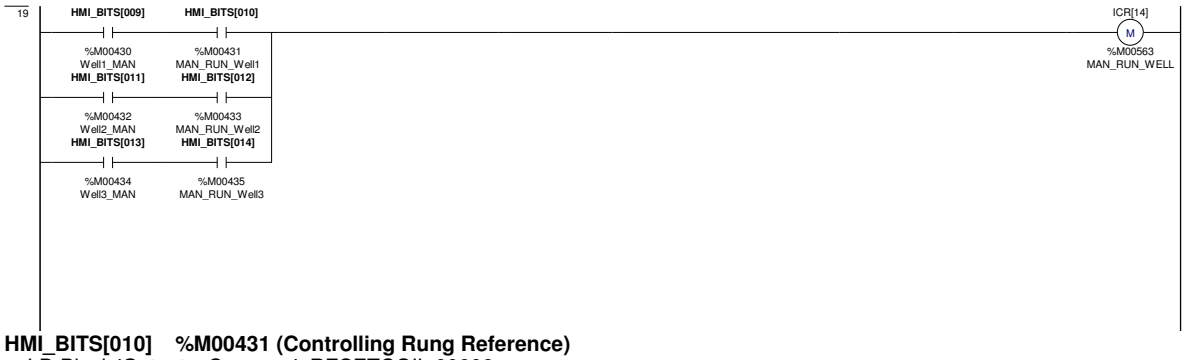
ONSBITS[15] %M00612
LD Block,'Outputs_Common': POSCOIL 00015; NOCON 00016;

ONSBITS[15] %M00612 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00015;
HMI_BITS[014] %M00435
LD Block,'Outputs_Common': RESETCOIL 00018; SETCOIL 00016; NOCON 00017, 00018, 00019;

Run_Well3 %Q00082
LD Block,'Outputs_Common': NOCON 00016, 00017; COIL 00017;
HMI_BITS[014] %M00435 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00016;

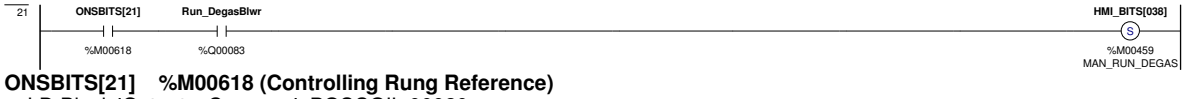


HMI_BITS[014] %M00435 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00016;
HMI_BITS[014] %M00435
LD Block,'Outputs_Common': RESETCOIL 00018; SETCOIL 00016; NOCON 00017, 00018, 00019;



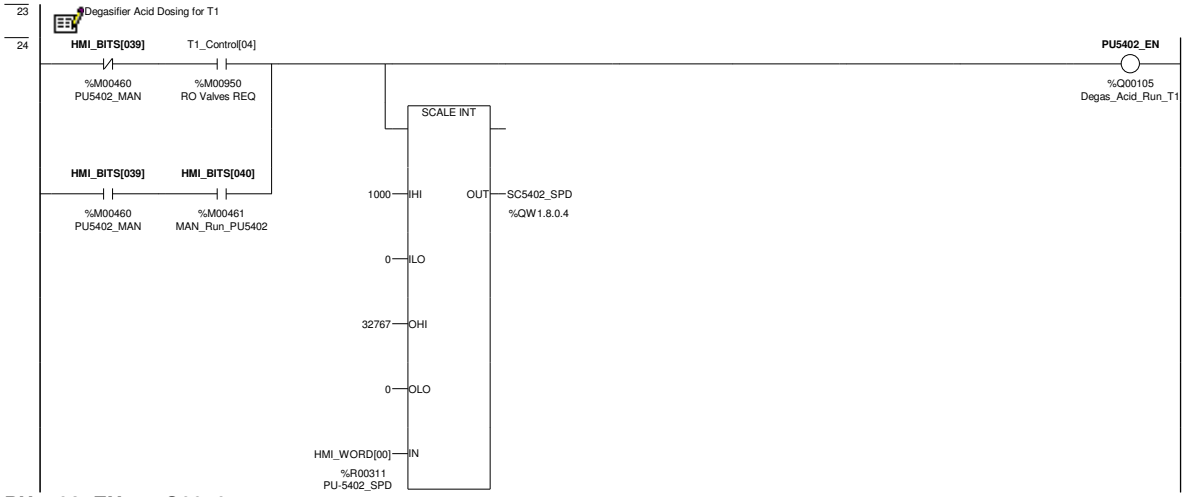
HMI_BITS[010] %M00431 (Controlling Rung Reference)
LD Block,'Outputs_Common': RESETCOIL 00009;
ICR[14] %M00563
LD Block,'Outputs_Common': COIL 00019;
LD Block,'Well_Control': NOCON 00014, 00017, 00019;
HMI_BITS[012] %M00433 (Controlling Rung Reference)
LD Block,'Outputs_Common': RESETCOIL 00014;
HMI_BITS[014] %M00435 (Controlling Rung Reference)
LD Block,'Outputs_Common': RESETCOIL 00018;

ONSBITS[21] %M00618
LD Block,'Outputs_Common': POSCOIL 00020; NOCON 00021;

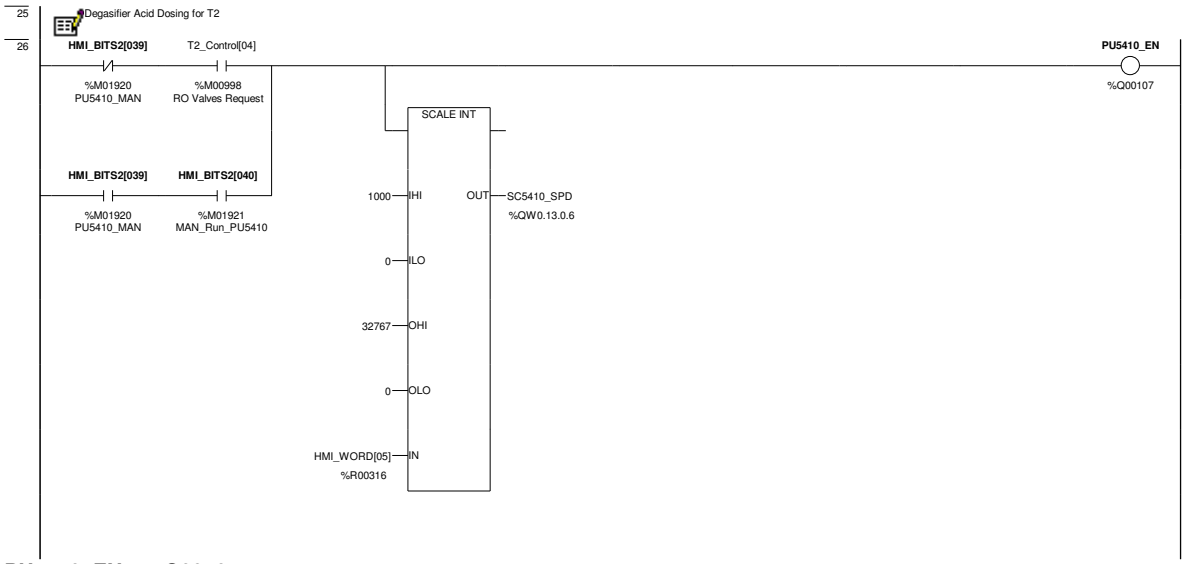


ONSBITS[21] %M00618 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00020;
HMI_BITS[038] %M00459
LD Block,'Outputs_Common': SETCOIL 00021; NOCON 00022;

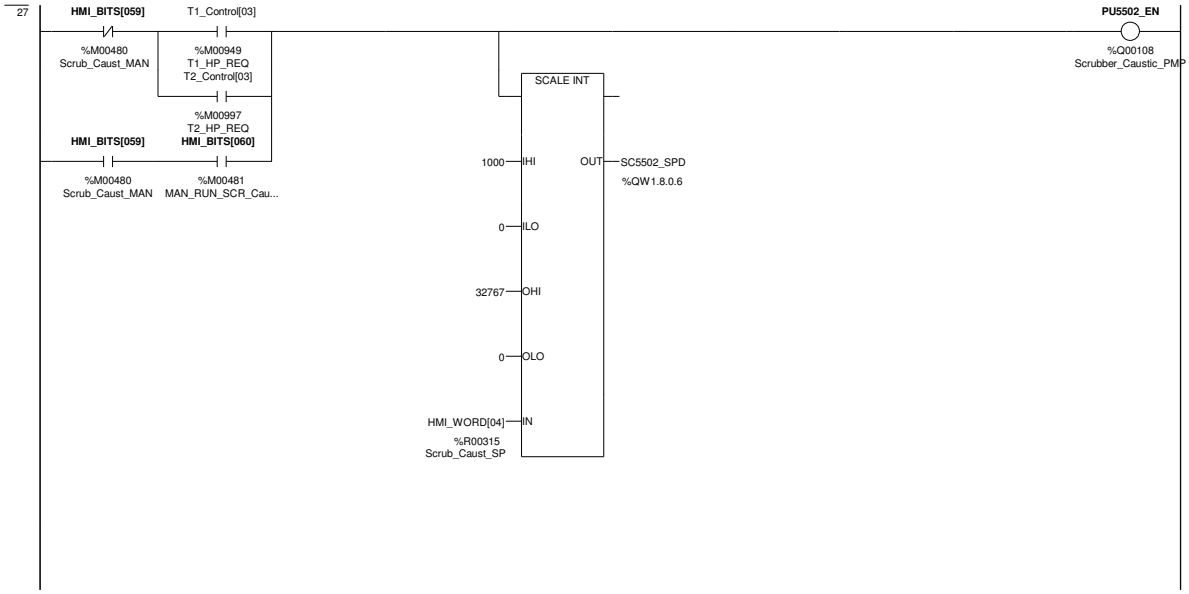
Run_DegasBlwr %Q00083
LD Block,'Outputs_Common': NOCON 00021; COIL 00022;
HMI_BITS[038] %M00459 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00021;



PU5402_EN %Q00105
LD Block,'Outputs_Common': COIL 00024;



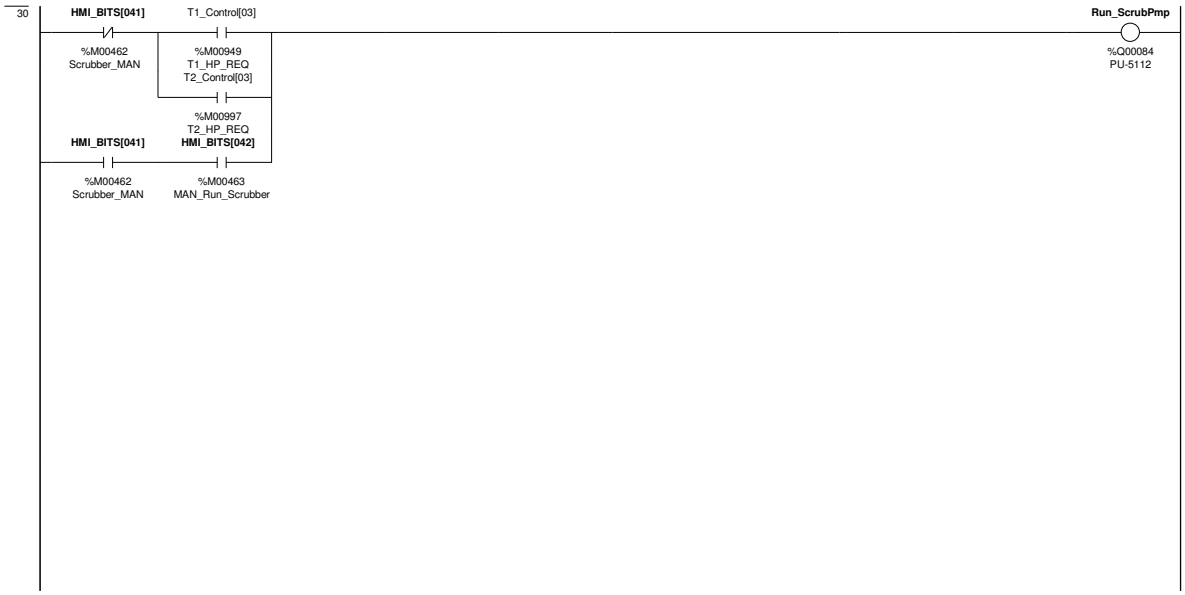
PU5410_EN %Q00107
LD Block,'Outputs_Common': COIL 00026;



PU5502_EN %Q00108
LD Block,'Outputs_Common': COIL 00027;

ONSBITS[16] %M00613
LD Block,'Outputs_Common': POSCOIL 00028; NOCON 00029;

ONSBITS[16] %M00613 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00028;
HMI_BITS[042] %M00463
LD Block,'Outputs_Common': SETCOIL 00029; NOCON 00030;

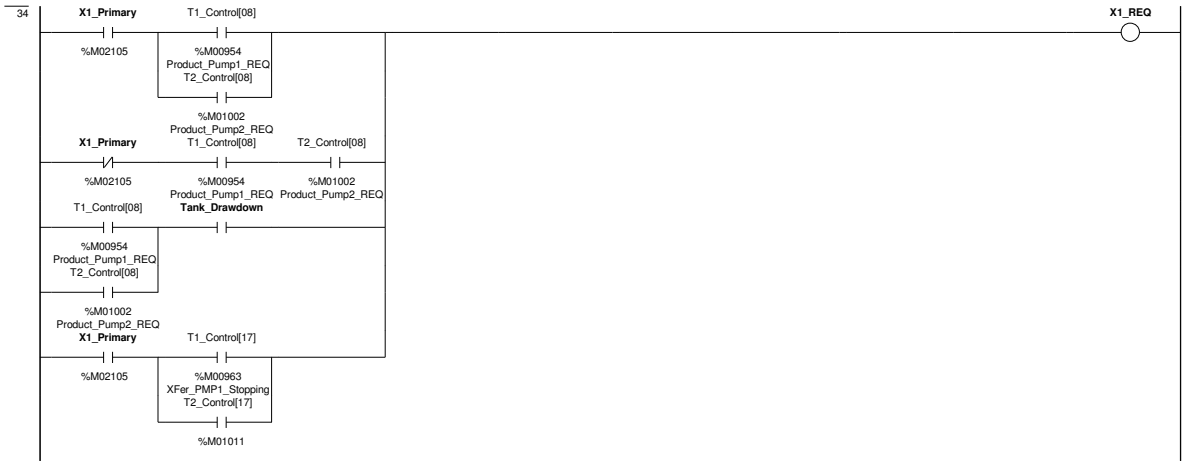


Run_ScrubPmp %Q00084
LD Block,'Outputs_Common': NOCON 00029; COIL 00030;
HMI_BITS[042] %M00463 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00029;

PDCT_DELIVER_RLY %Q00097
LD Block,'Outputs_Common': COIL 00031;

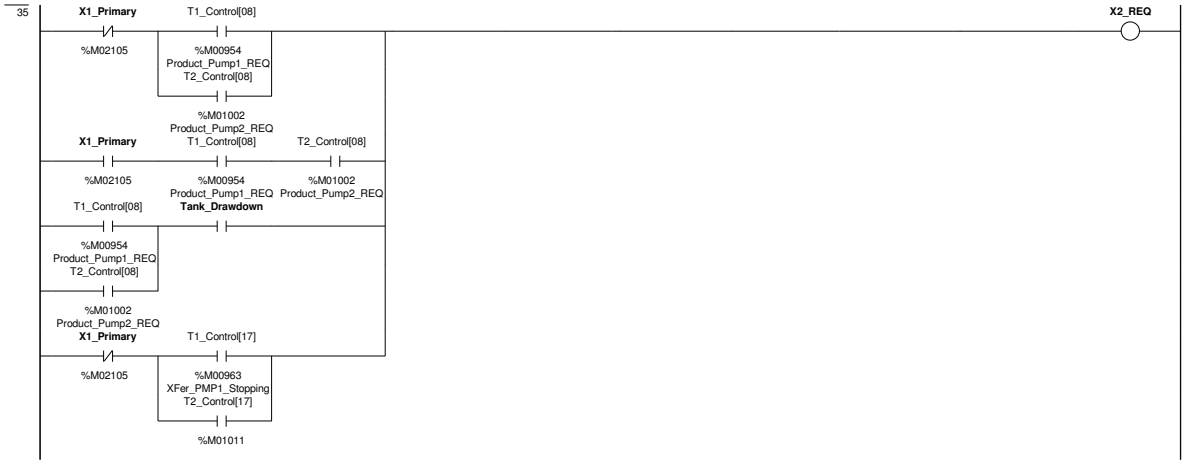
PDCT_DIVERT_RLY %Q00098
LD Block,'Outputs_Common': COIL 00032;

ICR[20] %M00569
LD Block,'Outputs_Common': NOCON 00039, 00043; COIL 00033;



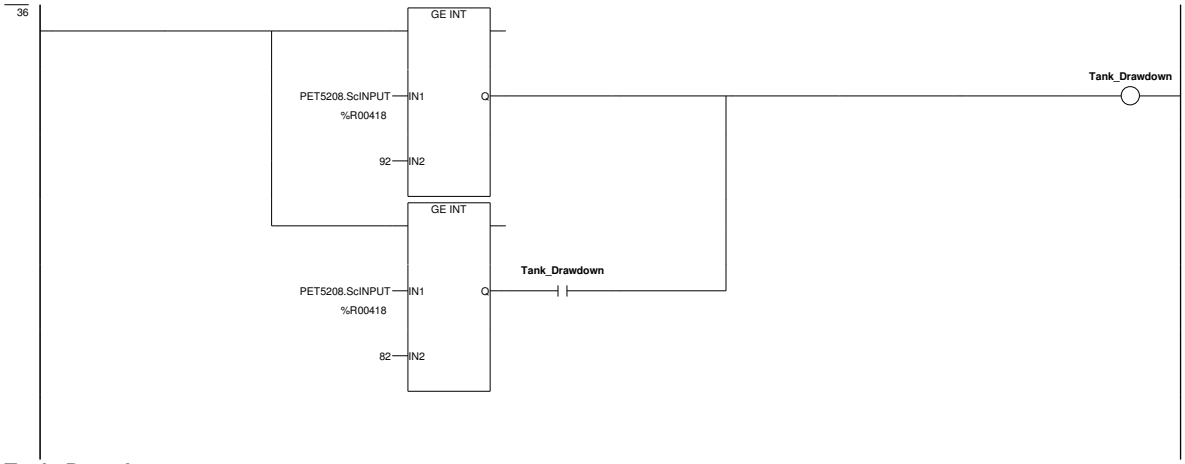
X1_REQ

LD Block,'Outputs_Common': NOCON 00039; COIL 00034;



X2_REQ

LD Block,'Outputs_Common': NOCON 00043; COIL 00035;

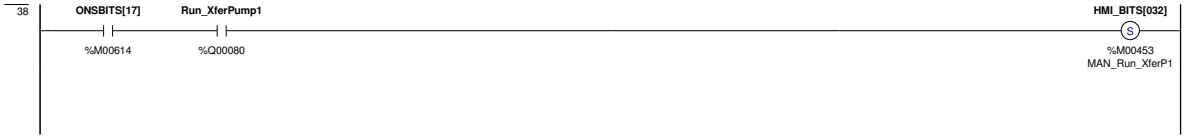


Tank_Drawdown

LD Block,'Outputs_Common': NOCON 00034, 00035, 00036; COIL 00036;

ONSBITS[17] %M00614

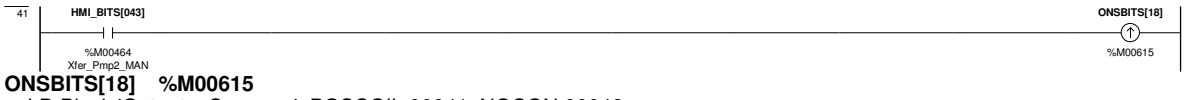
LD Block,'Outputs_Common': POSCOIL 00037; NOCON 00038;



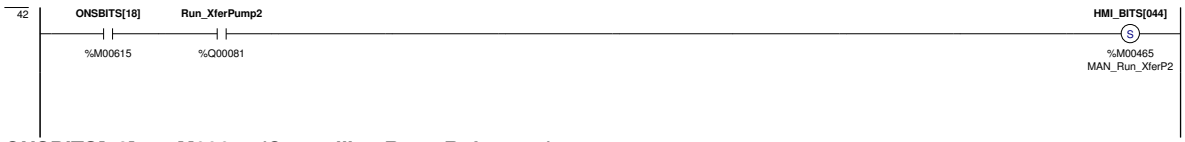
ONSBITS[17] %M00614 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00037;
HMI_BITS[032] %M00453
LD Block,'Outputs_Common': SETCOIL 00038; NOCON 00039;

X1_REQ (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00034;
ICR[20] %M00569 (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00033;
Run_XferPump1 %Q00080
LD Block,'Outputs_Common': NOCON 00038, 00046; COIL 00039;
HMI_BITS[032] %M00453 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00038;

SOV5330 %Q00089
LD Block,'Outputs_Common': NOCON 00045; COIL 00040;



ONSBITS[18] %M00615
LD Block,'Outputs_Common': POSCOIL 00041; NOCON 00042;

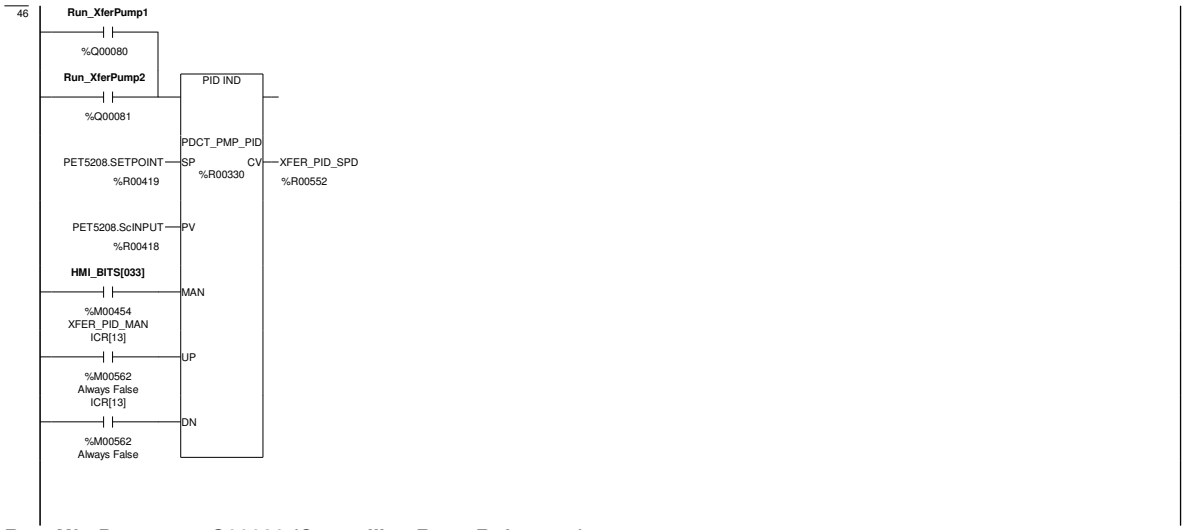


ONSBITS[18] %M00615 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00041;
HMI_BITS[044] %M00465
LD Block,'Outputs_Common': SETCOIL 00042; NOCON 00043;

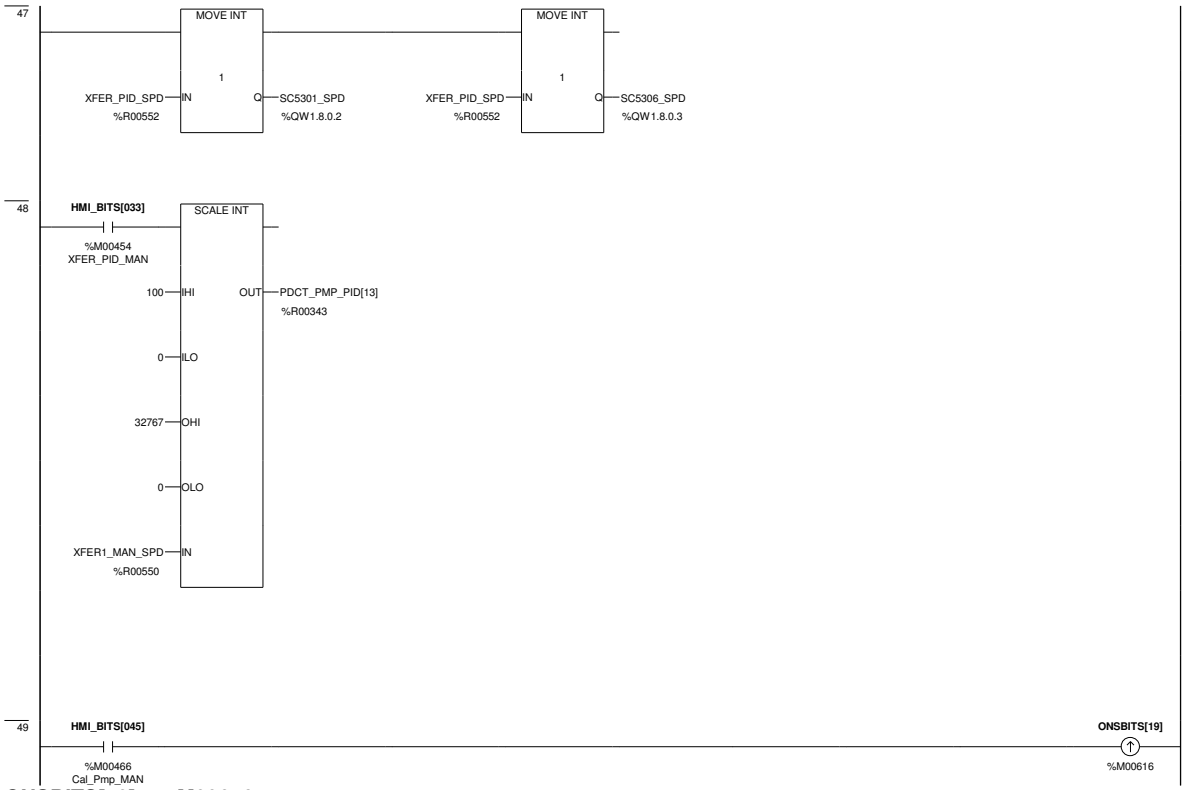
X2_REQ (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00035;
ICR[20] %M00569 (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00033;
Run_XferPump2 %Q00081
LD Block,'Outputs_Common': NOCON 00042, 00046; COIL 00043;
HMI_BITS[044] %M00465 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00042;

SOV5331 %Q00090
LD Block,'Outputs_Common': NOCON 00045; COIL 00044;

SOV5330 %Q00089 (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00040;
SOV5334 %Q00091
LD Block,'Outputs_Common': COIL 00045;
SOV5331 %Q00090 (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00044;

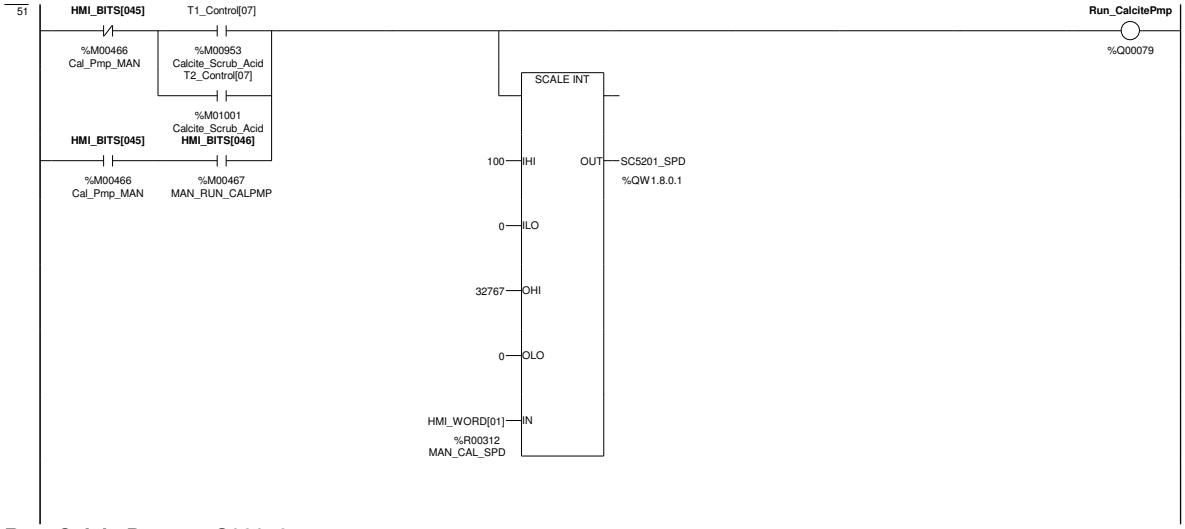


Run_XferPump1 %Q00080 (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00039;
Run_XferPump2 %Q00081 (Controlling Rung Reference)
LD Block,'Outputs_Common': COIL 00043;

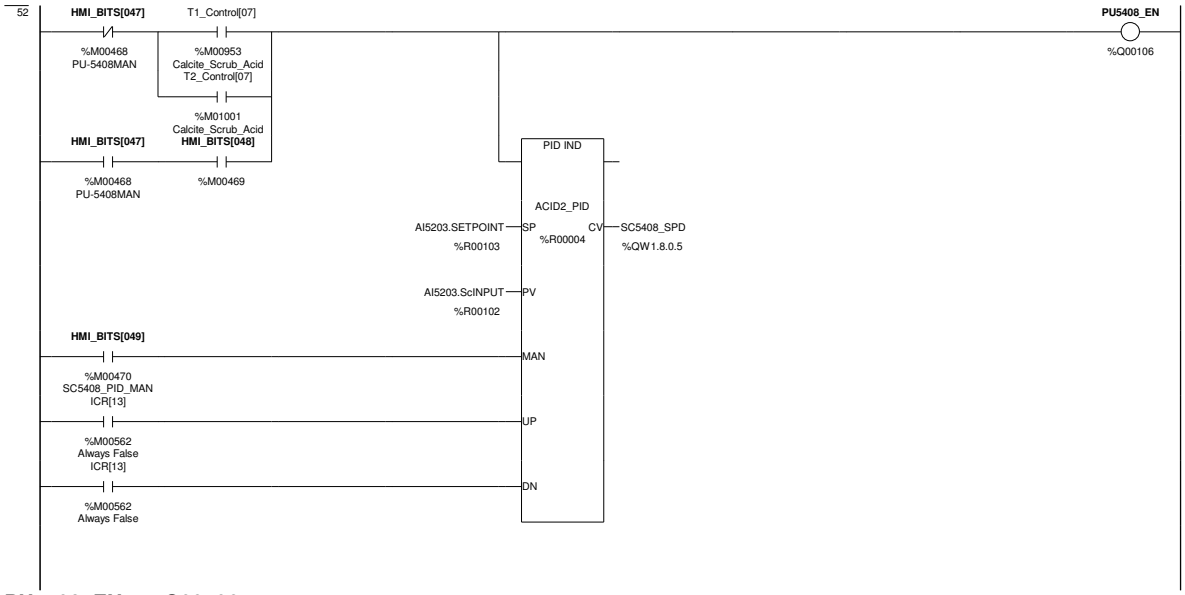


ONSBITS[19] %M00616
LD Block,'Outputs_Common': POSCOIL 00049; NOCON 00050;

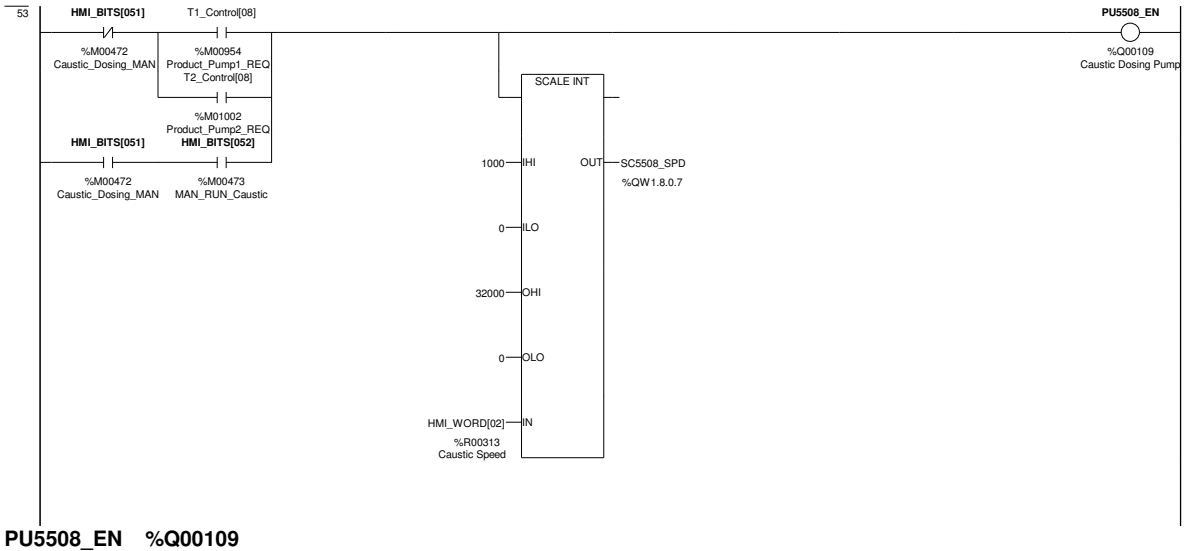
ONSBITS[19] %M00616 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00049;
HMI_BITS[046] %M00467
LD Block,'Outputs_Common': SETCOIL 00050; NOCON 00051;



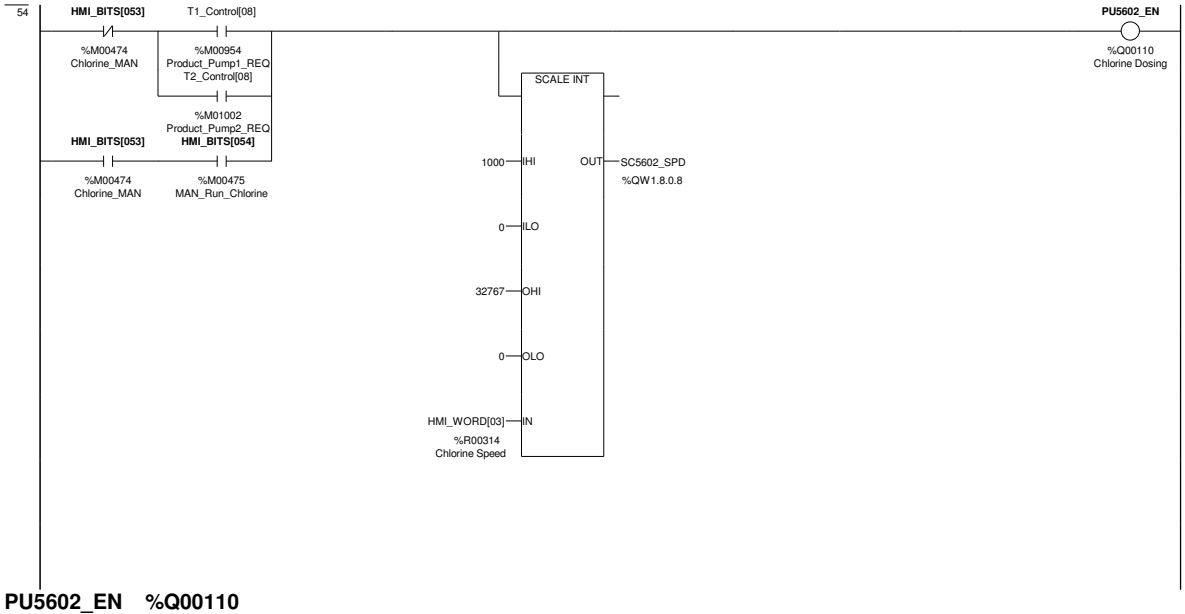
Run_CalcitePmp %Q00079
LD Block,'Outputs_Common': NOCON 00050; COIL 00051;
HMI_BITS[046] %M00467 (Controlling Rung Reference)
LD Block,'Outputs_Common': SETCOIL 00050;



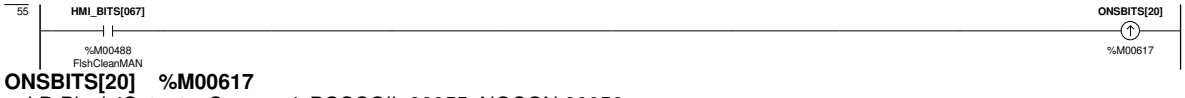
PU5408_EN %Q00106
LD Block,'Outputs_Common': COIL 00052;



PU5508_EN %Q00109
LD Block,'Outputs_Common': COIL 00053;



PU5602_EN %Q00110
LD Block,'Outputs_Common': COIL 00054;



ONSBITS[20] %M00617
LD Block,'Outputs_Common': POSCOIL 00055; NOCON 00056;

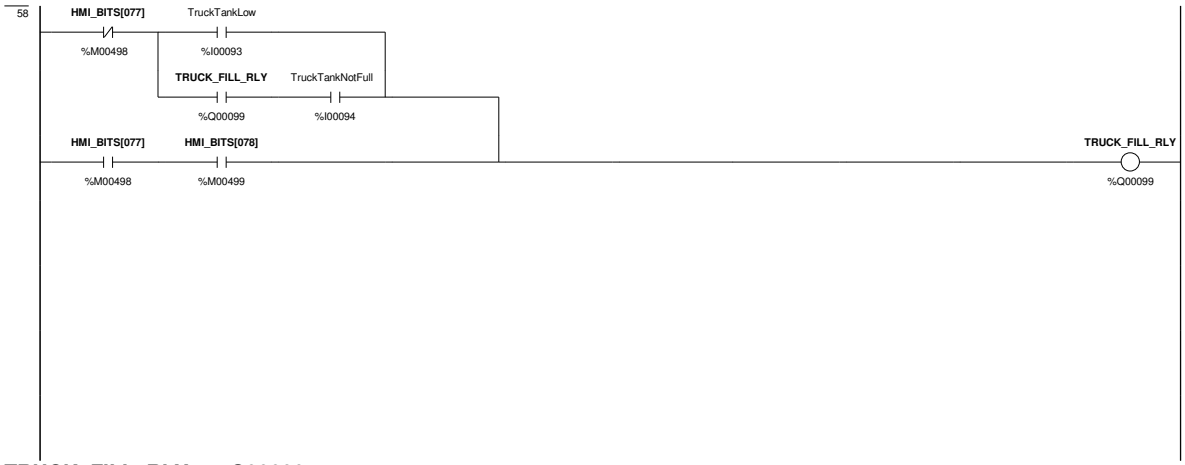
ONSBITS[20] %M00617 (Controlling Rung Reference)
LD Block,'Outputs_Common': POSCOIL 00055;
HMI_BITS[068] %M00489
LD Block,'Outputs_Common': SETCOIL 00056; NOCON 00057;

Run_Flsh_Cln_Pmp %Q00085

LD Block,'Outputs_Common': NOCON 00056; COIL 00057;

HMI_BITS[068] %M00489 (Controlling Rung Reference)

LD Block,'Outputs_Common': SETCOIL 00056;



TRUCK_FILL_RLY %Q00099

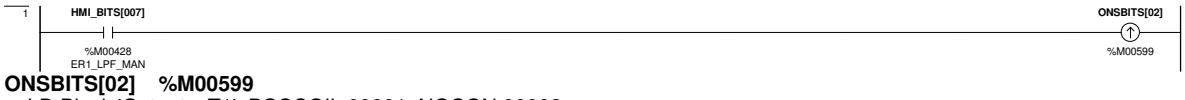
LD Block,'Outputs_Common': NOCON 00058; COIL 00058;

PU6001_EN %Q00112

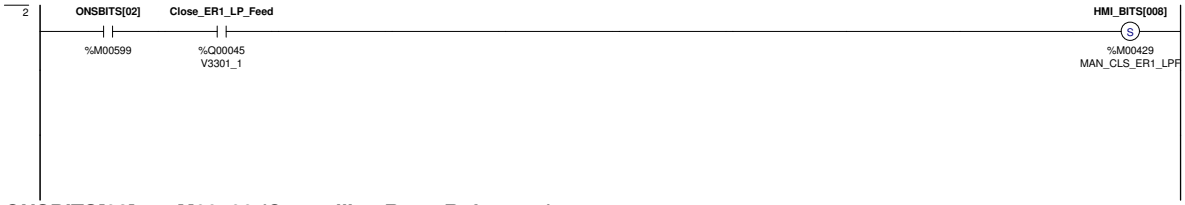
LD Block,'Outputs_Common': COIL 00059;

PU9101_EN %Q00111

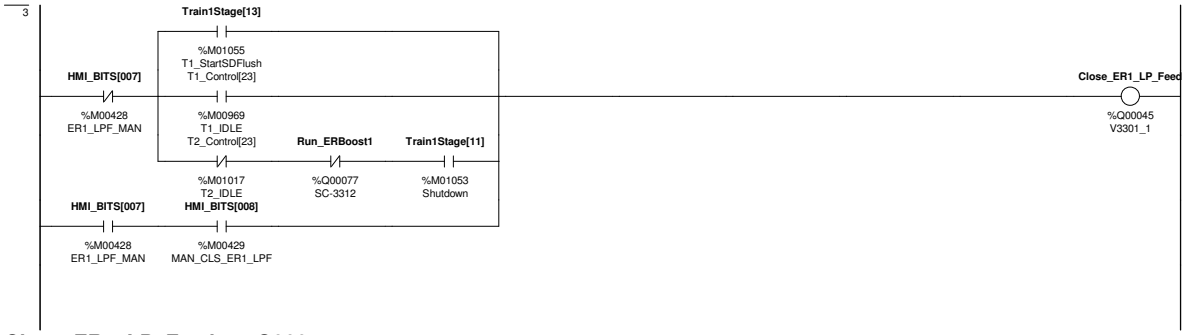
LD Block,'Outputs_Common': COIL 00060;



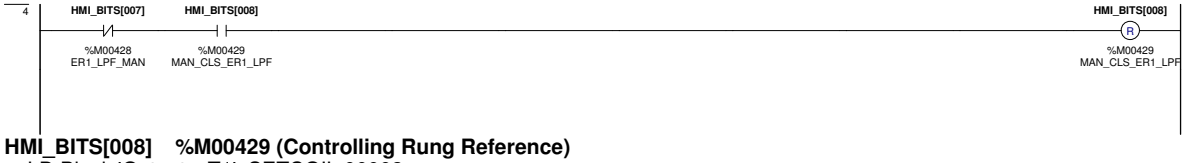
ONSBITS[02] %M00599
LD Block,'Outputs_T1': POSCOIL 00001; NOCON 00002;



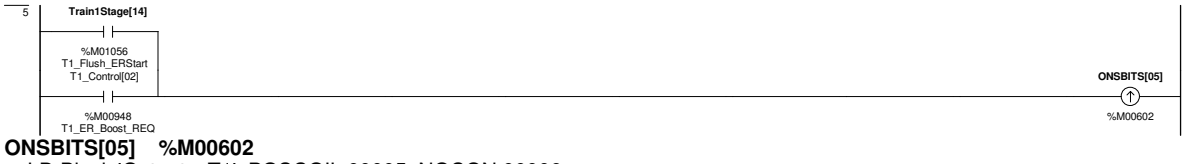
ONSBITS[02] %M00599 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00001;
HMI_BITS[008] %M00429
LD Block,'Outputs_T2': NOCON 00003;
LD Block,'Outputs_T1': RESETCOIL 00004; SETCOIL 00002; NOCON 00003, 00004;



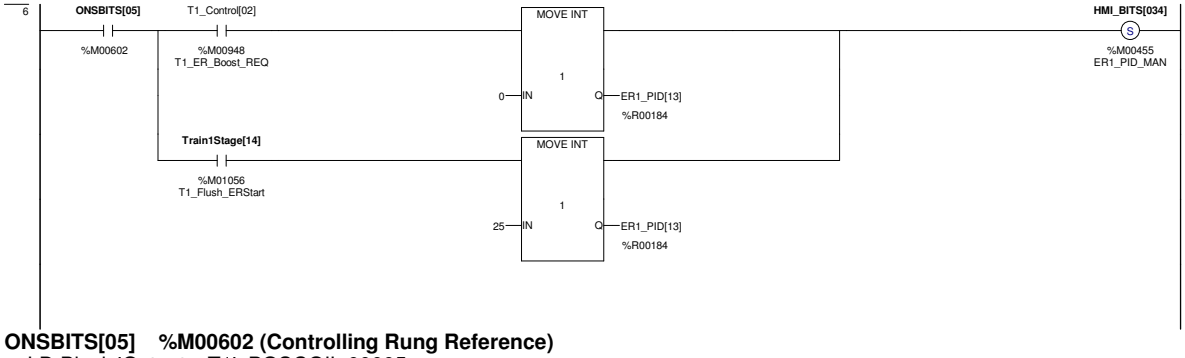
Close_ER1_LP_Feed %Q00045
LD Block,'Outputs_T1': NOCON 00002; COIL 00003;
HMI_BITS[008] %M00429 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00002;



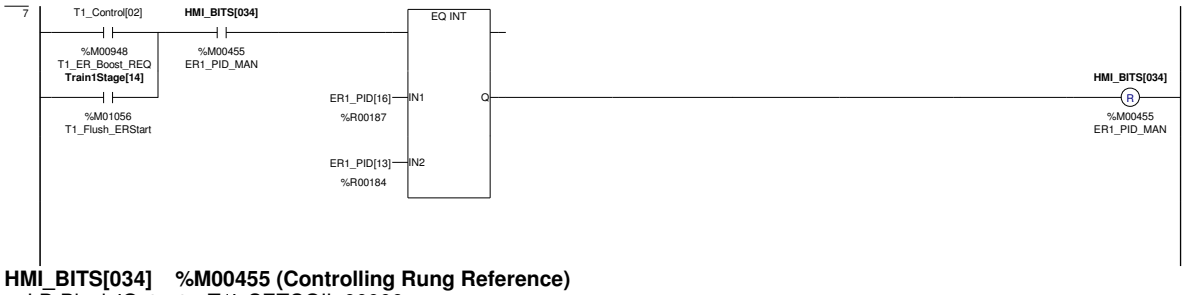
HMI_BITS[008] %M00429 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00002;
HMI_BITS[008] %M00429
LD Block,'Outputs_T2': NOCON 00003;
LD Block,'Outputs_T1': RESETCOIL 00004; SETCOIL 00002; NOCON 00003, 00004;



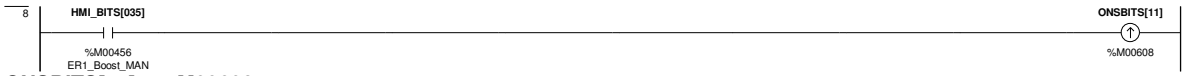
ONSBITS[05] %M00602
LD Block,'Outputs_T1': POSCOIL 00005; NOCON 00006;



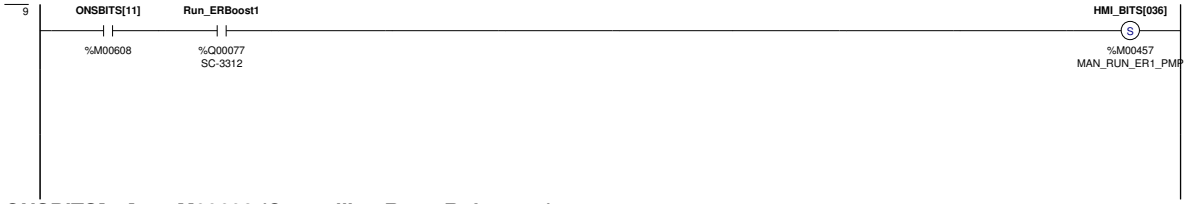
ONSBITS[05] %M00602 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00005;
HMI_BITS[034] %M00455
LD Block,'Outputs_T1': RESETCOIL 00007; SETCOIL 00006; NOCON 00007, 00010, 00012;



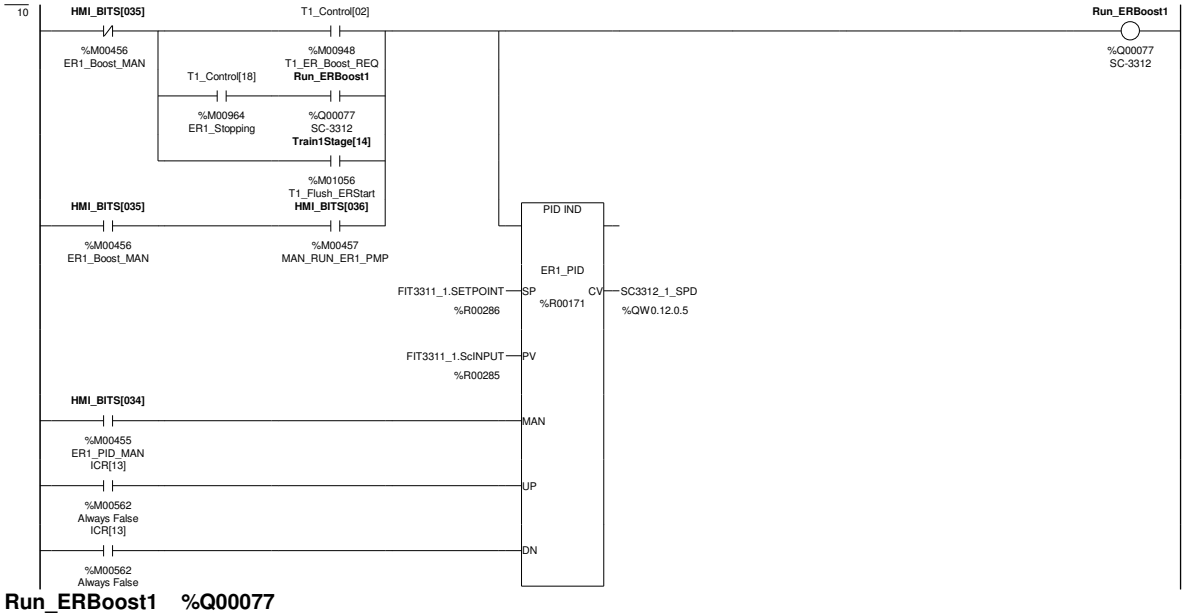
HMI_BITS[034] %M00455 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00006;
HMI_BITS[034] %M00455
LD Block,'Outputs_T1': RESETCOIL 00007; SETCOIL 00006; NOCON 00007, 00010, 00012;



ONSBITS[11] %M00608
LD Block,'Outputs_T1': POSCOIL 00008; NOCON 00009;



ONSBITS[11] %M00608 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00008;
HMI_BITS[036] %M00457
LD Block,'Outputs_T1': RESETCOIL 00011; SETCOIL 00009; NOCON 00010, 00011;



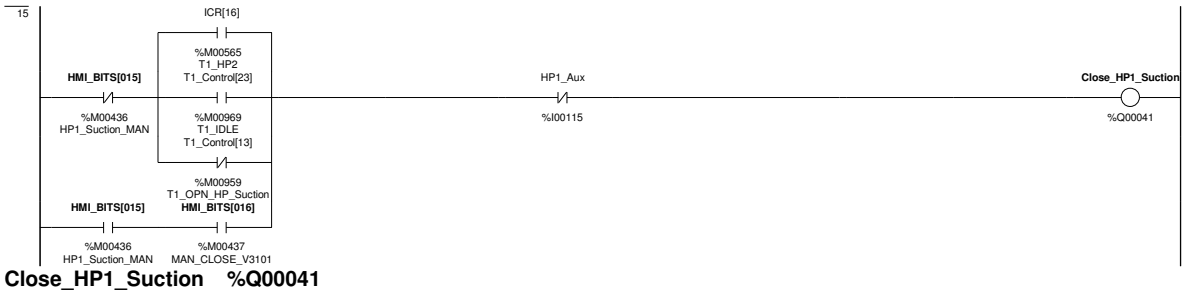
Run_ERBoost1 %Q00077
LD Block,'Train1_Shutdown': NCCON 00020; NOCON 00009;
LD Block,'Outputs_T1': NCCON 00003; NOCON 00009, 00010; COIL 00010;
HMI_BITS[036] %M00457 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00009;
HMI_BITS[034] %M00455 (Controlling Rung Reference)
LD Block,'Outputs_T1': RESETCOIL 00007;

HMI_BITS[036] %M00457 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00009;
HMI_BITS[036] %M00457
LD Block,'Outputs_T1': RESETCOIL 00011; SETCOIL 00009; NOCON 00010, 00011;

HMI_BITS[034] %M00455 (Controlling Rung Reference)
LD Block,'Outputs_T1': RESETCOIL 00007;

ONSBITS[03] %M00600
LD Block,'Outputs_T1': POSCOIL 00013; NOCON 00014;

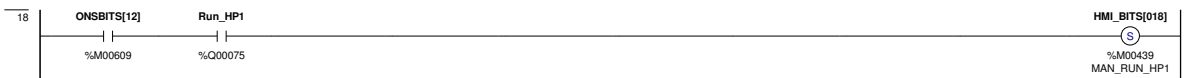
ONSBITS[03] %M00600 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00013;
HMI_BITS[016] %M00437
LD Block,'Outputs_T1': RESETCOIL 00016; SETCOIL 00014; NOCON 00015, 00016;



Close_HP1_Suction %Q00041
LD Block,'Outputs_T1': NOCON 00014; COIL 00015;
HMI_BITS[016] %M00437 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00014;

HMI_BITS[016] %M00437 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00014;
HMI_BITS[016] %M00437
LD Block,'Outputs_T1': RESETCOIL 00016; SETCOIL 00014; NOCON 00015, 00016;

ONSBITS[12] %M00609
LD Block,'Outputs_T1': POSCOIL 00017; NOCON 00018;

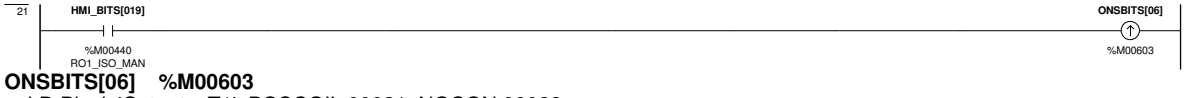


ONSBITS[12] %M00609 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00017;

HMI_BITS[018] %M00439
LD Block,'Outputs_T1': RESETCOIL 00020; SETCOIL 00018; NOCON 00019, 00020;

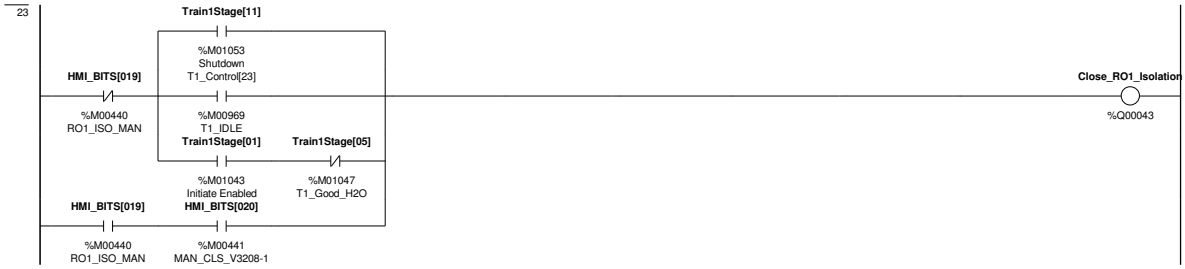
Run_HP1 %Q00075
LD Block,'HP_Select': NOCON 00007;
LD Block,'Outputs_T1': NOCON 00018, 00032; COIL 00019;
HMI_BITS[018] %M00439 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00018;

HMI_BITS[018] %M00439 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00018;
HMI_BITS[018] %M00439
LD Block,'Outputs_T1': RESETCOIL 00020; SETCOIL 00018; NOCON 00019, 00020;

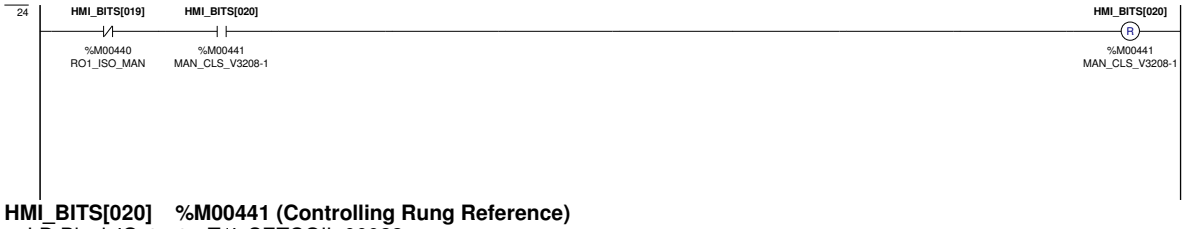


ONSBITS[06] %M00603
LD Block,'Outputs_T1': POSCOIL 00021; NOCON 00022;

ONSBITS[06] %M00603 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00021;
HMI_BITS[020] %M00441
LD Block,'Outputs_T1': RESETCOIL 00024; SETCOIL 00022; NOCON 00023, 00024;

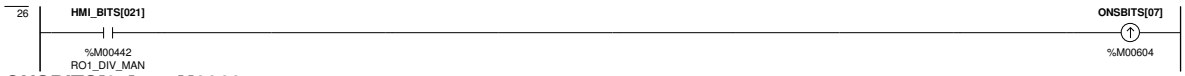


Close_RO1_Isolation %Q00043
LD Block,'Outputs_T1': NCCON 00025; NOCON 00022; COIL 00023;
HMI_BITS[020] %M00441 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00022;

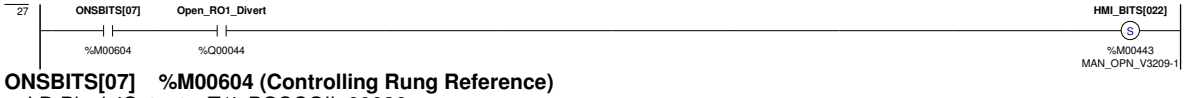


HMI_BITS[020] %M00441 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00022;
HMI_BITS[020] %M00441
LD Block,'Outputs_T1': RESETCOIL 00024; SETCOIL 00022; NOCON 00023, 00024;

Close_RO1_Isolation %Q00043 (Controlling Rung Reference)
LD Block,'Outputs_T1': COIL 00023;
T1_Control[24] %M00970
LD Block,'Outputs_T1': NCCON 00028; COIL 00025;

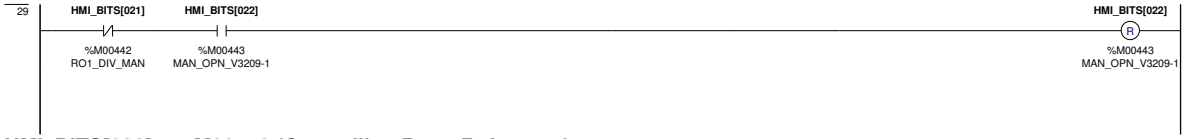


ONSBITS[07] %M00604
LD Block,'Outputs_T1': POSCOIL 00026; NOCON 00027;

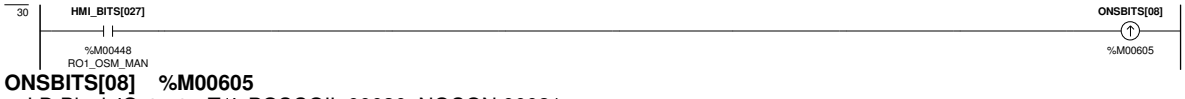


ONSBITS[07] %M00604 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00026;
HMI_BITS[022] %M00443
LD Block,'Outputs_T1': RESETCOIL 00029; SETCOIL 00027; NOCON 00028, 00029;

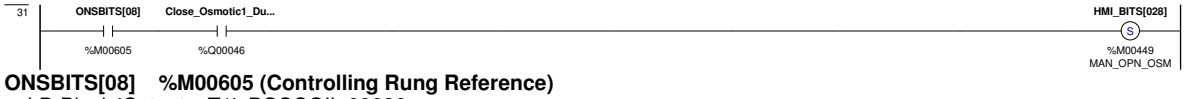
T1_Control[24] %M00970 (Controlling Rung Reference)
LD Block,'Outputs_T1': COIL 00025;
Open_RO1_Divert %Q00044
LD Block,'Outputs_T1': NOCON 00027; COIL 00028;
HMI_BITS[022] %M00443 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00027;



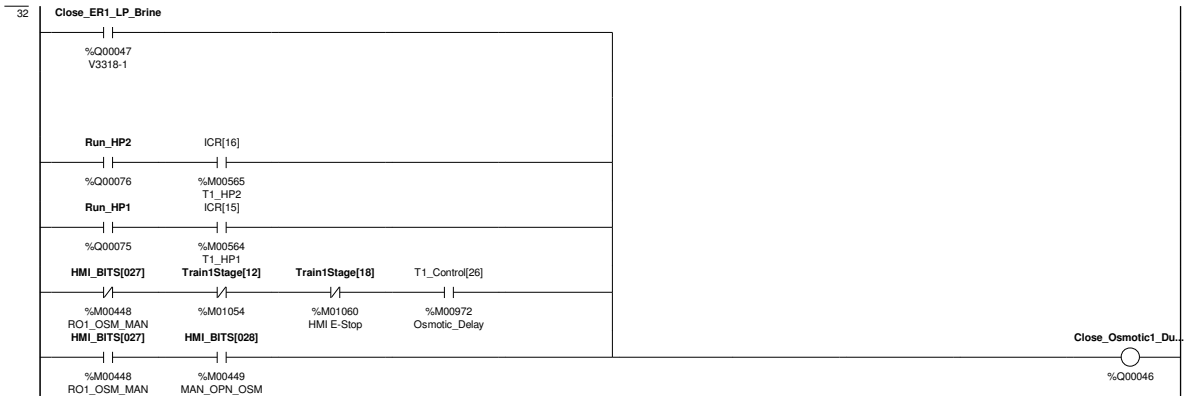
HMI_BITS[022] %M00443 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00027;
HMI_BITS[022] %M00443
LD Block,'Outputs_T1': RESETCOIL 00029; SETCOIL 00027; NOCON 00028, 00029;



ONSBITS[08] %M00605
LD Block,'Outputs_T1': POSCOIL 00030; NOCON 00031;

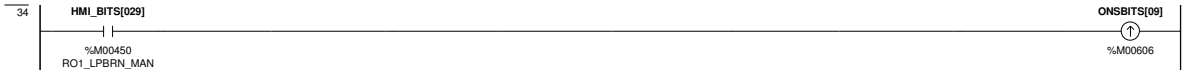


ONSBITS[08] %M00605 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00030;
HMI_BITS[028] %M00449
LD Block,'Outputs_T1': RESETCOIL 00033; SETCOIL 00031; NOCON 00032, 00033;

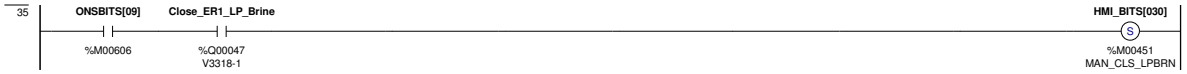


Run_HP1 %Q00075 (Controlling Rung Reference)
LD Block,'Outputs_T1': COIL 00019;
HMI_BITS[028] %M00449 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00031;
Close_Osmotic1_Dump %Q00046
LD Block,'Outputs_T1': NOCON 00031; COIL 00032;

HMI_BITS[028] %M00449 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00031;
HMI_BITS[028] %M00449
LD Block,'Outputs_T1': RESETCOIL 00033; SETCOIL 00031; NOCON 00032, 00033;

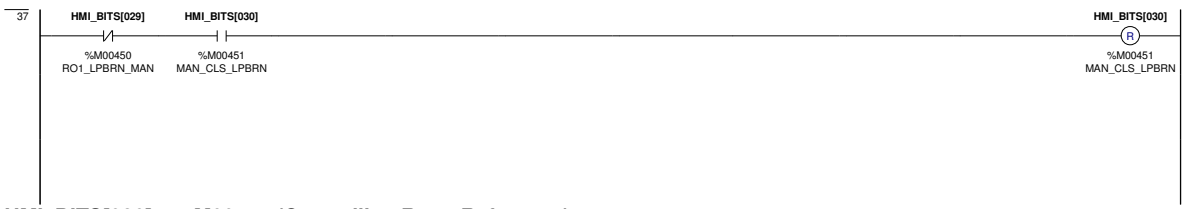


ONSBITS[09] %M00606
LD Block,'Outputs_T1': POSCOIL 00034; NOCON 00035;

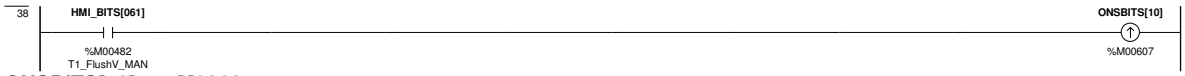


ONSBITS[09] %M00606 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00034;
HMI_BITS[030] %M00451
LD Block,'Outputs_T1': RESETCOIL 00037; SETCOIL 00035; NOCON 00036, 00037;

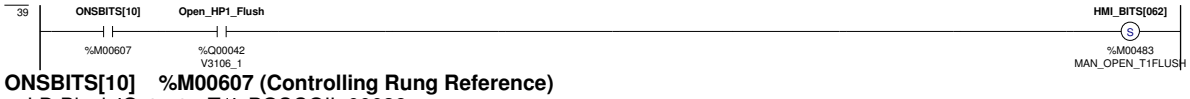
Close_ER1_LP_Brine %Q00047
LD Block,'Outputs_T1': NOCON 00032, 00035; COIL 00036;
HMI_BITS[030] %M00451 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00035;



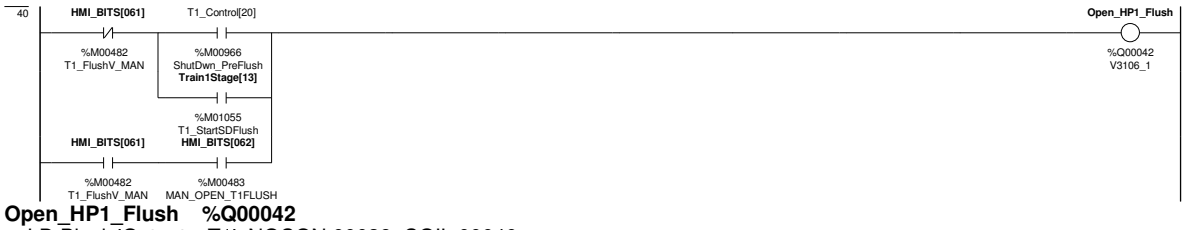
HMI_BITS[030] %M00451 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00035;
HMI_BITS[030] %M00451
LD Block,'Outputs_T1': RESETCOIL 00037; SETCOIL 00035; NOCON 00036, 00037;



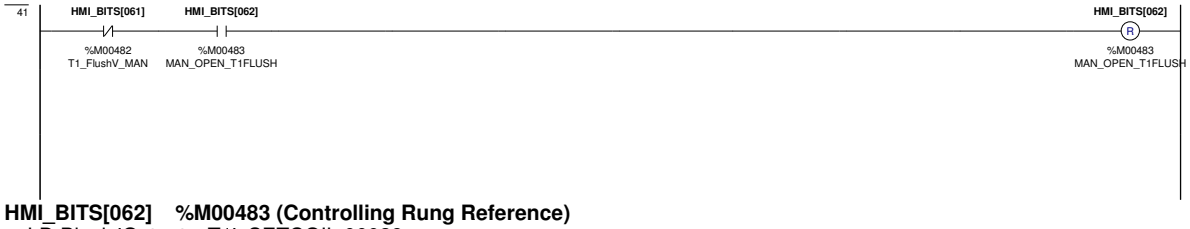
ONSBITS[10] %M00607
LD Block,'Outputs_T1': POSCOIL 00038; NOCON 00039;



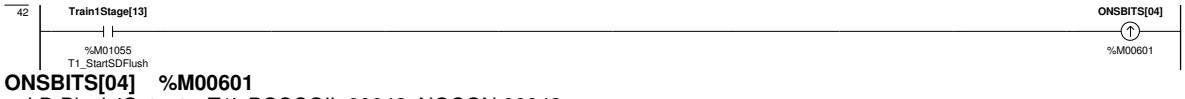
ONSBITS[10] %M00607 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00038;
HMI_BITS[062] %M00483
LD Block,'Outputs_T1': RESETCOIL 00041; SETCOIL 00039; NOCON 00040, 00041;



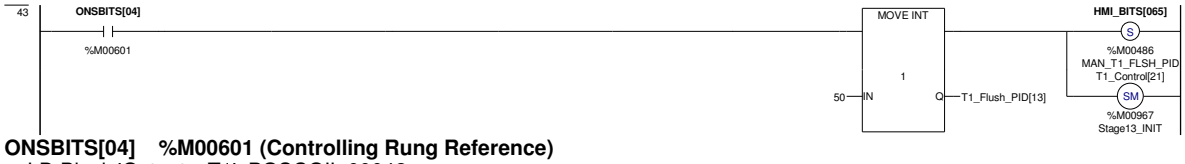
Open_HP1_Flush %Q00042
LD Block,'Outputs_T1': NOCON 00039; COIL 00040;
HMI_BITS[062] %M00483 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00039;



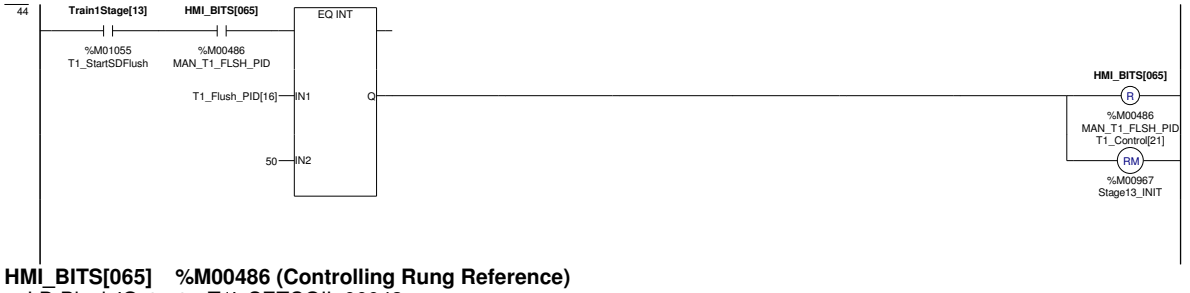
HMI_BITS[062] %M00483 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00039;
HMI_BITS[062] %M00483
LD Block,'Outputs_T1': RESETCOIL 00041; SETCOIL 00039; NOCON 00040, 00041;



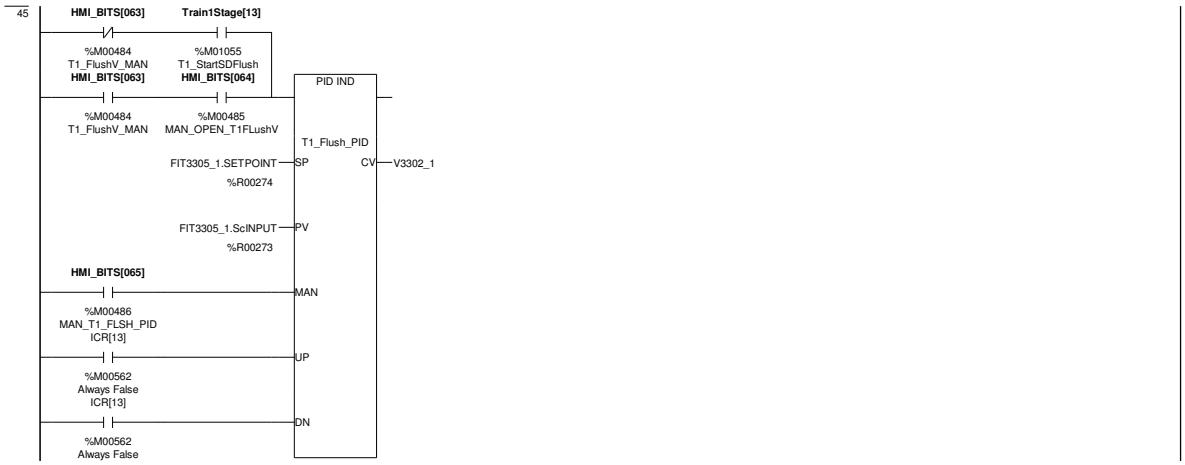
ONSBITS[04] %M00601
LD Block,'Outputs_T1': POSCOIL 00042; NOCON 00043;



ONSBITS[04] %M00601 (Controlling Rung Reference)
LD Block,'Outputs_T1': POSCOIL 00042;
HMI_BITS[065] %M00486
LD Block,'Outputs_T1': RESETCOIL 00044; SETCOIL 00043; NOCON 00044, 00045;
T1_Control[21] %M00967
LD Block,'Train1_Shutdown': NCCON 00030;
LD Block,'Outputs_T1': RESETCOIL 00044; SETCOIL 00043;

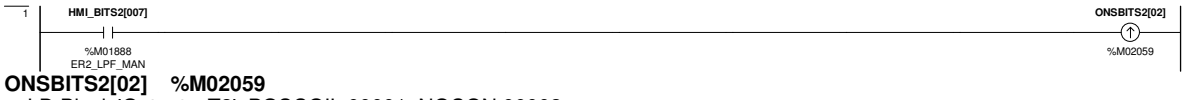


HMI_BITS[065] %M00486 (Controlling Rung Reference)
LD Block,'Outputs_T1': SETCOIL 00043;
HMI_BITS[065] %M00486
LD Block,'Outputs_T1': RESETCOIL 00044; SETCOIL 00043; NOCON 00044, 00045;
T1_Control[21] %M00967
LD Block,'Train1_Shutdown': NCCON 00030;
LD Block,'Outputs_T1': RESETCOIL 00044; SETCOIL 00043;

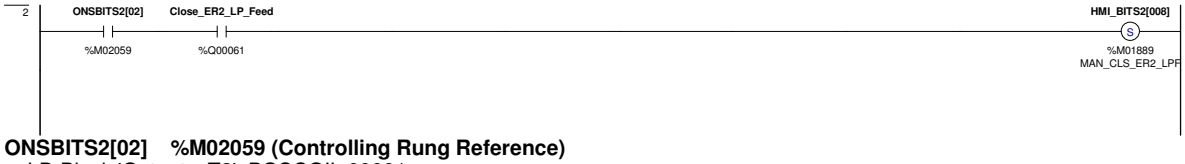


HMI_BITS[065] %M00486 (Controlling Rung Reference)

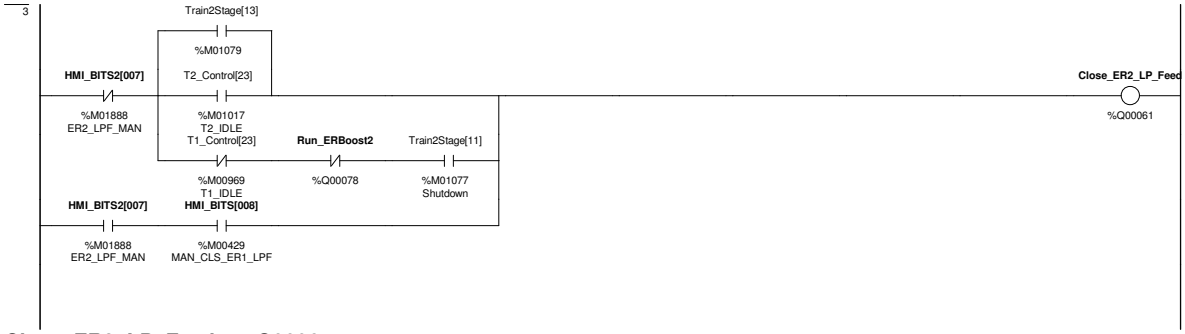
LD Block,'Outputs_T1': RESETCOIL 00044;



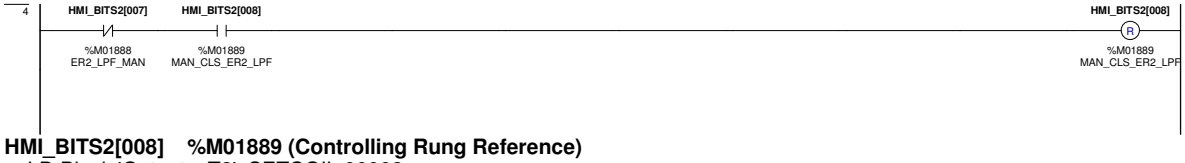
ONSBITS2[02] %M02059
LD Block,'Outputs_T2': POSCOIL 00001; NOCON 00002;



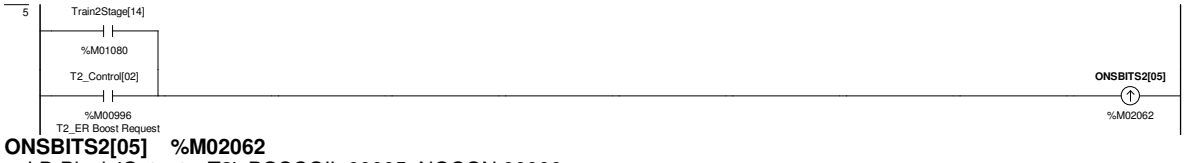
ONSBITS2[02] %M02059 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00001;
HMI_BITS2[008] %M01889
LD Block,'Outputs_T2': RESETCOIL 00004; SETCOIL 00002; NOCON 00004;



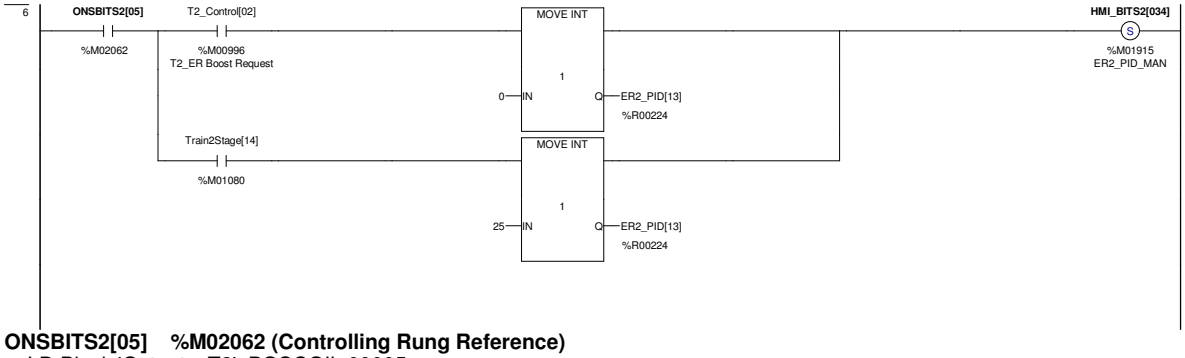
Close_ER2_LP_Feed %Q00061
LD Block,'Outputs_T2': NOCON 00002; COIL 00003;



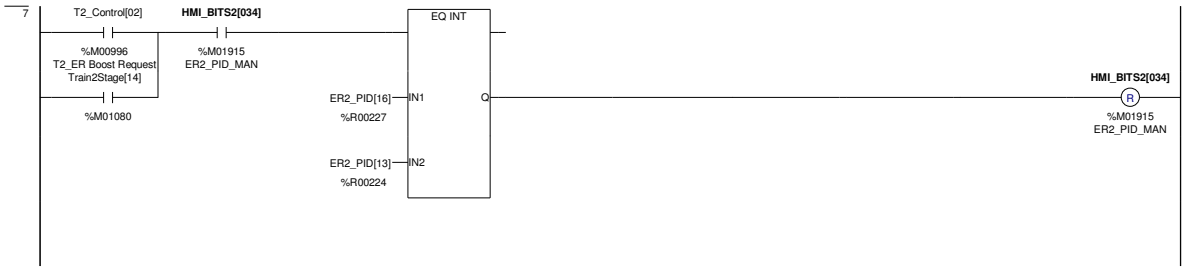
HMI_BITS2[008] %M01889 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00002;
HMI_BITS2[008] %M01889
LD Block,'Outputs_T2': RESETCOIL 00004; SETCOIL 00002; NOCON 00004;



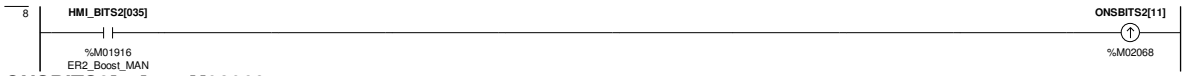
ONSBITS2[05] %M02062
LD Block,'Outputs_T2': POSCOIL 00005; NOCON 00006;



ONSBITS2[05] %M02062 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00005;
HMI_BITS2[034] %M01915
LD Block,'Outputs_T2': RESETCOIL 00007; SETCOIL 00006; NOCON 00007, 00010, 00012;

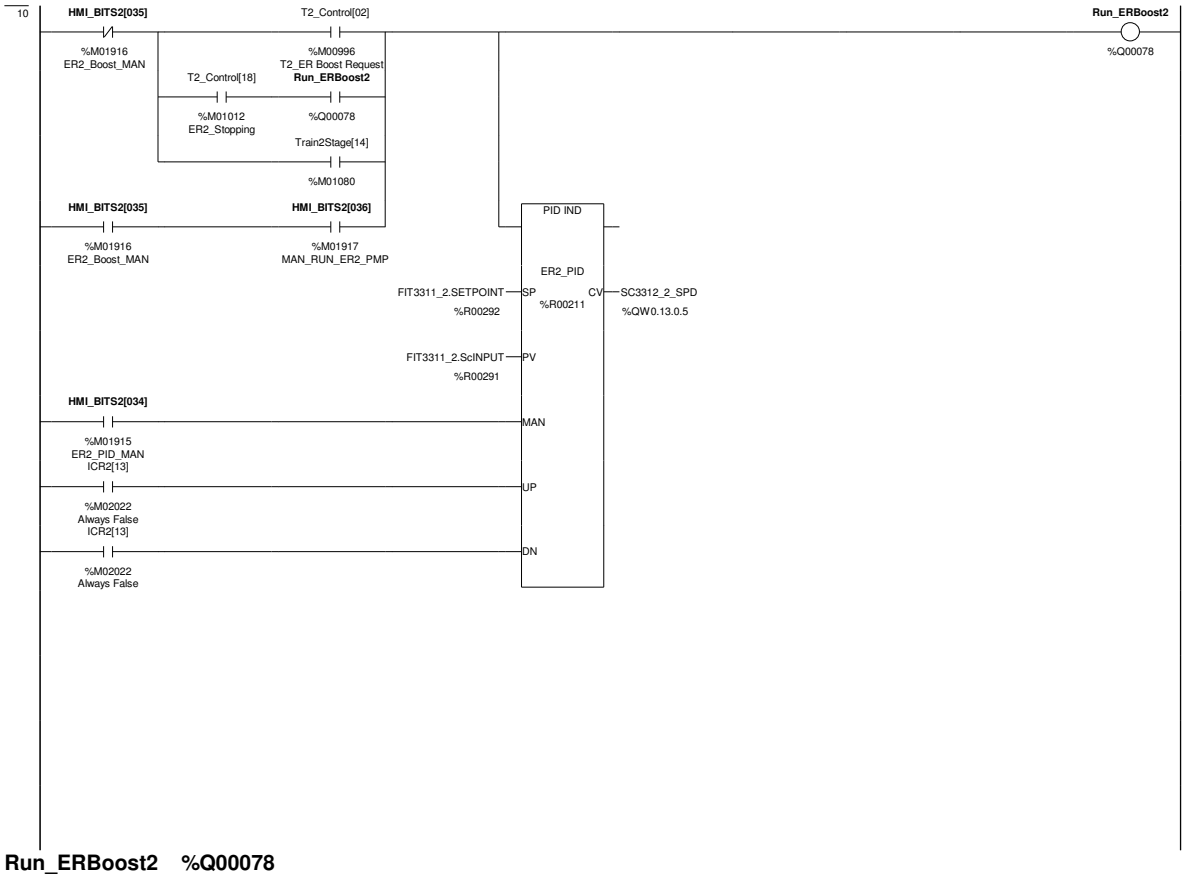


HMI_BITS2[034] %M01915 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00006;
HMI_BITS2[034] %M01915
LD Block,'Outputs_T2': RESETCOIL 00007; SETCOIL 00006; NOCON 00007, 00010, 00012;



ONSBITS2[11] %M02068
LD Block,'Outputs_T2': POSCOIL 00008; NOCON 00009;

ONSBITS2[11] %M02068 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00008;
HMI_BITS2[036] %M01917
LD Block,'Outputs_T2': RESETCOIL 00011; SETCOIL 00009; NOCON 00010, 00011;

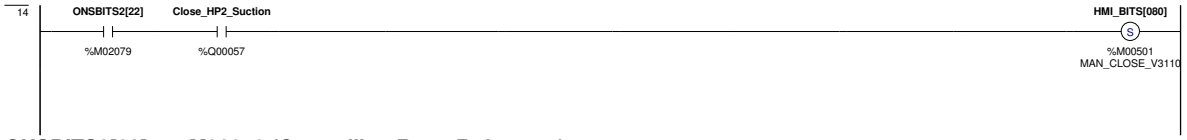


Run_ERBoost2 %Q00078
LD Block,'Outputs_T2': NCCON 00003; NOCON 00009, 00010; COIL 00010;
LD Block,'Train2_Shutdown': NCCON 00020; NOCON 00009;
HMI_BITS2[036] %M01917 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00009;
HMI_BITS2[034] %M01915 (Controlling Rung Reference)
LD Block,'Outputs_T2': RESETCOIL 00007;

HMI_BITS2[036] %M01917 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00009;
HMI_BITS2[036] %M01917
LD Block,'Outputs_T2': RESETCOIL 00011; SETCOIL 00009; NOCON 00010, 00011;

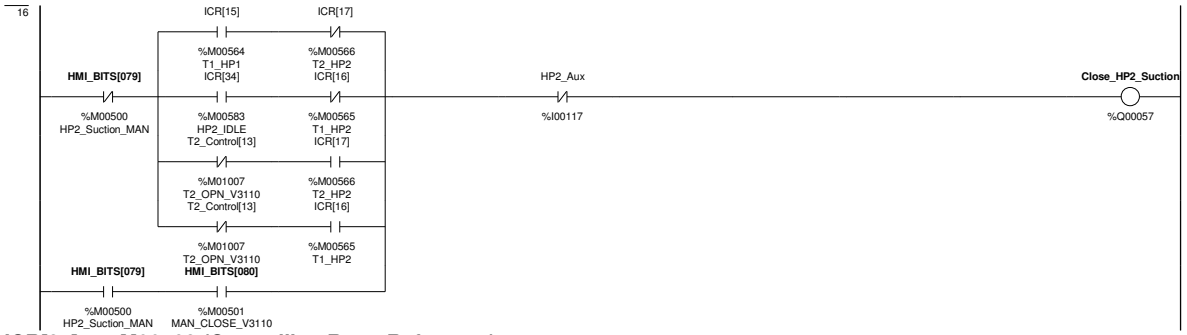
HMI_BITS2[034] %M01915 (Controlling Rung Reference)
LD Block,'Outputs_T2': RESETCOIL 00007;

ONSBITS2[22] %M02079
LD Block,'Outputs_T2': POSCOIL 00013; NOCON 00014;

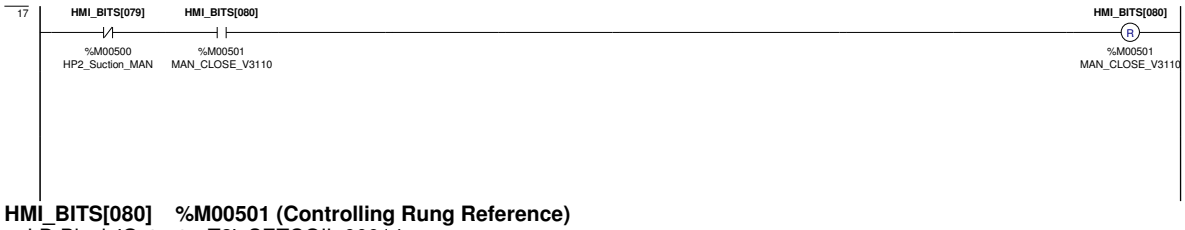


ONSBITS2[22] %M02079 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00013;
HMI_BITS[080] %M00501
LD Block,'Outputs_T2': RESETCOIL 00017; SETCOIL 00014; NOCON 00016, 00017;

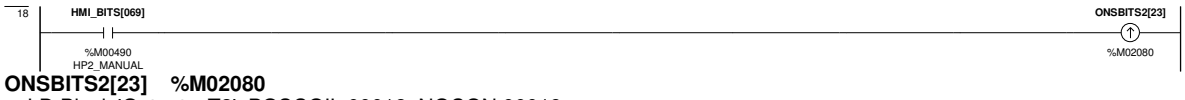
ICR[34] %M00583
LD Block,'Outputs_T2': NOCON 00016; COIL 00015;



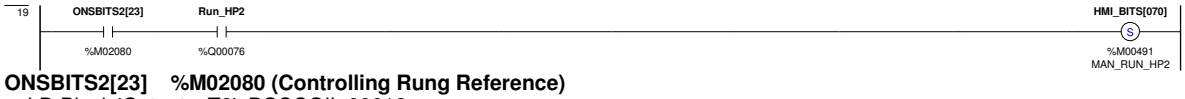
ICR[34] %M00583 (Controlling Rung Reference)
LD Block,'Outputs_T2': COIL 00015;
Close_HP2_Suction %Q00057
LD Block,'Outputs_T2': NOCON 00014; COIL 00016;
HMI_BITS[080] %M00501 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00014;



HMI_BITS[080] %M00501 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00014;
HMI_BITS[080] %M00501
LD Block,'Outputs_T2': RESETCOIL 00017; SETCOIL 00014; NOCON 00016, 00017;

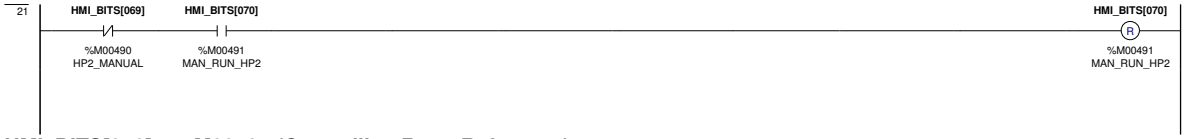


ONSBITS2[23] %M02080
LD Block,'Outputs_T2': POSCOIL 00018; NOCON 00019;

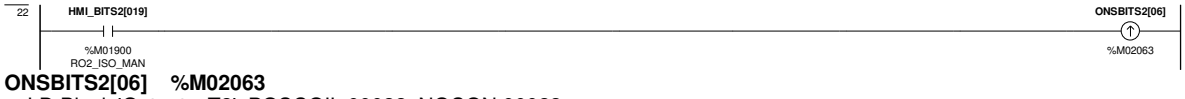


ONSBITS2[23] %M02080 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00018;
HMI_BITS[070] %M00491
LD Block,'Outputs_T2': RESETCOIL 00021; SETCOIL 00019; NOCON 00020, 00021;

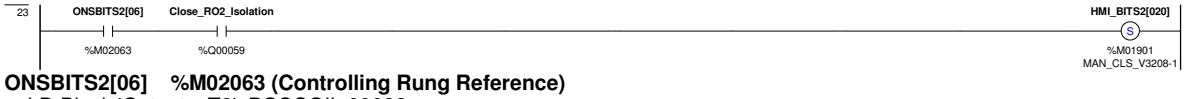
Run_HP2 %Q00076
LD Block,'Outputs_T2': NOCON 00019, 00033; COIL 00020;
LD Block,'HP_Select': NOCON 00008;
LD Block,'Outputs_T1': NOCON 00032;
HMI_BITS[070] %M00491 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00019;



HMI_BITS[070] %M00491 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00019;
HMI_BITS[070] %M00491
LD Block,'Outputs_T2': RESETCOIL 00021; SETCOIL 00019; NOCON 00020, 00021;



ONSBITS2[06] %M02063
LD Block,'Outputs_T2': POSCOIL 00022; NOCON 00023;



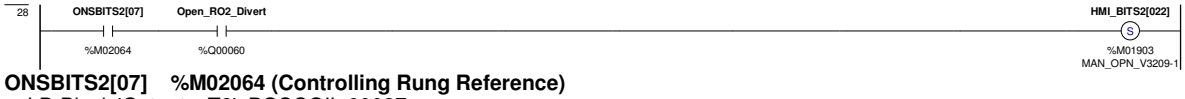
ONSBITS2[06] %M02063 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00022;
HMI_BITS2[020] %M01901
LD Block,'Outputs_T2': RESETCOIL 00025; SETCOIL 00023; NOCON 00024, 00025;

Close_RO2_Isolation %Q00059
LD Block,'Outputs_T2': NCCON 00026; NOCON 00023; COIL 00024;
HMI_BITS2[020] %M01901 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00023;

HMI_BITS2[020] %M01901 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00023;
HMI_BITS2[020] %M01901
LD Block,'Outputs_T2': RESETCOIL 00025; SETCOIL 00023; NOCON 00024, 00025;

Close_RO2_Isolation %Q00059 (Controlling Rung Reference)
LD Block,'Outputs_T2': COIL 00024;
T2_Control[24] %M01018
LD Block,'Outputs_T2': NCCON 00029; COIL 00026;

ONSBITS2[07] %M02064
LD Block,'Outputs_T2': POSCOIL 00027; NOCON 00028;

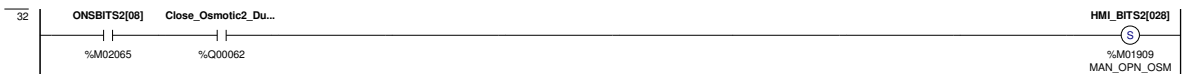


ONSBITS2[07] %M02064 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00027;
HMI_BITS2[022] %M01903
LD Block,'Outputs_T2': RESETCOIL 00030; SETCOIL 00028; NOCON 00029, 00030;

T2_Control[24] %M01018 (Controlling Rung Reference)
LD Block,'Outputs_T2': COIL 00026;
Open_RO2_Divert %Q00060
LD Block,'Outputs_T2': NOCON 00028; COIL 00029;
HMI_BITS2[022] %M01903 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00028;

HMI_BITS2[022] %M01903 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00028;
HMI_BITS2[022] %M01903
LD Block,'Outputs_T2': RESETCOIL 00030; SETCOIL 00028; NOCON 00029, 00030;

ONSBITS2[08] %M02065
LD Block,'Outputs_T2': POSCOIL 00031; NOCON 00032;

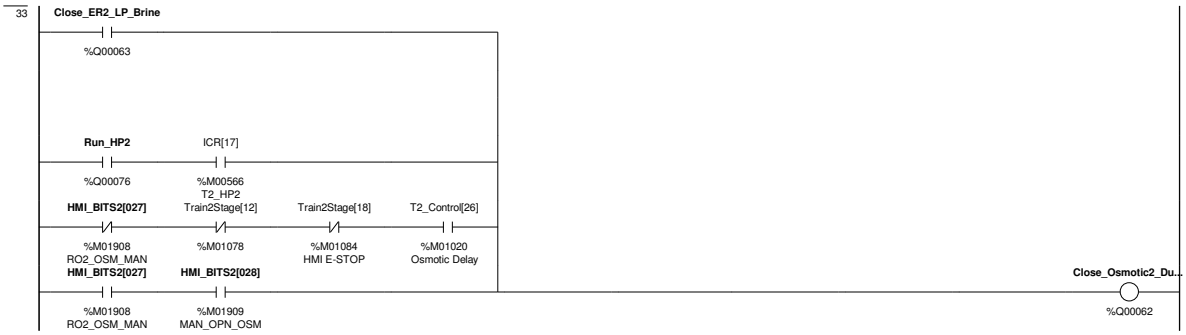


ONSBITS2[08] %M02065 (Controlling Rung Reference)

LD Block,'Outputs_T2': POSCOIL 00031;

HMI_BITS2[028] %M01909

LD Block,'Outputs_T2': RESETCOIL 00034; SETCOIL 00032; NOCON 00033, 00034;



Run_HP2 %Q00076 (Controlling Rung Reference)

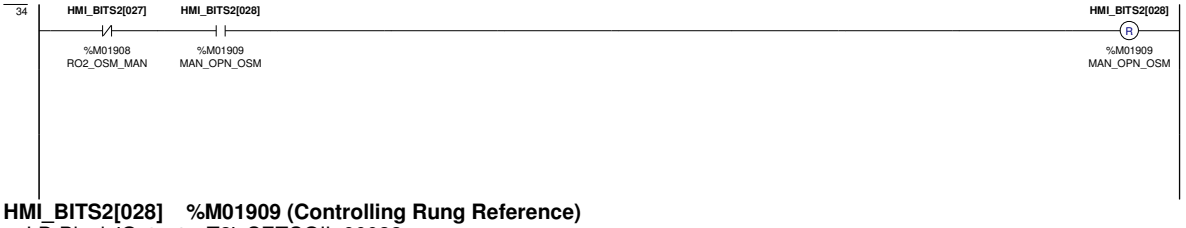
LD Block,'Outputs_T2': COIL 00020;

HMI_BITS2[028] %M01909 (Controlling Rung Reference)

LD Block,'Outputs_T2': SETCOIL 00032;

Close_Osmotic2_Dump %Q00062

LD Block,'Outputs_T2': NOCON 00032; COIL 00033;



HMI_BITS2[028] %M01909 (Controlling Rung Reference)

LD Block,'Outputs_T2': SETCOIL 00032;

HMI_BITS2[028] %M01909

LD Block,'Outputs_T2': RESETCOIL 00034; SETCOIL 00032; NOCON 00033, 00034;

ONSBITS2[09] %M02066

LD Block,'Outputs_T2': POSCOIL 00035; NOCON 00036;

ONSBITS2[09] %M02066 (Controlling Rung Reference)

LD Block,'Outputs_T2': POSCOIL 00035;

HMI_BITS2[030] %M01911

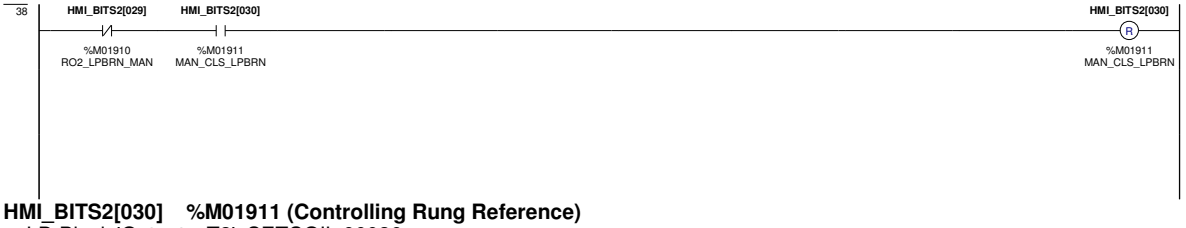
LD Block,'Outputs_T2': RESETCOIL 00038; SETCOIL 00036; NOCON 00037, 00038;

Close_ER2_LP_Brine %Q00063

LD Block,'Outputs_T2': NOCON 00033, 00036; COIL 00037;

HMI_BITS2[030] %M01911 (Controlling Rung Reference)

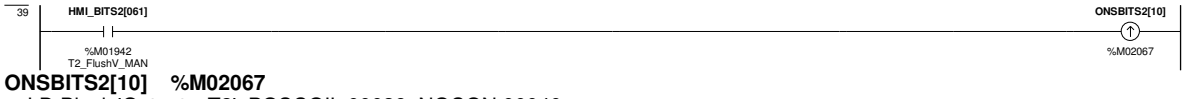
LD Block,'Outputs_T2': SETCOIL 00036;



HMI_BITS2[030] %M01911 (Controlling Rung Reference)

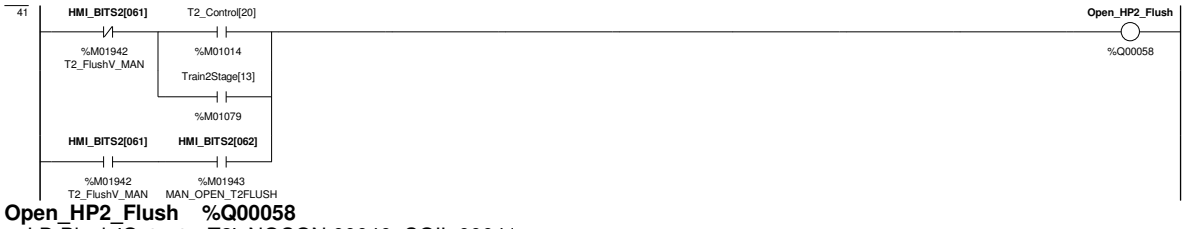
LD Block,'Outputs_T2': SETCOIL 00036;

HMI_BITS2[030] %M01911
LD Block,'Outputs_T2': RESETCOIL 00038; SETCOIL 00036; NOCON 00037, 00038;



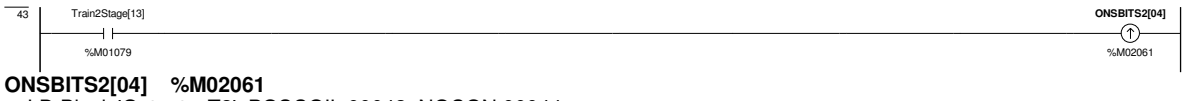
ONSBITS2[10] %M02067
LD Block,'Outputs_T2': POSCOIL 00039; NOCON 00040;

ONSBITS2[10] %M02067 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00039;
HMI_BITS2[062] %M01943
LD Block,'Outputs_T2': RESETCOIL 00042; SETCOIL 00040; NOCON 00041, 00042;



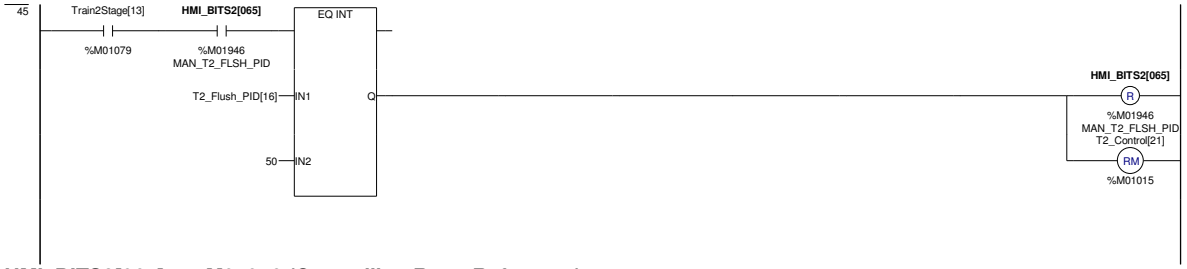
Open_HP2_Flush %Q00058
LD Block,'Outputs_T2': NOCON 00040; COIL 00041;
HMI_BITS2[062] %M01943 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00040;

HMI_BITS2[062] %M01943 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00040;
HMI_BITS2[062] %M01943
LD Block,'Outputs_T2': RESETCOIL 00042; SETCOIL 00040; NOCON 00041, 00042;



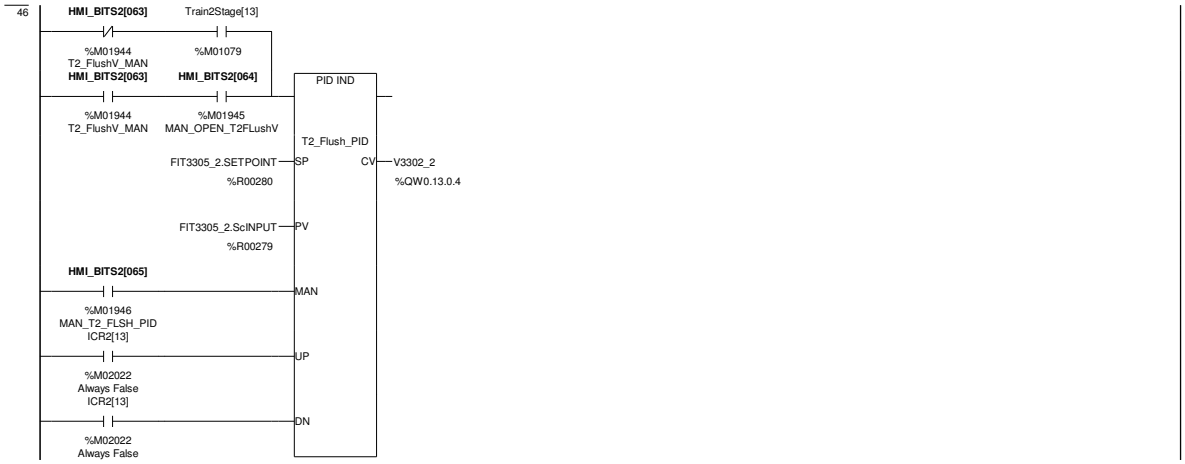
ONSBITS2[04] %M02061
LD Block,'Outputs_T2': POSCOIL 00043; NOCON 00044;

ONSBITS2[04] %M02061 (Controlling Rung Reference)
LD Block,'Outputs_T2': POSCOIL 00043;
HMI_BITS2[065] %M01946
LD Block,'Outputs_T2': RESETCOIL 00045; SETCOIL 00044; NOCON 00045, 00046;
T2_Control[21] %M01015
LD Block,'Outputs_T2': RESETCOIL 00045; SETCOIL 00044;
LD Block,'Train2_Shutdown': NCCON 00030;



HMI_BITS2[065] %M01946 (Controlling Rung Reference)
LD Block,'Outputs_T2': SETCOIL 00044;
HMI_BITS2[065] %M01946
LD Block,'Outputs_T2': RESETCOIL 00045; SETCOIL 00044; NOCON 00045, 00046;
T2_Control[21] %M01015

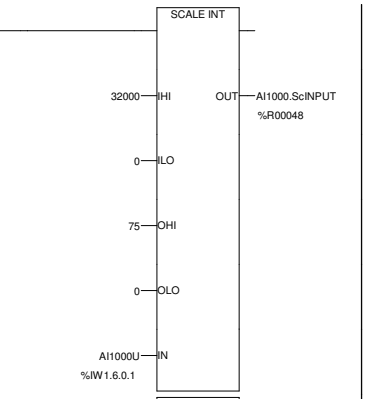
LD Block,'Outputs_T2': RESETCOIL 00045; SETCOIL 00044;
LD Block,'Train2_Shutdown': NCCON 00030;



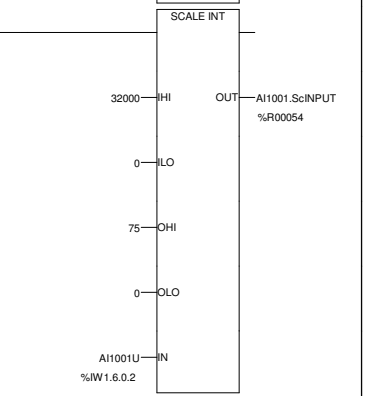
HMI_BITS2[065] %M01946 (Controlling Rung Reference)
LD Block,'Outputs_T2': RESETCOIL 00045;

1 Well Speed inputs

2

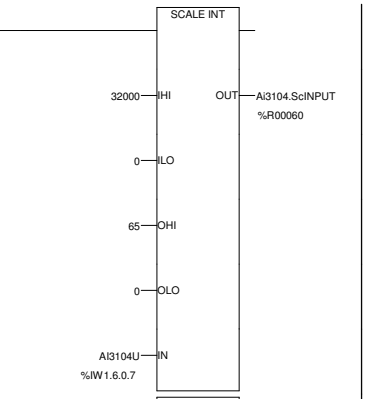


3

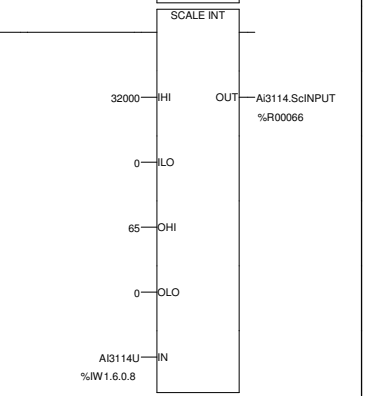


4 High Pressure Pump Speed Controllers

5



6



7 ER BOOST PUMP SPEED CONTROLLERS

8

SCALE INT

32000 — IHI
OUT — AI3312_1.ScINPUT
%R00072
0 — ILO
63 — OHI
0 — OLO
AI3312_1U — IN
%IW0.10.0.8

9

SCALE INT

32000 — IHI
OUT — AI3312_2.ScINPUT
%R00078
0 — ILO
63 — OHI
0 — OLO
AI3312_2U — IN
%IW0.11.0.8

10 DEGASIFIER FEED pH

11

SCALE INT

32000 — IHI
OUT — AI5101.ScINPUT
%R00084
0 — ILO
140 — OHI
0 — OLO
AI5101U — IN
%IW1.6.0.9

12

SCALE INT

32000 — IHI
OUT — AI5102.ScINPUT
%R00984
0 — ILO
140 — OHI
0 — OLO
AI5102U — IN
%IW1.7.0.12

13 SCRUBBER RECIRC pH

14

15 CALCITE PUMP SPEED INPUT

16

17 CALCITE DOSING SYSTEM pH

18

19 Product Pump Speed Inputs

20

21

SCALE INT

32000 — IHI
0 — ILO
65 — OHI
0 — OLO
AI5306U — IN
%IW1.7.0.2

OUT — AI5306.ScINPUT
%R00114

22 Treated Water pH

23

SCALE INT

32000 — IHI
0 — ILO
140 — OHI
0 — OLO
AI5326U — IN
%IW1.7.0.4

OUT — AI5326.ScINPUT
%R00120
pH

24 Treated Water Chlorine Level

25

SCALE INT

32000 — IHI
0 — ILO
100 — OHI
0 — OLO
AI5328U — IN
%IW1.7.0.6

OUT — AI5328.ScINPUT
%R00126
Chlorine

26 Treated Water Hardness

27

SCALE INT

32000 — IHI
0 — ILO
100 — OHI
0 — OLO
AI5329U — IN
%IW1.7.0.7

OUT — AI5329.ScINPUT
%R00132
Hardness

28 RO #1 Product Conductivity

29

SCALE INT

32000 — IHI
0 — ILO
1000 — OHI
0 — OLO
CIT3207_1U — IN
%IW0.10.0.5

OUT — CIT3207_1.ScINPUT
%R00138

30 RO #2 Product Conductivity

31

SCALE INT

32000 — IHI
0 — ILO
1000 — OHI
0 — OLO
CIT3207_2U — IN
%IW0.11.0.5

OUT — CIT3207_2.ScINPUT
%R00144

32 Treated Water Conductivity

33

SCALE INT

32000 — IHI
0 — ILO
10000 — OHI
10 — OLO
CIT5327U — IN
%IW1.7.0.5

OUT — CIT5327.ScINPUT
%R00150
Conductivity

34 Cartridge Filter Differential Pressure

35

SCALE INT

32000 — IHI
0 — ILO
300 — OHI
0 — OLO
dPET2308U — IN
%IW1.6.0.5

OUT — dPET2308.ScINPUT
%R00157

36 RO #1 Feed/Brine Differential Pressure

37

38 RO #2 Feed/Brine Differential Pressure

39

40 Plant Input Product Flow

41

42 RO #1 Product Flow

43

44 RO #2 Product Flow

45

SCALE INT

32000 — IHI
OUT — FIT3206_2.ScINPUT
%R00267

0 — ILO

1000 — OHI

0 — OLO

FIT3206_2U — IN
%IW0.11.0.4

46 ER #1 Low Pressure Feed Flow

47

SCALE INT

32000 — IHI
OUT — FIT3305_1.ScINPUT
%R00273

0 — ILO

1000 — OHI

0 — OLO

FIT3305_1U — IN
%IW0.10.0.6

48 ER #2 Low Pressure Feed Flow

49

SCALE INT

32000 — IHI
OUT — FIT3305_2.ScINPUT
%R00279

0 — ILO

1000 — OHI

0 — OLO

FIT3305_2U — IN
%IW0.11.0.6

50 ER #1 High Pressure Brine Flow

51

SCALE INT

32000 — IHI
OUT — FIT3311_1.ScINPUT
%R00285

0 — ILO

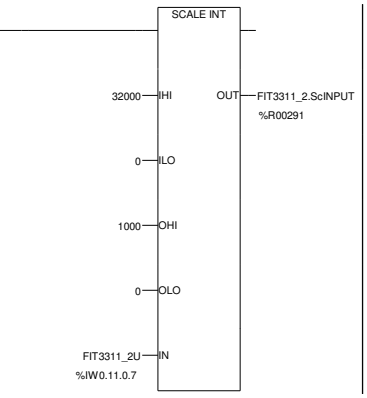
1000 — OHI

0 — OLO

FIT3311_1U — IN
%IW0.10.0.7

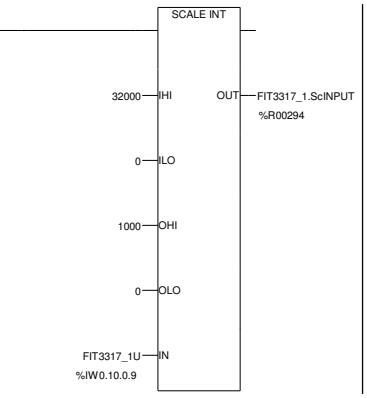
52 ER #2 High Pressure Brine Flow

53



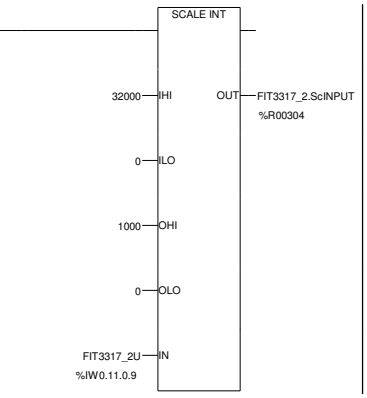
54 ER #1 Low Pressure Brine Flow

55



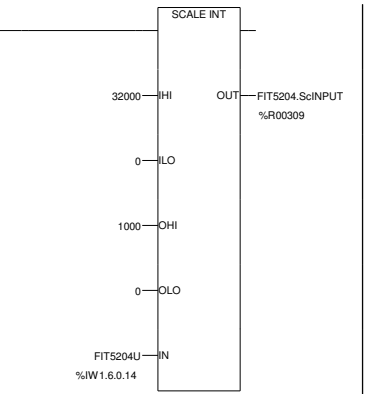
56 ER #2 Low Pressure Brine Flow

57



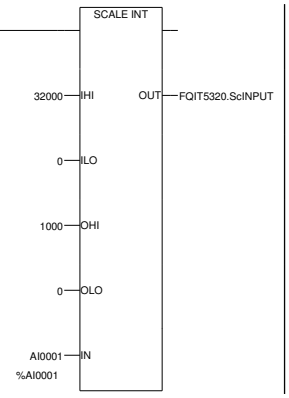
58 Calcite Dosing System Flow

59



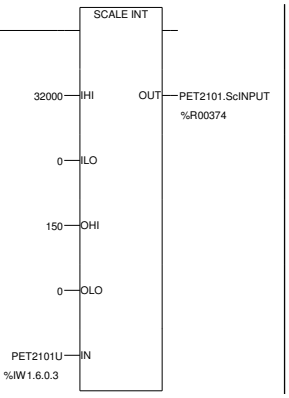
60 Treated Water Delivery Flow

61



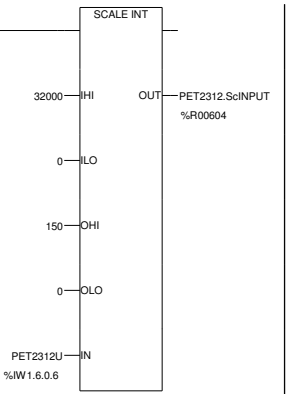
62 Media Filter Pressure

63



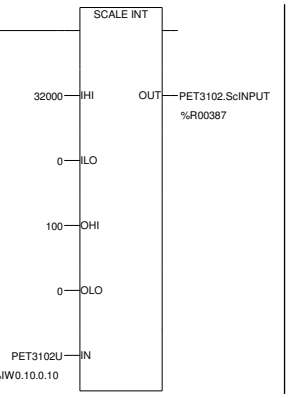
64 Plant Low Pressure Feed Header Pressure

65



66 High Pressure Pump #1 Suction Pressure

67



68 High Pressure Pump #12 Suction Pressure

69

SCALE INT

32000 — IHI
OUT — PET3112.SclNPUT
%R00394
0 — ILO
150 — OHI
0 — OLO
PET3112U — IN
%IW0.11.0.1

70 RO #1 Membrane Feed Header Pressure

71

SCALE INT

32000 — IHI
OUT — PET3202_1.SclNPUT
%R00400
0 — ILO
1000 — OHI
0 — OLO
PET3202_1U — IN
%IW0.10.0.2

72 RO #2 Membrane Feed Header Pressure

73

SCALE INT

32000 — IHI
OUT — PET3202_2.SclNPUT
%R00406
0 — ILO
1000 — OHI
0 — OLO
PET3202_2U — IN
%IW0.11.0.2

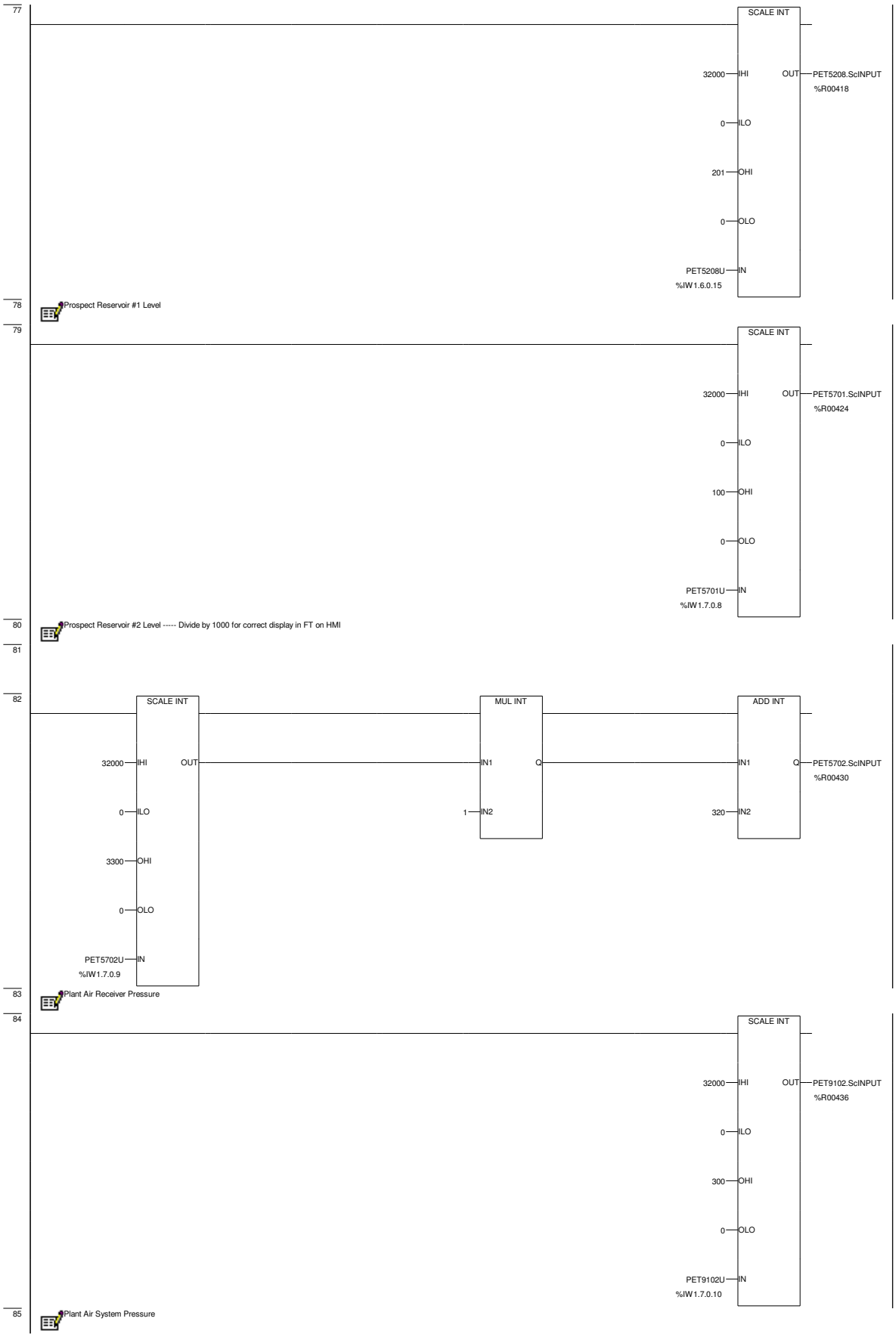
74 Product Water Flush Tank Level

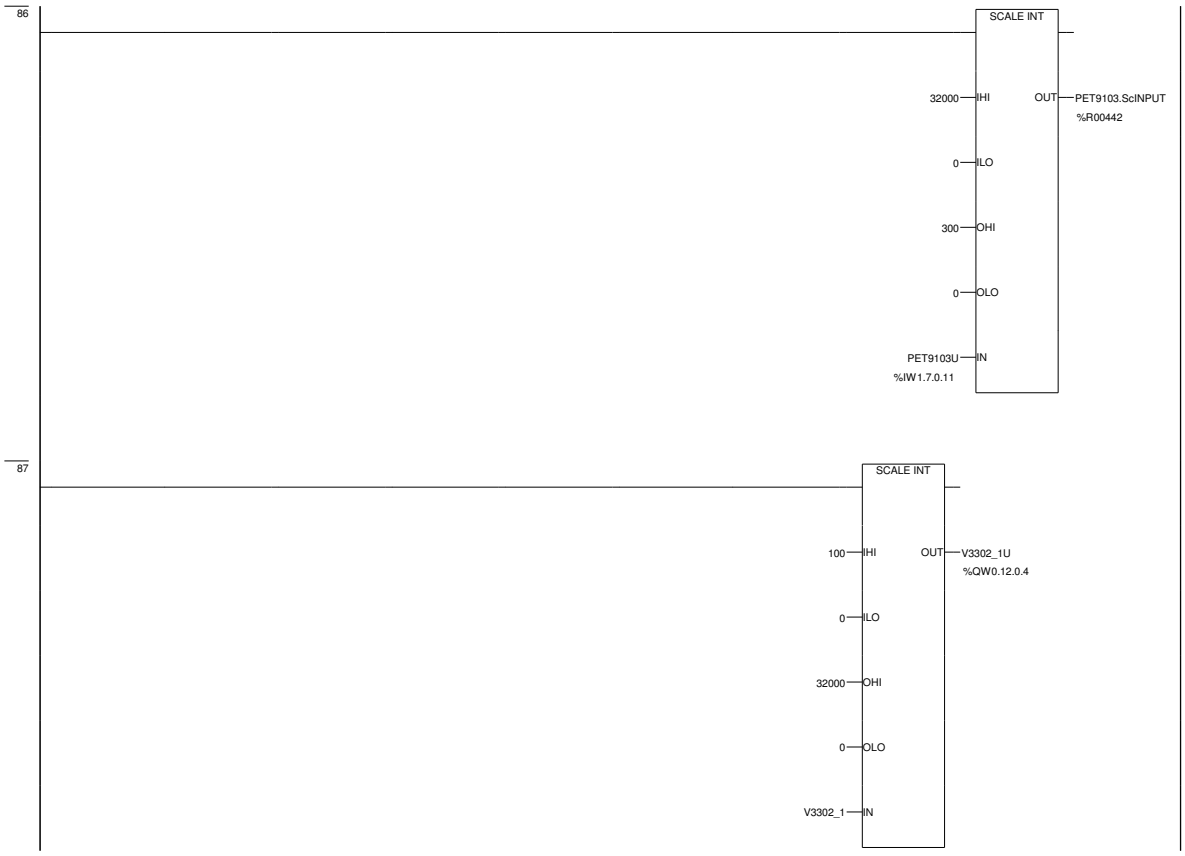
75

SCALE INT

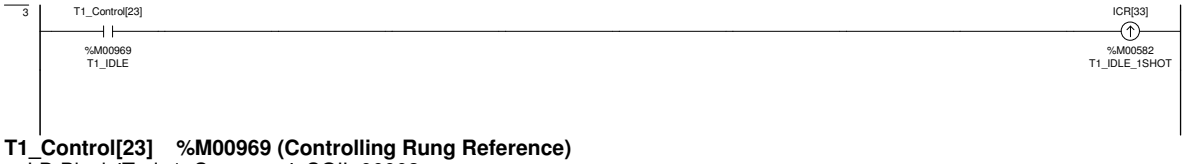
32000 — IHI
OUT — PET5202.SclNPUT
%R00412
0 — ILO
145 — OHI
0 — OLO
PET5202U — IN
%IW1.6.0.12

76 Product Water Tank Level


77
SCALE INT
32000
IHI
OUT
PET5208.SclNPUT
%R00418
0
ILO
201
OHI
0
OLO
PET5208U
%IW1.6.0.15
IN
78
Prospect Reservoir #1 Level
79
SCALE INT
32000
IHI
OUT
PET5701.SclNPUT
%R00424
0
ILO
100
OHI
0
OLO
PET5701U
%IW1.7.0.8
IN
80
Prospect Reservoir #2 Level ----- Divide by 1000 for correct display in FT on HMI
81
82
SCALE INT
MUL INT
ADD INT
32000
IHI
OUT
IN1
Q
IN1
Q
PET5702.SclNPUT
%R00430
0
ILO
1
IN2
320
IN2
3300
OHI
0
OLO
PET5702U
%IW1.7.0.9
IN
83
Plant Air Receiver Pressure
84
SCALE INT
32000
IHI
OUT
PET9102.SclNPUT
%R00436
0
ILO
300
OHI
0
OLO
PET9102U
%IW1.7.0.10
IN
85
Plant Air System Pressure

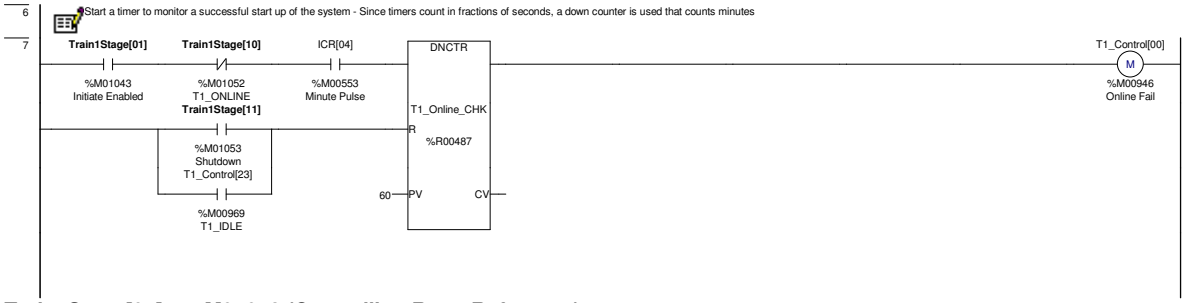

86
SCALE INT
32000
IHI
OUT
PET9103.ScINPUT
%R00442
0
ILO
300
OHI
0
OLO
PET9103U
IN
%IW1.7.0.11
87
SCALE INT
100
IHI
OUT
V3302_1U
%QW0.12.0.4
0
ILO
32000
OHI
0
OLO
V3302_1
IN

T1_Control[23] %M00969
LD Block,'AlarmsTrain2': NCCON 00004, 00029; NOCON 00004;
LD Block,'Outputs_T2': NCCON 00003; NOCON 00015;
LD Block,'Train1_Sequence': NOCON 00003, 00007, 00019; COIL 00002;
LD Block,'AlarmsCommon': NCCON 00016, 00053, 00054; NOCON 00014;
LD Block,'AlarmsTrain1': NCCON 00030;
LD Block,'Outputs_T1': NOCON 00003, 00015, 00023, 00036;
LD Block,'Train2_Shutdown': NOCON 00022;

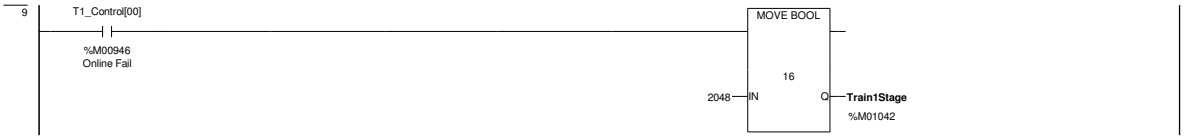


T1_Control[23] %M00969 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00002;
ICR[33] %M00582
LD Block,'Train1_Shutdown': NOCON 00007, 00016, 00024;
LD Block,'Train1_Sequence': POSCOIL 00003;
LD Block,'AlarmsCommon': NOCON 00017;
LD Block,'AlarmsTrain1': NOCON 00004, 00005, 00008, 00011, 00014, 00017, 00019, 00021, 00026;

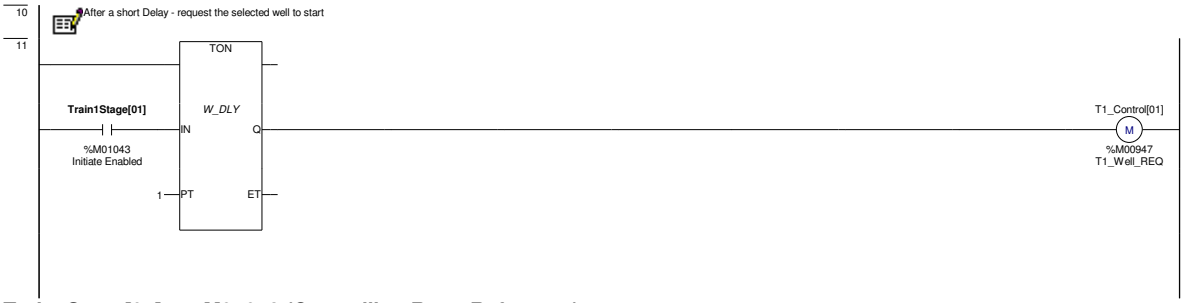
Train1Stage[01] %M01043
LD Block,'Train1_Sequence': SETCOIL 00005; NOCON 00007, 00011;
LD Block,'AlarmsCommon': NOCON 00027;
LD Block,'Outputs_T1': NOCON 00023, 00028;
LD Block,'Train2_Shutdown': NCCON 00022;



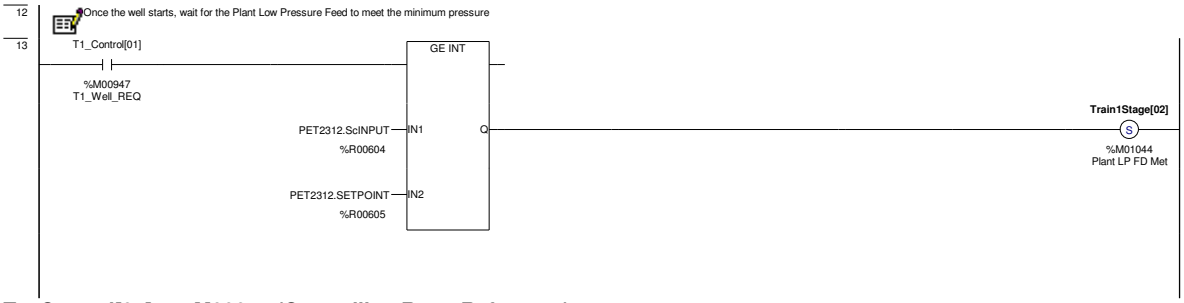
Train1Stage[01] %M01043 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00005;
T1_Control[00] %M00946
LD Block,'Train1_Sequence': NOCON 00009; COIL 00007;
T1_Control[23] %M00969 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00002;



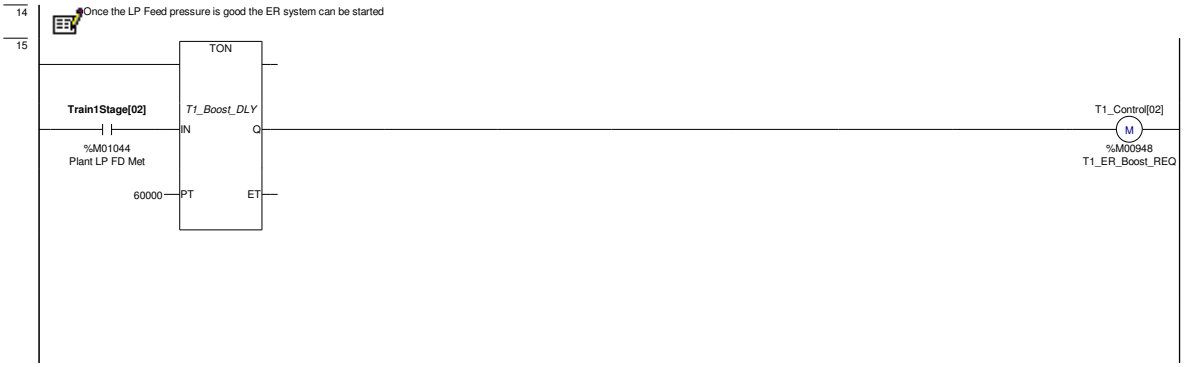
T1_Control[00] %M00946 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00007;



Train1Stage[01] %M01043 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00005;
T1_Control[01] %M00947
LD Block,'Train1_Sequence': NOCON 00013; COIL 00011;
LD Block,'AlarmsCommon': NOCON 00012, 00022, 00023, 00024, 00025;
LD Block,'Well_Control': NOCON 00009, 00010, 00011;

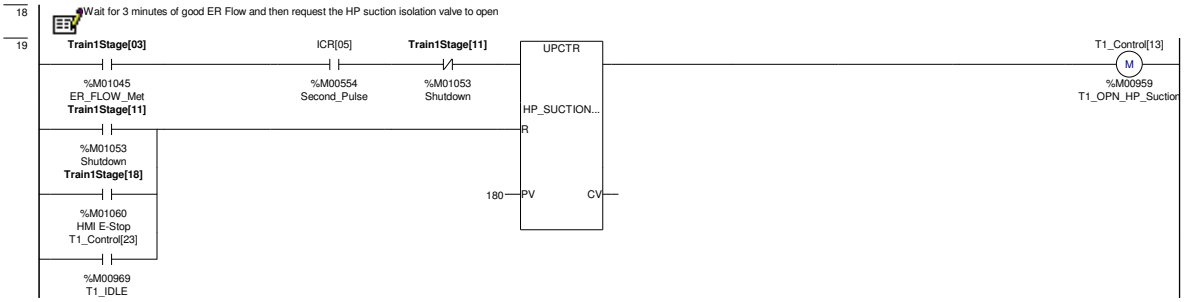


T1_Control[01] %M00947 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00011;
Train1Stage[02] %M01044
LD Block,'Train1_Sequence': SETCOIL 00013; NOCON 00015;
LD Block,'AlarmsCommon': NOCON 00016, 00026;
LD Block,'AlarmsTrain1': NOCON 00002, 00003;

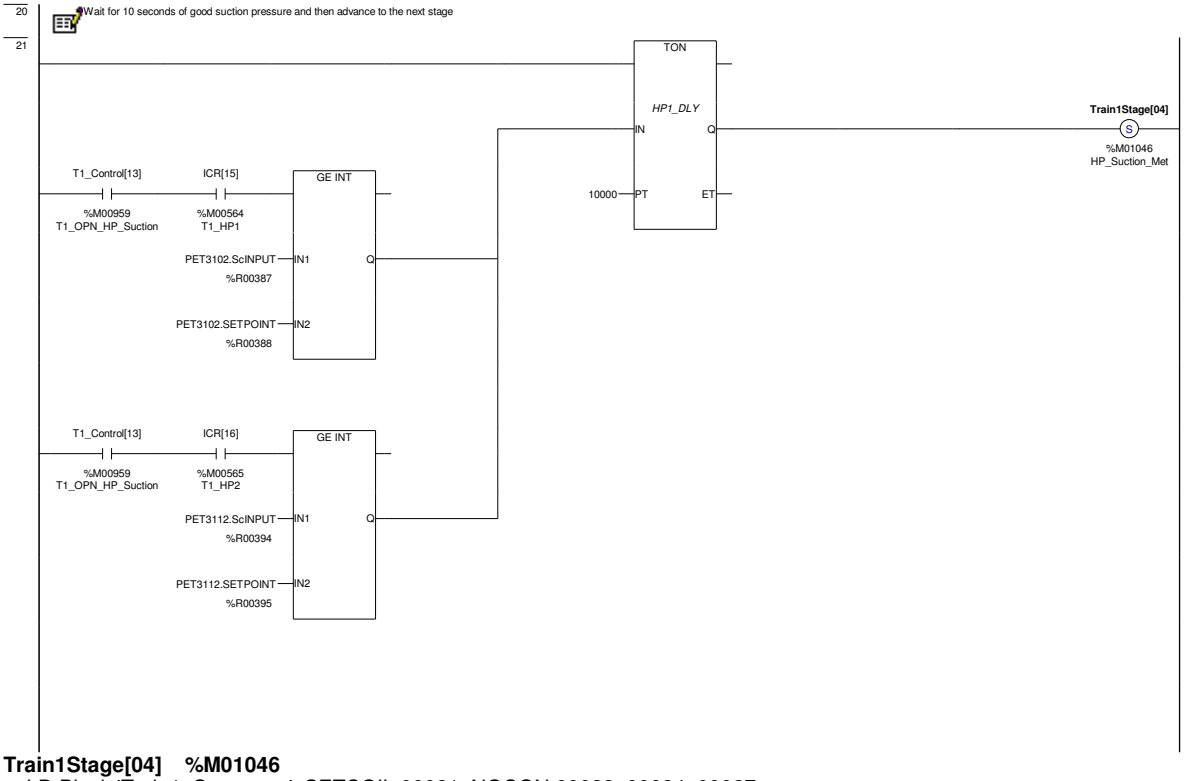


Train1Stage[02] %M01044 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00013;
T1_Control[02] %M00948
LD Block,'Train1_Sequence': NOCON 00017; COIL 00015;
LD Block,'Outputs_T1': NOCON 00005, 00006, 00007, 00010;

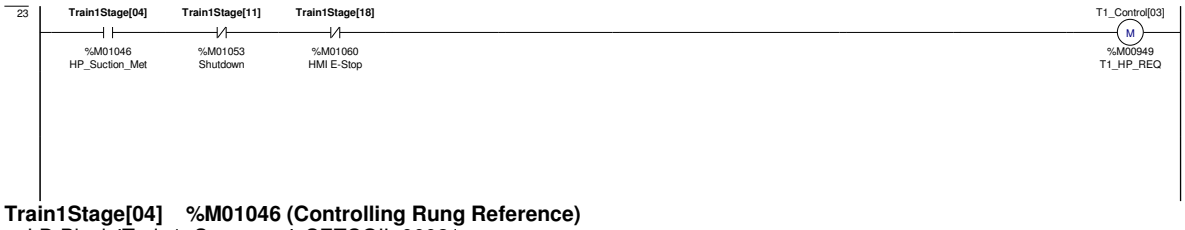
T1_Control[02] %M00948 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00015;
Train1Stage[03] %M01045
LD Block,'Train1_Sequence': SETCOIL 00017; NOCON 00019;
LD Block,'AlarmsCommon': NCCON 00013;
LD Block,'AlarmsTrain1': NOCON 00006, 00007, 00022, 00023;



Train1Stage[03] %M01045 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00017;
T1_Control[13] %M00959
LD Block,'Train1_Sequence': NOCON 00021, 00021; COIL 00019;
LD Block,'Outputs_T1': NCCON 00015;
T1_Control[23] %M00969 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00002;

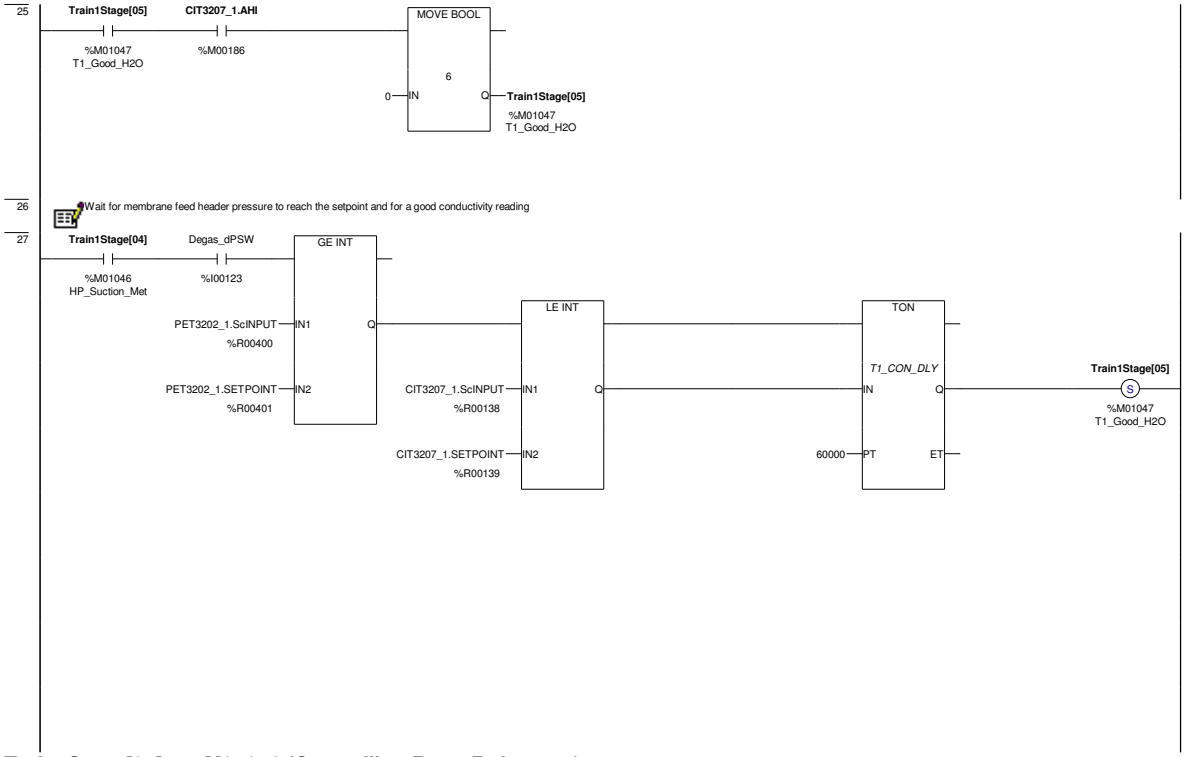


Train1Stage[04] %M01046
LD Block,'Train1_Sequence': SETCOIL 00021; NOCON 00023, 00024, 00027;
LD Block,'AlarmsCommon': NOCON 00018, 00021;
T1_Control[13] %M00959 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00019;

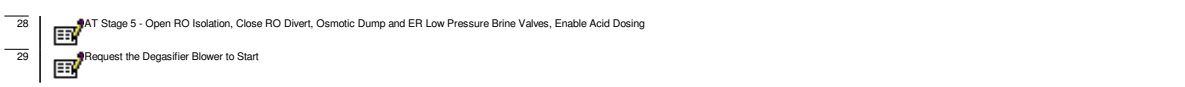


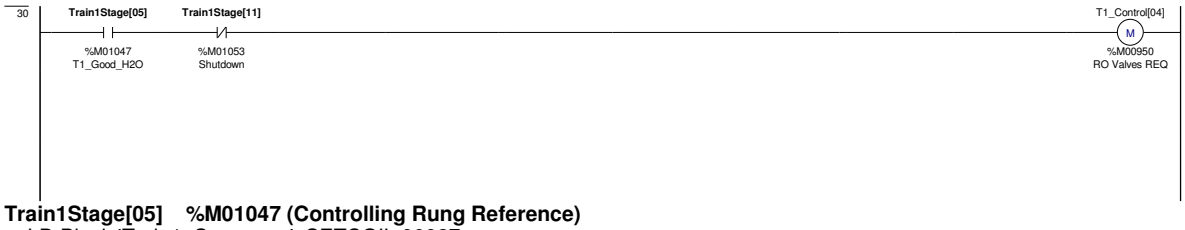
Train1Stage[04] %M01046 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00021;
T1_Control[03] %M00949
LD Block,'Outputs_Common': NOCON 00022, 00027, 00030, 00040;
LD Block,'Train1_Sequence': COIL 00023;
LD Block,'AlarmsTrain1': NOCON 00010;
LD Block,'HP_Select': NOCON 00005, 00006;

Train1Stage[04] %M01046 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00021;
T1_Control[25] %M00971
LD Block,'Train1_Sequence': COIL 00024;
LD Block,'AlarmsTrain1': NOCON 00009, 00012, 00013, 00027;

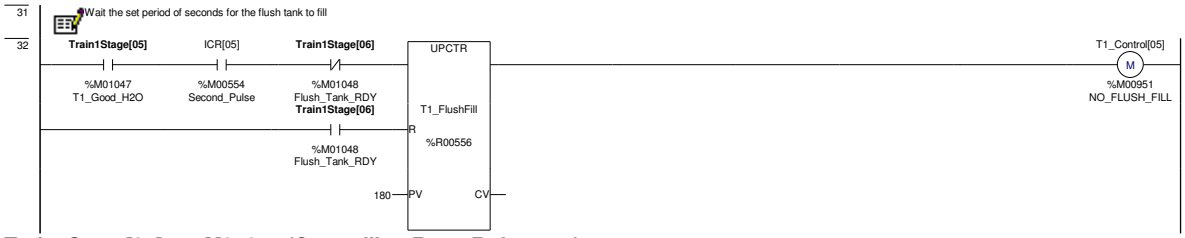


Train1Stage[04] %M01046 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00021;
Train1Stage[05] %M01047
LD Block,'Train1_Sequence': SETCOIL 00027; MOVE_BOOL 00025; NOCON 00025, 00030, 00032, 00036;
LD Block,'AlarmsTrain1': NOCON 00015, 00018, 00020;
LD Block,'Outputs_T1': NCCON 00023;

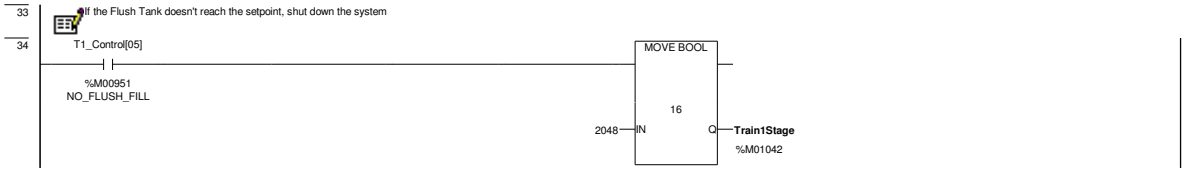




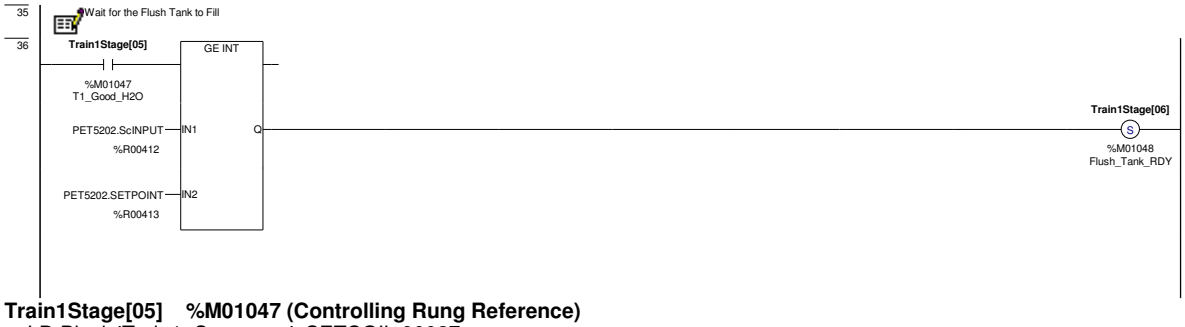
Train1Stage[05] %M01047 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00027;
T1_Control[04] %M00950
LD Block,'Outputs_Common': NOCON 00024;
LD Block,'Train1_Sequence': COIL 00030;



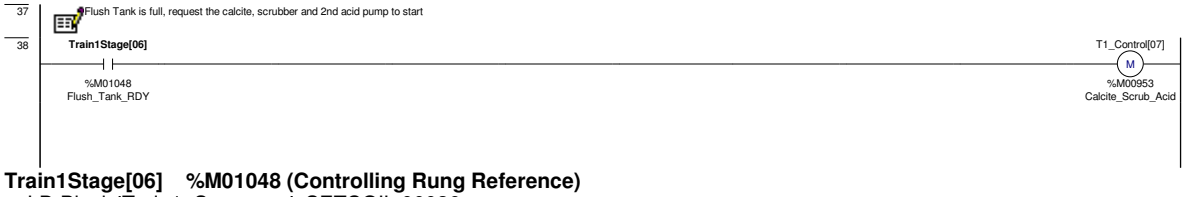
Train1Stage[05] %M01047 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00027;
T1_Control[05] %M00951
LD Block,'Train1_Sequence': NOCON 00034; COIL 00032;



T1_Control[05] %M00951 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00032;

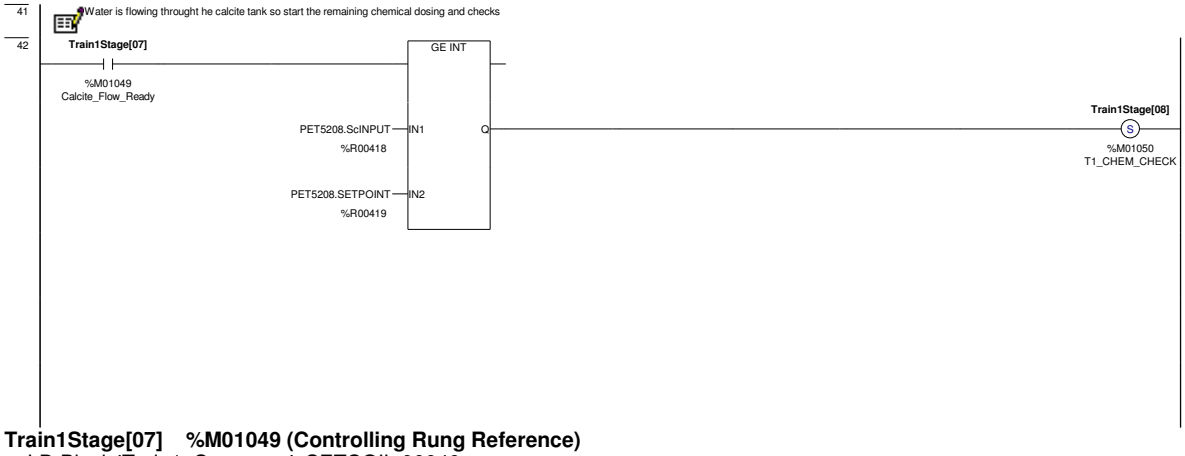


Train1Stage[05] %M01047 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00027;
Train1Stage[06] %M01048
LD Block,'Train1_Sequence': SETCOIL 00036; NCCON 00032; NOCON 00032, 00038, 00040;

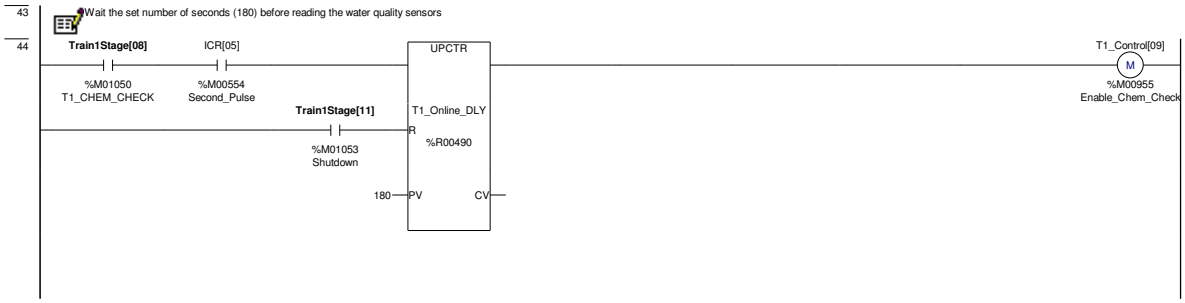


Train1Stage[06] %M01048 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00036;
T1_Control[07] %M00953
LD Block,'Outputs_Common': NOCON 00051, 00052;
LD Block,'Train1_Sequence': COIL 00038;

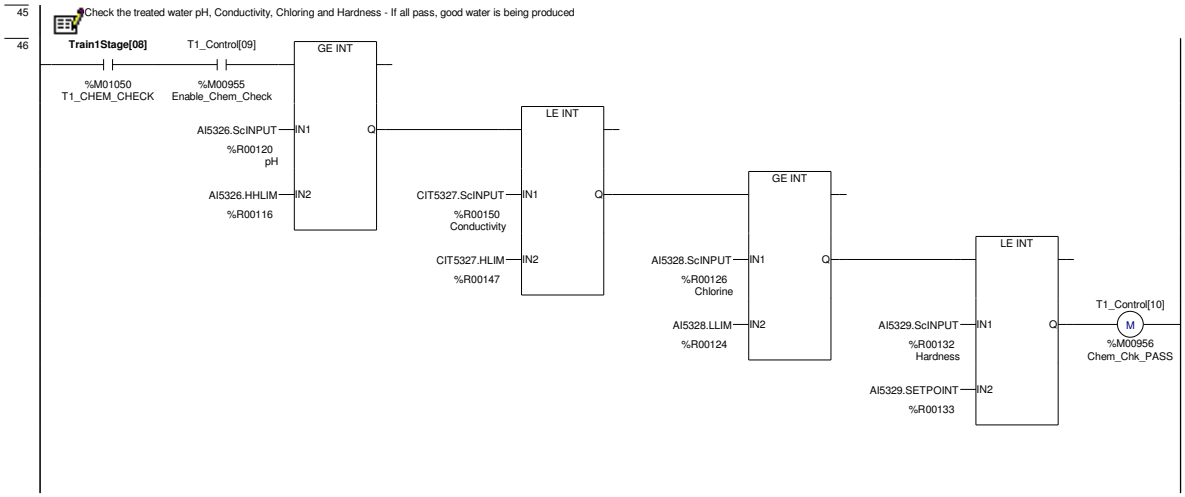
Train1Stage[06] %M01048 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00036;
Train1Stage[07] %M01049
LD Block,'Train1_Sequence': SETCOIL 00040; NOCON 00042;



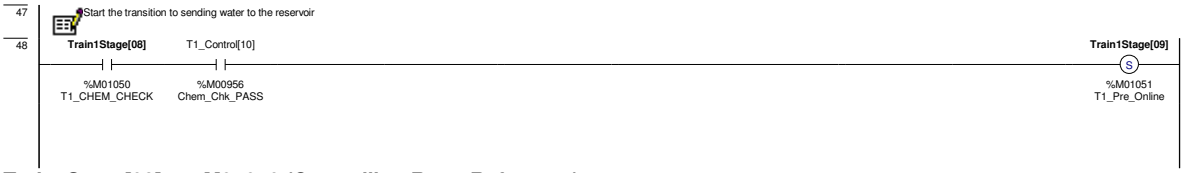
Train1Stage[07] %M01049 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00040;
Train1Stage[08] %M01050
LD Block,'Train1_Sequence': SETCOIL 00042; NOCON 00044, 00046, 00048;
LD Block,'AlarmsCommon': NOCON 00038;



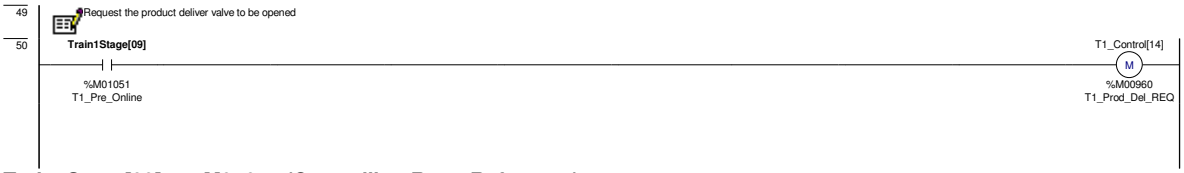
Train1Stage[08] %M01050 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00042;
T1_Control[09] %M00955
LD Block,'Train1_Sequence': NOCON 00046; COIL 00044;



Train1Stage[08] %M01050 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00042;
T1_Control[09] %M00955 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00044;
T1_Control[10] %M00956
LD Block,'Train1_Sequence': NOCON 00048; COIL 00046;



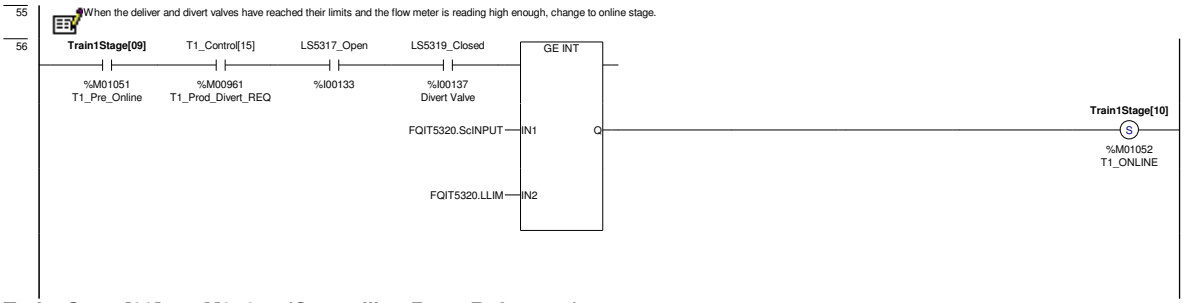
Train1Stage[08] %M01050 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00042;
T1_Control[10] %M00956 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00046;
Train1Stage[09] %M01051
LD Block,'Train1_Sequence': SETCOIL 00048; NOCON 00050, 00052, 00054, 00056;
LD Block,'AlarmsCommon': NOCON 00028, 00029, 00030, 00031, 00032, 00033, 00034, 00035, 00036, 00037;
LD Block,'AlarmsTrain1': NOCON 00024, 00025;



Train1Stage[09] %M01051 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00048;
T1_Control[14] %M00960
LD Block,'Outputs_Common': NOCON 00031;
LD Block,'Train1_Sequence': NOCON 00054; COIL 00050;

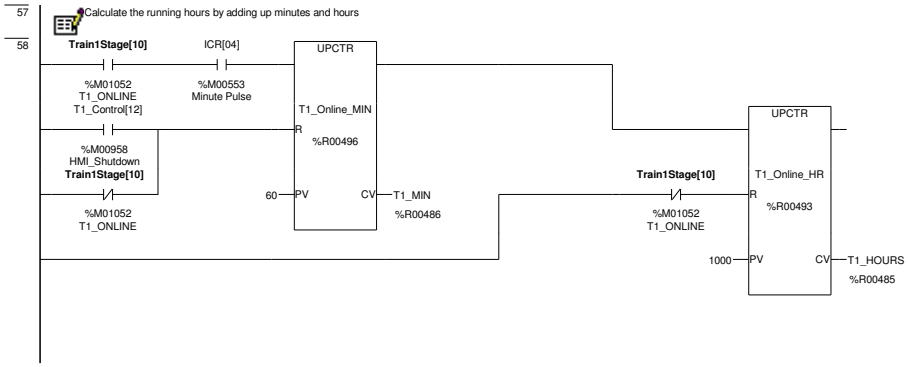
Train1Stage[09] %M01051 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00048;
T1_Control[08] %M00954
LD Block,'Outputs_Common': NOCON 00034, 00034, 00034, 00035, 00035, 00035, 00053, 00054;
LD Block,'Train1_Sequence': COIL 00052;

Train1Stage[09] %M01051 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00048;
T1_Control[14] %M00960 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00050;
T1_Control[15] %M00961
LD Block,'Outputs_Common': NOCON 00032;
LD Block,'Train1_Sequence': NOCON 00056; COIL 00054;

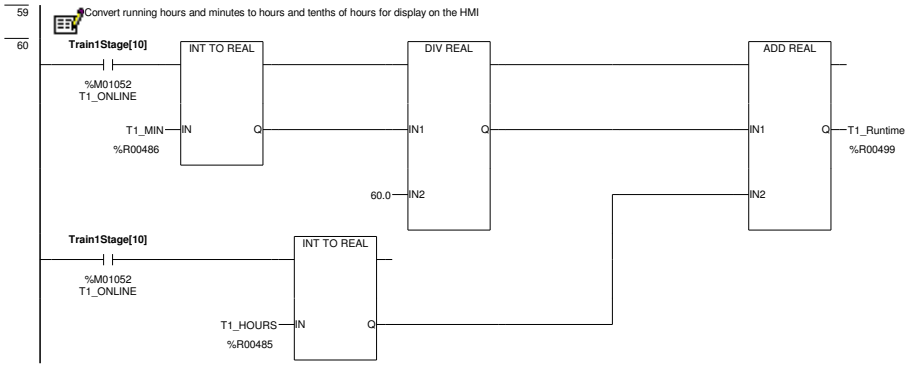


Train1Stage[09] %M01051 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00048;

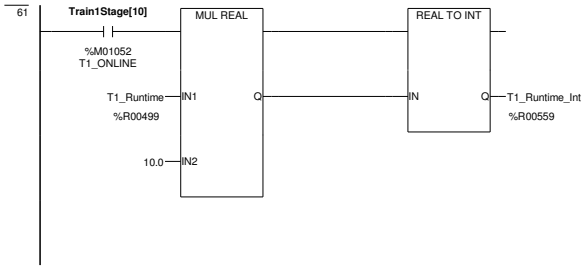
T1_Control[15] %M00961 (Controlling Rung Reference)
LD Block,'Train1_Sequence': COIL 00054;
Train1Stage[10] %M01052
LD Block,'Outputs_Common': NCCON 00040;
LD Block,'Train1_Shutdown': NOCON 00003;
LD Block,'Train1_Sequence': SETCOIL 00056; NCCON 00007, 00058, 00058, 00062; NOCON 00058, 00060, 00060, 00061, 00064, 00065, 00066, 00067;
LD Block,'AlarmsCommon': NOCON 00001, 00002, 00003, 00004, 00005, 00006, 00039, 00040, 00041, 00042, 00043, 00044, 00045, 00046, 00047, 00048, 00049;



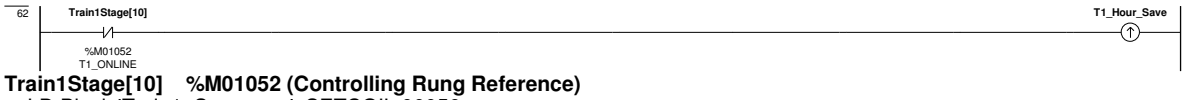
Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;



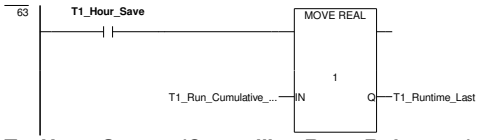
Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;



Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;



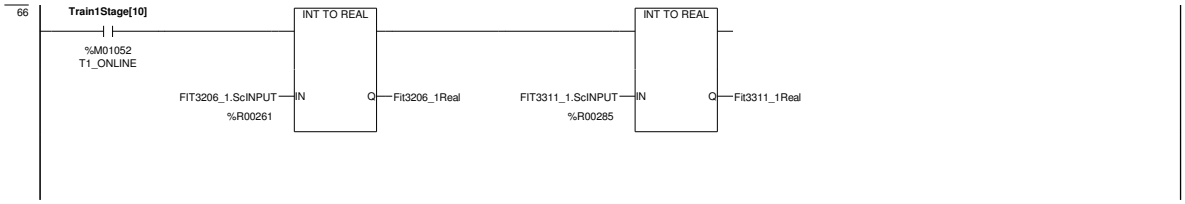
Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;
T1_Hour_Save
LD Block,'Train1_Sequence': POSCOIL 00062; NOCON 00063;



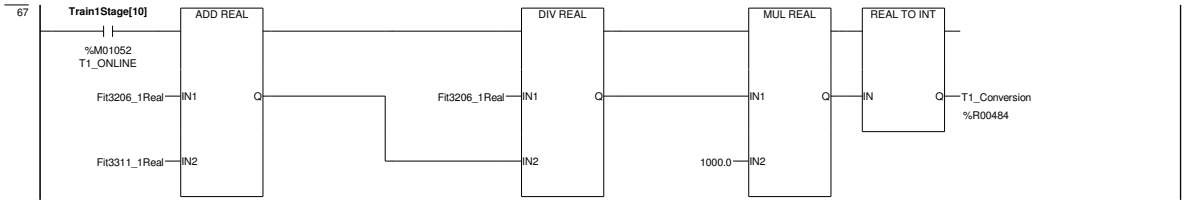
T1_Hour_Save (Controlling Rung Reference)
LD Block,'Train1_Sequence': POSCOIL 00062;

Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;

Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;



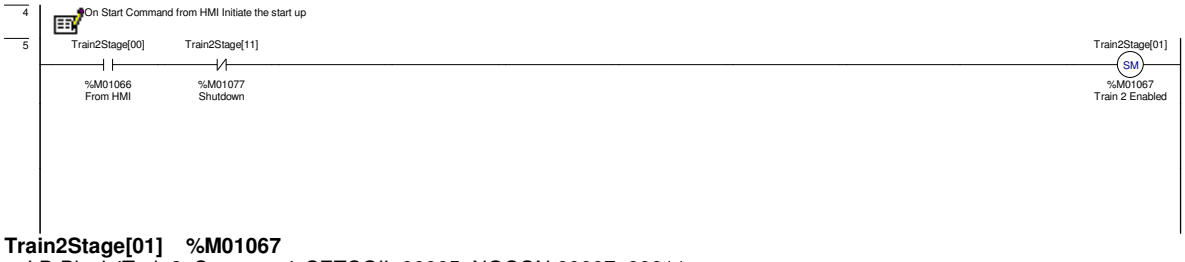
Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;



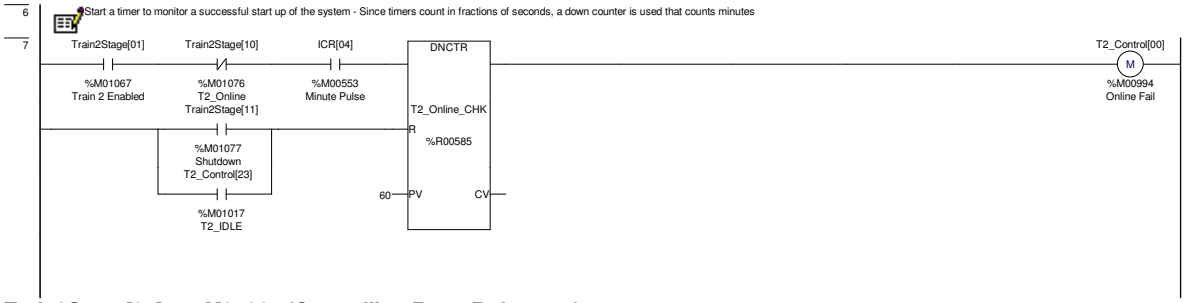
Train1Stage[10] %M01052 (Controlling Rung Reference)
LD Block,'Train1_Sequence': SETCOIL 00056;

T2_Control[23] %M01017
LD Block,'AlarmsTrain2': NCCON 00004, 00006, 00007, 00009, 00010, 00012, 00013, 00018, 00019, 00021, 00023, 00024, 00025, 00026, 00029, 00031, 00032;
LD Block,'Train2_Sequence': NOCON 00003, 00007, 00019; COIL 00002;
LD Block,'Outputs_T2': NOCON 00003, 00015, 00024, 00037;
LD Block,'Train1_Shutdown': NOCON 00022;
LD Block,'AlarmsCommon': NCCON 00016, 00053, 00054; NOCON 00014;
LD Block,'AlarmsTrain1': NCCON 00003; NOCON 00003;
LD Block,'Outputs_T1': NCCON 00003;

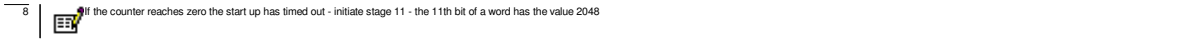
T2_Control[23] %M01017 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00002;
ICR2[33] %M02042
LD Block,'AlarmsTrain2': NOCON 00003, 00005, 00008, 00011, 00014, 00017, 00020, 00022, 00028;
LD Block,'Train2_Sequence': POSCOIL 00003;
LD Block,'AlarmsCommon': NOCON 00020;
LD Block,'Train2_Shutdown': NOCON 00007, 00016, 00024;

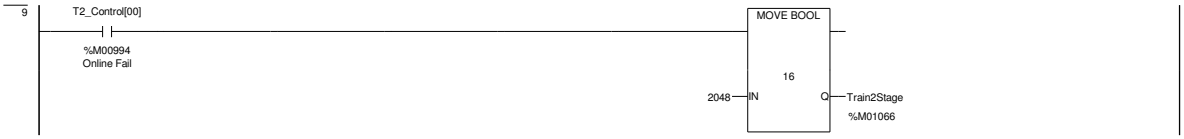


Train2Stage[01] %M01067
LD Block,'Train2_Sequence': SETCOIL 00005; NOCON 00007, 00011;
LD Block,'Outputs_T2': NOCON 00024, 00029;
LD Block,'Train1_Shutdown': NCCON 00022;

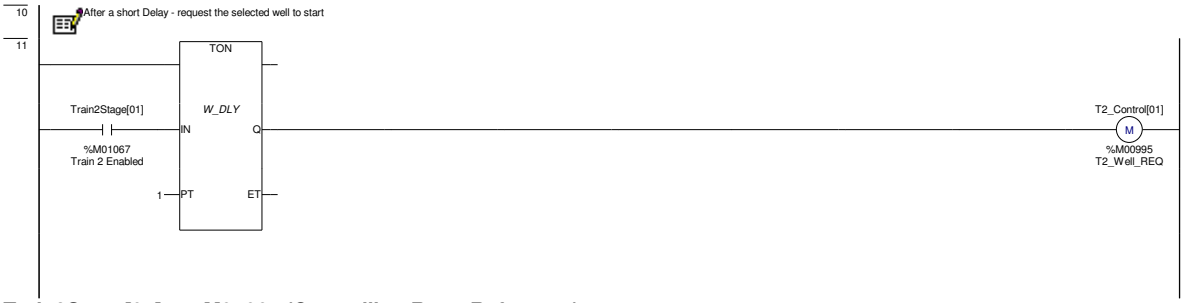


Train2Stage[01] %M01067 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00005;
T2_Control[00] %M00994
LD Block,'Train2_Sequence': NOCON 00009; COIL 00007;
T2_Control[23] %M01017 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00002;

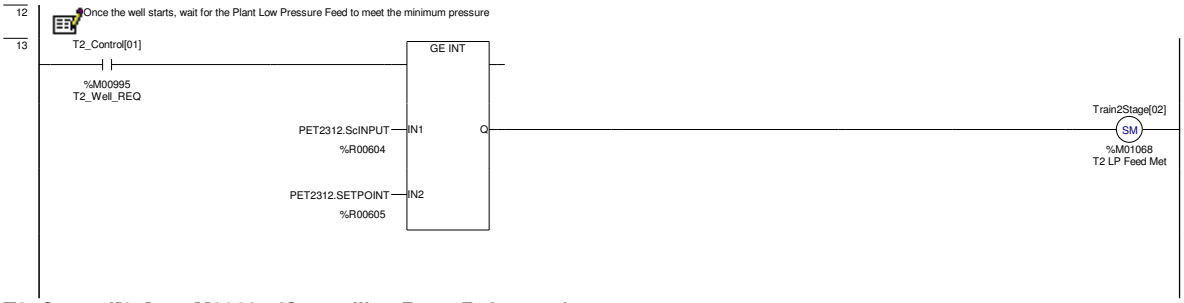




T2_Control[00] %M00994 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00007;

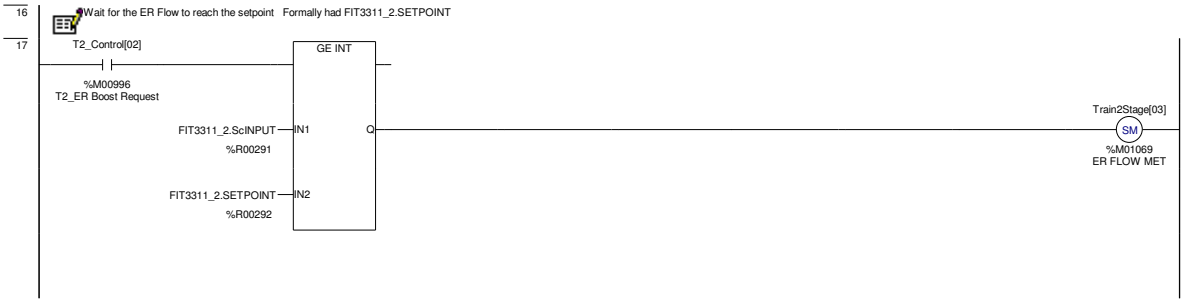


Train2Stage[01] %M01067 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00005;
T2_Control[01] %M00995
LD Block,'Train2_Sequence': NOCON 00013; COIL 00011;
LD Block,'AlarmsCommon': NOCON 00012;
LD Block,'Well_Control': NOCON 00009, 00010, 00011;

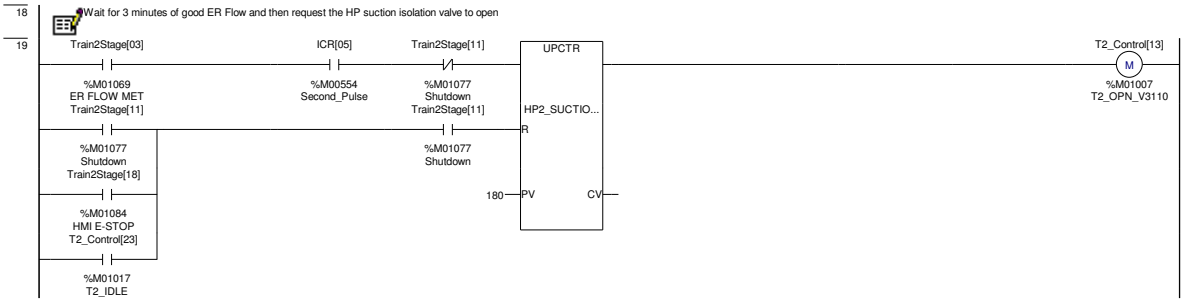


T2_Control[01] %M00995 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00011;
Train2Stage[02] %M01068
LD Block,'AlarmsTrain2': NOCON 00002, 00004;
LD Block,'Train2_Sequence': SETCOIL 00013; NOCON 00015;
LD Block,'AlarmsCommon': NOCON 00016;

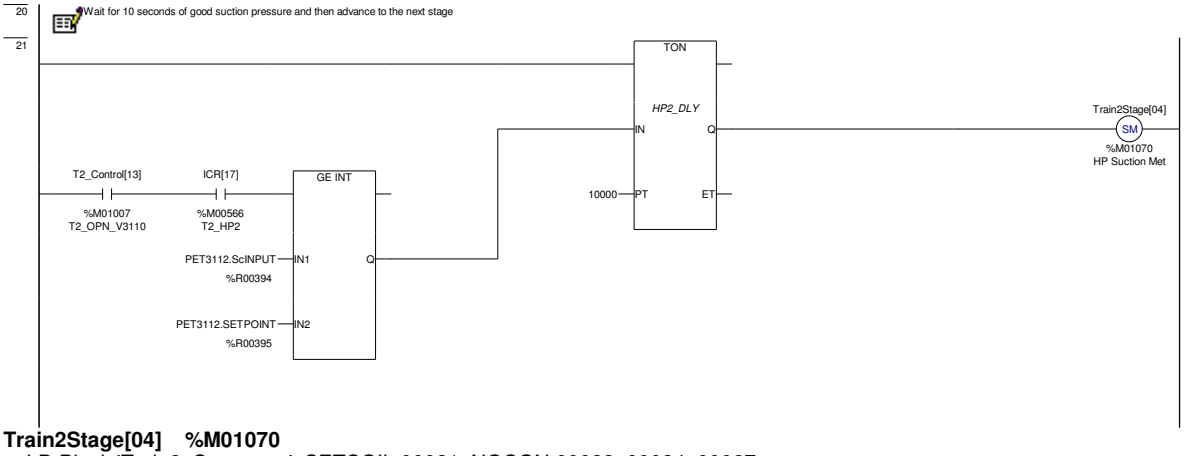
Train2Stage[02] %M01068 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00013;
T2_Control[02] %M00996
LD Block,'Train2_Sequence': NOCON 00017; COIL 00015;
LD Block,'Outputs_T2': NOCON 00005, 00006, 00007, 00010;



T2_Control[02] %M00996 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00015;
Train2Stage[03] %M01069
LD Block,'AlarmsTrain2': NOCON 00006, 00007, 00023, 00024;
LD Block,'Train2_Sequence': SETCOIL 00017; NOCON 00019;
LD Block,'AlarmsCommon': NCCON 00013;

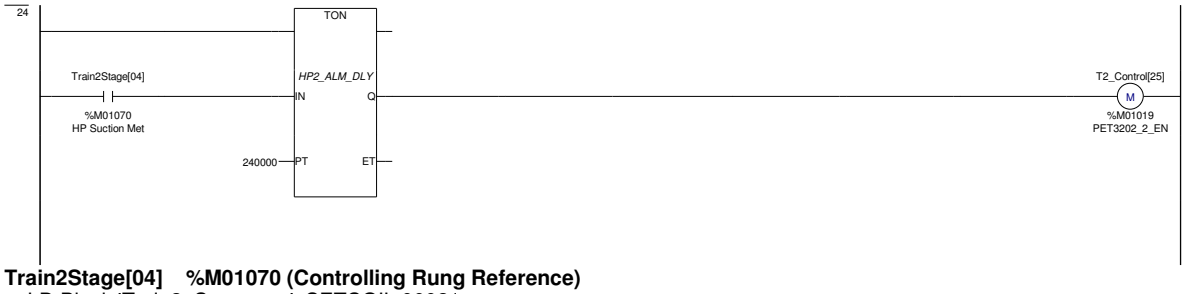


Train2Stage[03] %M01069 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00017;
T2_Control[13] %M01007
LD Block,'Train2_Sequence': NOCON 00021; COIL 00019;
LD Block,'Outputs_T2': NCCON 00016, 00016;
T2_Control[23] %M01017 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00002;

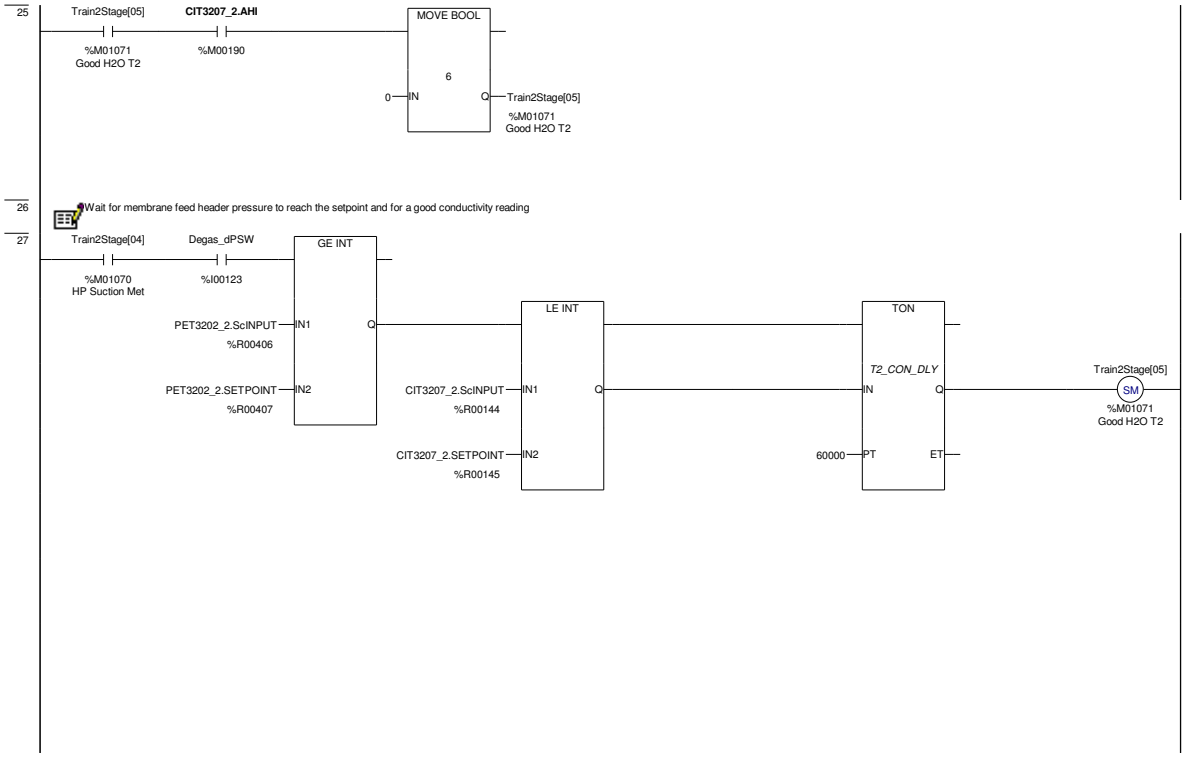


Train2Stage[04] %M01070
LD Block,'Train2_Sequence': SETCOIL 00021; NOCON 00023, 00024, 00027;
LD Block,'AlarmsCommon': NOCON 00021;
T2_Control[13] %M01007 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00019;

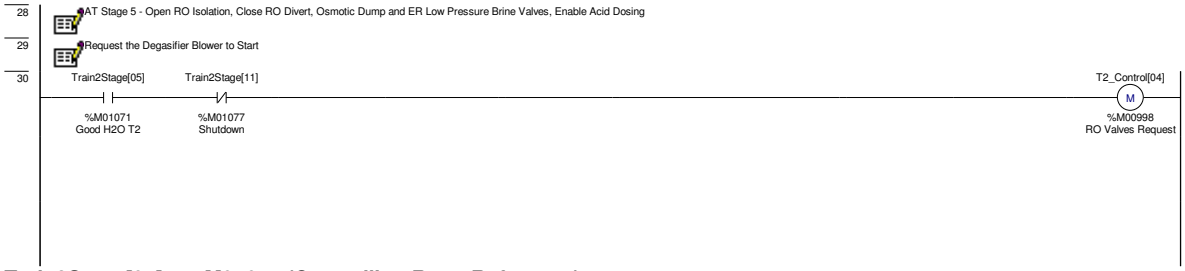
Train2Stage[04] %M01070 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00021;
T2_Control[03] %M00997
LD Block,'AlarmsTrain2': NOCON 00010;
LD Block,'Train2_Sequence': COIL 00023;
LD Block,'Outputs_Common': NOCON 00022, 00027, 00030, 00044;
LD Block,'HP_Select': NOCON 00006;



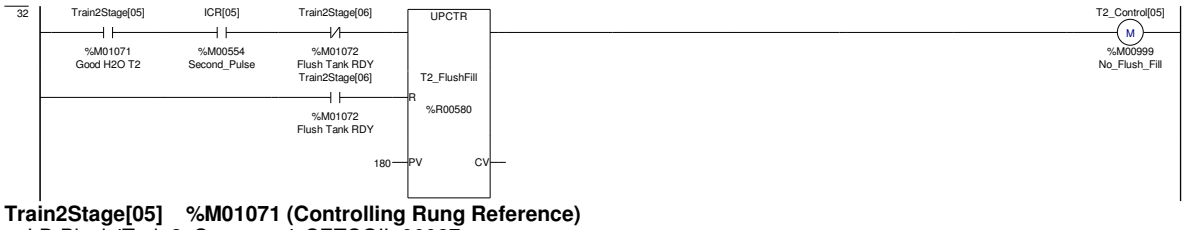
Train2Stage[04] %M01070 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00021;
T2_Control[25] %M01019
LD Block,'AlarmsTrain2': NOCON 00009, 00012, 00013, 00029;
LD Block,'Train2_Sequence': COIL 00024;



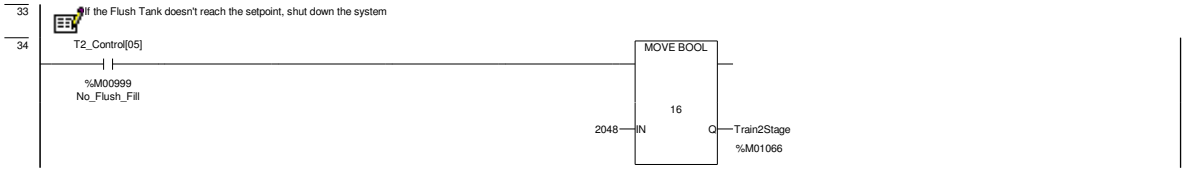
Train2Stage[04] %M01070 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00021;
Train2Stage[05] %M01071
LD Block,'AlarmsTrain2': NOCON 00015, 00018, 00019, 00021;
LD Block,'Train2_Sequence': SETCOIL 00027; MOVE_BOOL 00025; NOCON 00025, 00030, 00032, 00036;
LD Block,'Outputs_T2': NCCON 00024;



Train2Stage[05] %M01071 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00027;
T2_Control[04] %M00998
LD Block,'Train2_Sequence': COIL 00030;
LD Block,'Outputs_Common': NOCON 00026;

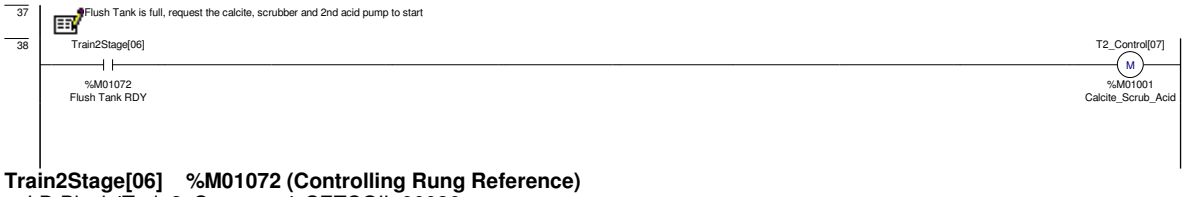


Train2Stage[05] %M01071 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00027;
T2_Control[05] %M00999
LD Block,'Train2_Sequence': NOCON 00034; COIL 00032;

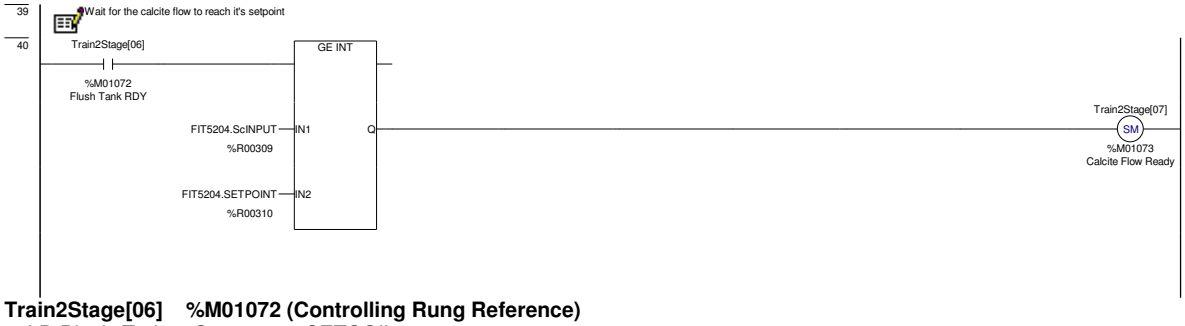


T2_Control[05] %M00999 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00032;

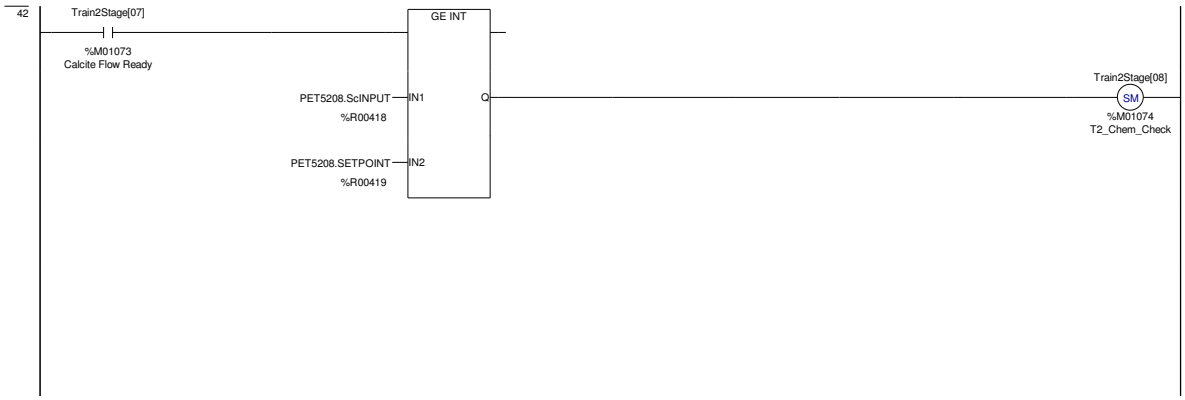
Train2Stage[05] %M01071 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00027;
Train2Stage[06] %M01072
LD Block,'Train2_Sequence': SETCOIL 00036; NCCON 00032; NOCON 00032, 00038, 00040;



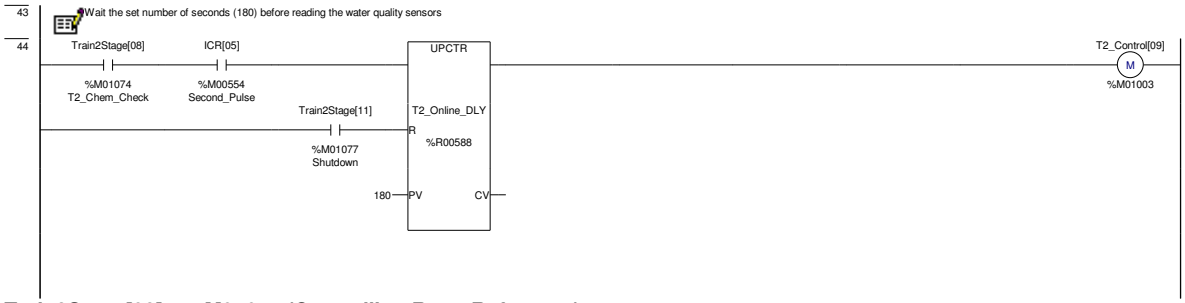
Train2Stage[06] %M01072 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00036;
T2_Control[07] %M01001
LD Block,'Train2_Sequence': COIL 00038;
LD Block,'Outputs_Common': NOCON 00051, 00052;



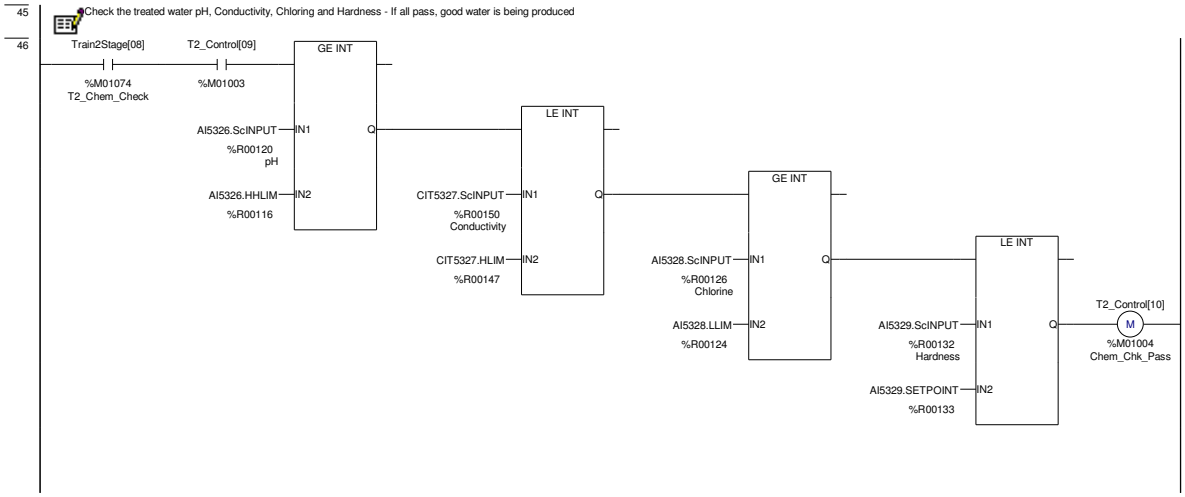
Train2Stage[06] %M01072 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00036;
Train2Stage[07] %M01073
LD Block,'Train2_Sequence': SETCOIL 00040; NOCON 00042;



Train2Stage[07] %M01073 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00040;
Train2Stage[08] %M01074
LD Block,'Train2_Sequence': SETCOIL 00042; NOCON 00044, 00046, 00048;



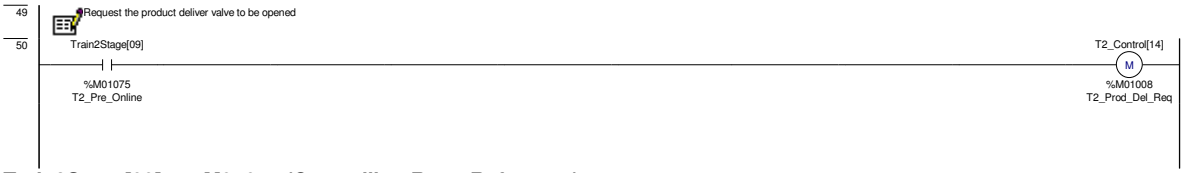
Train2Stage[08] %M01074 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00042;
T2_Control[09] %M01003
LD Block,'Train2_Sequence': NOCON 00046; COIL 00044;



Train2Stage[08] %M01074 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00042;
T2_Control[09] %M01003 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00044;
T2_Control[10] %M01004
LD Block,'Train2_Sequence': NOCON 00048; COIL 00046;

Train2Stage[08] %M01074 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00042;
T2_Control[10] %M01004 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00046;
Train2Stage[09] %M01075

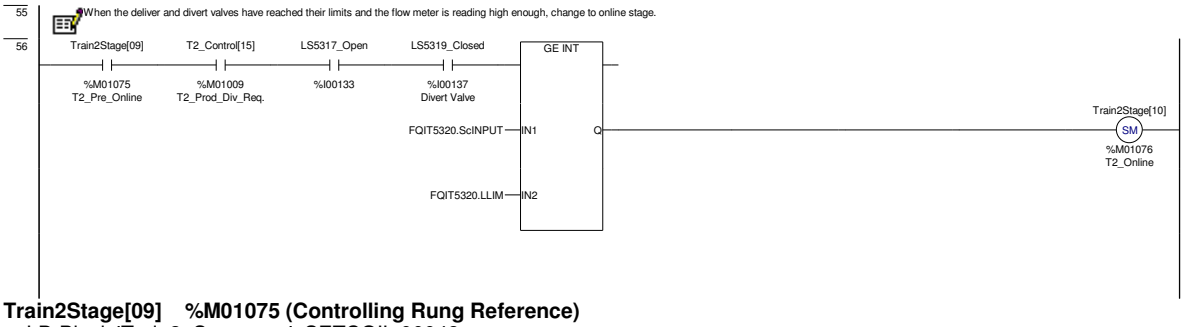
LD Block,'AlarmsTrain2': NOCON 00025, 00026;
LD Block,'Train2_Sequence': SETCOIL 00048; NOCON 00050, 00052, 00054, 00056;



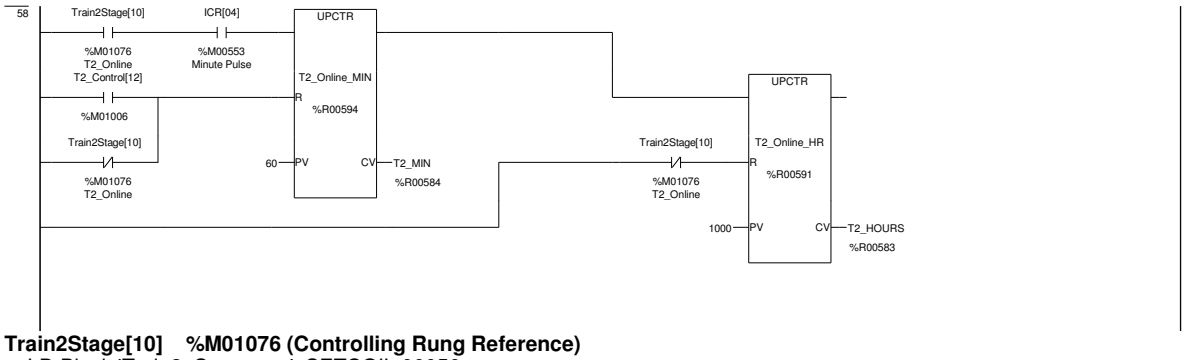
Train2Stage[09] %M01075 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00048;
T2_Control[14] %M01008
LD Block,'Train2_Sequence': NOCON 00054; COIL 00050;
LD Block,'Outputs_Common': NOCON 00031;

Train2Stage[09] %M01075 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00048;
T2_Control[08] %M01002
LD Block,'Train2_Sequence': COIL 00052;
LD Block,'Outputs_Common': NOCON 00034, 00034, 00034, 00035, 00035, 00035, 00053, 00054;

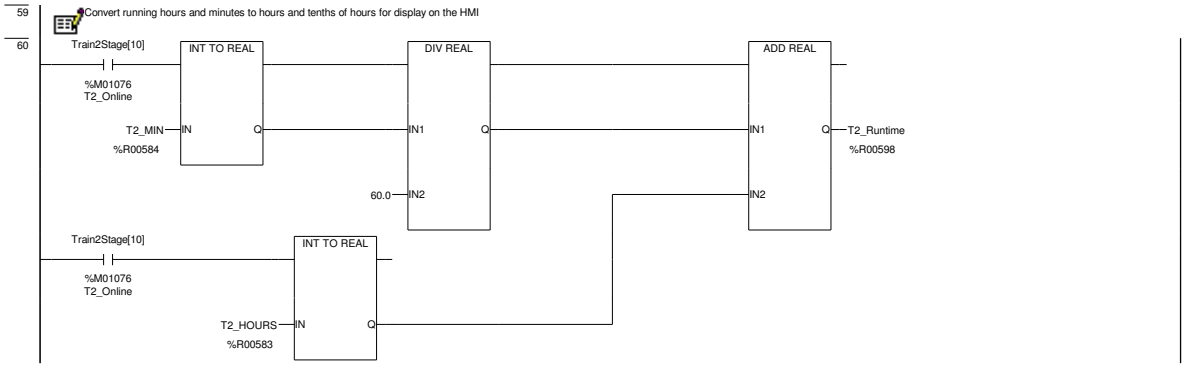
Train2Stage[09] %M01075 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00048;
T2_Control[14] %M01008 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00050;
T2_Control[15] %M01009
LD Block,'Train2_Sequence': NOCON 00056; COIL 00054;
LD Block,'Outputs_Common': NOCON 00032;



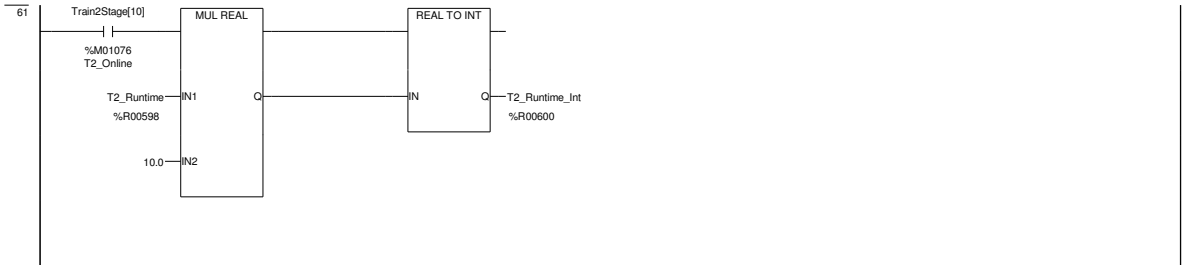
Train2Stage[09] %M01075 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00048;
T2_Control[15] %M01009 (Controlling Rung Reference)
LD Block,'Train2_Sequence': COIL 00054;
Train2Stage[10] %M01076
LD Block,'AlarmsTrain2': NOCON 00001;
LD Block,'Train2_Sequence': SETCOIL 00056; NCCON 00007, 00058, 00058, 00062; NOCON 00058, 00060, 00060, 00061, 00064, 00065, 00066, 00067;
LD Block,'Outputs_Common': NCCON 00044;
LD Block,'AlarmsCommon': NOCON 00001, 00002, 00003, 00004, 00005, 00006;
LD Block,'Train2_Shutdown': NOCON 00003;



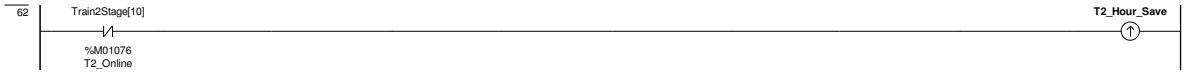
Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;



Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;

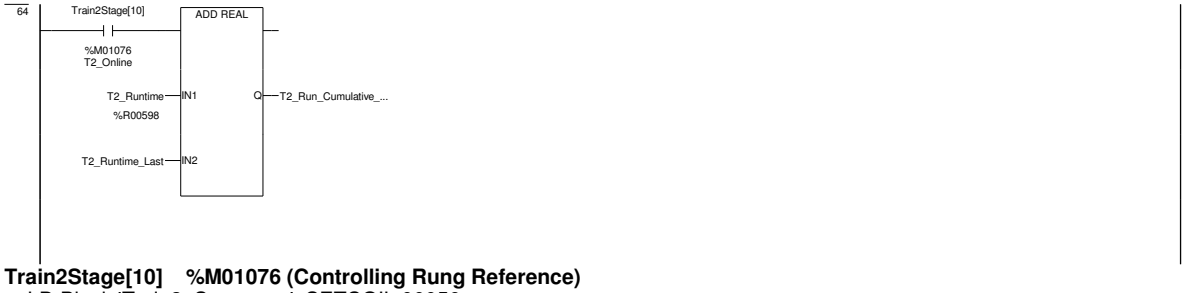


Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;

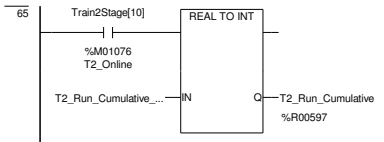


Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;
T2_Hour_Save
LD Block,'Train2_Sequence': POSCOIL 00062; NOCON 00063;

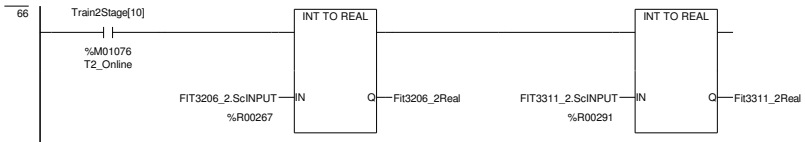
T2_Hour_Save (Controlling Rung Reference)
LD Block,'Train2_Sequence': POSCOIL 00062;



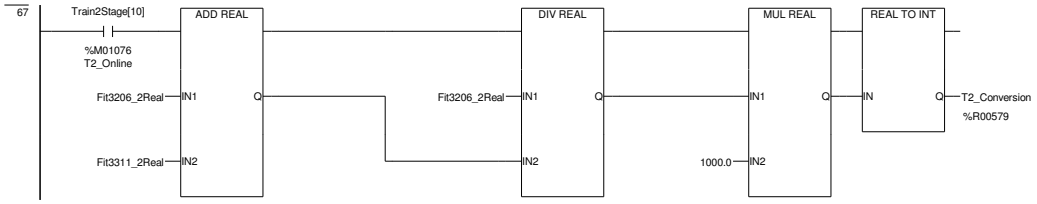
Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;



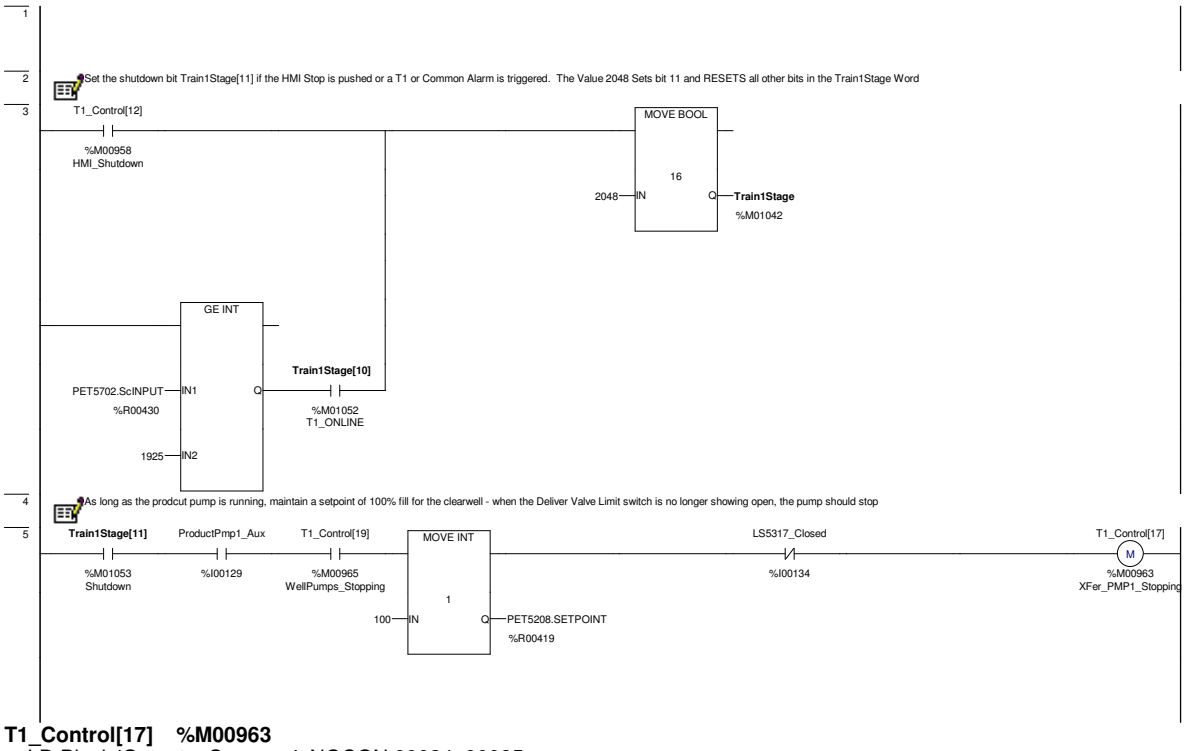
Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;



Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;

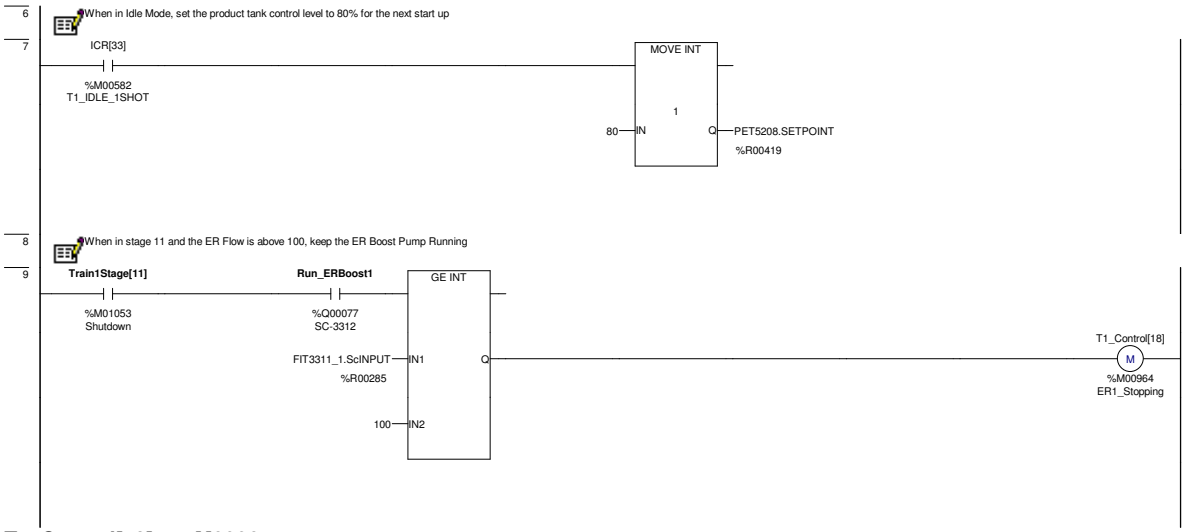


Train2Stage[10] %M01076 (Controlling Rung Reference)
LD Block,'Train2_Sequence': SETCOIL 00056;



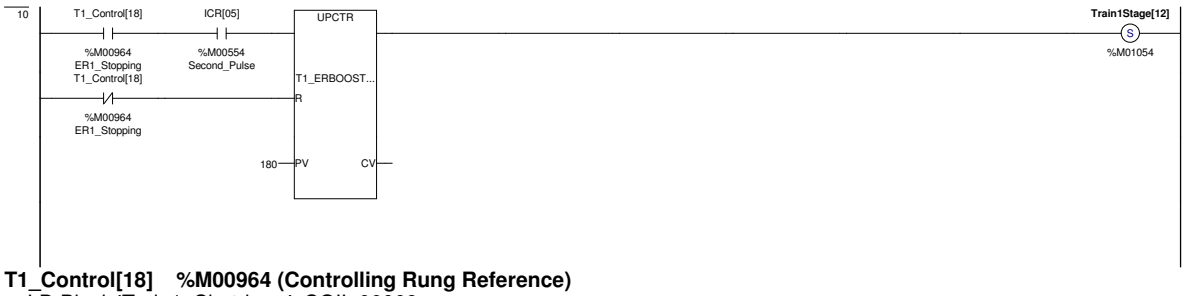
T1_Control[17] %M00963

LD Block,'Outputs_Common': NOCON 00034, 00035;
LD Block,'Train1_Shutdown': NCCON 00028; COIL 00005;



T1_Control[18] %M00964

LD Block,'Train1_Shutdown': NCCON 00010, 00028; NOCON 00010; COIL 00009;
LD Block,'Outputs_T1': NOCON 00010;



T1_Control[18] %M00964 (Controlling Rung Reference)

LD Block,'Train1_Shutdown': COIL 00009;

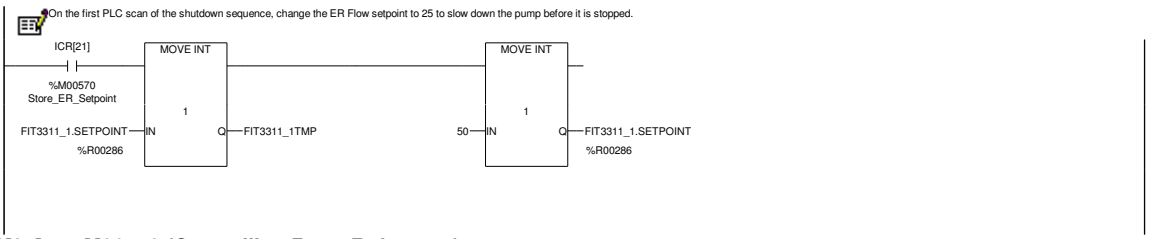
Train1Stage[12] %M01054

LD Block,'Train1_Shutdown': SETCOIL 00010; NOCON 00012, 00028;
LD Block,'AlarmsCommon': NCCON 00001, 00002, 00003, 00004, 00005, 00006, 00022, 00023, 00024, 00025, 00026, 00027, 00028, 00029, 00030, 00031, 00032, 00033, 00034, 00035, 00036, 00037, 00038, 00039, 00040, 00041, 00042, 00043, 00044, 00045, 00046, 00047, 00048, 00049;

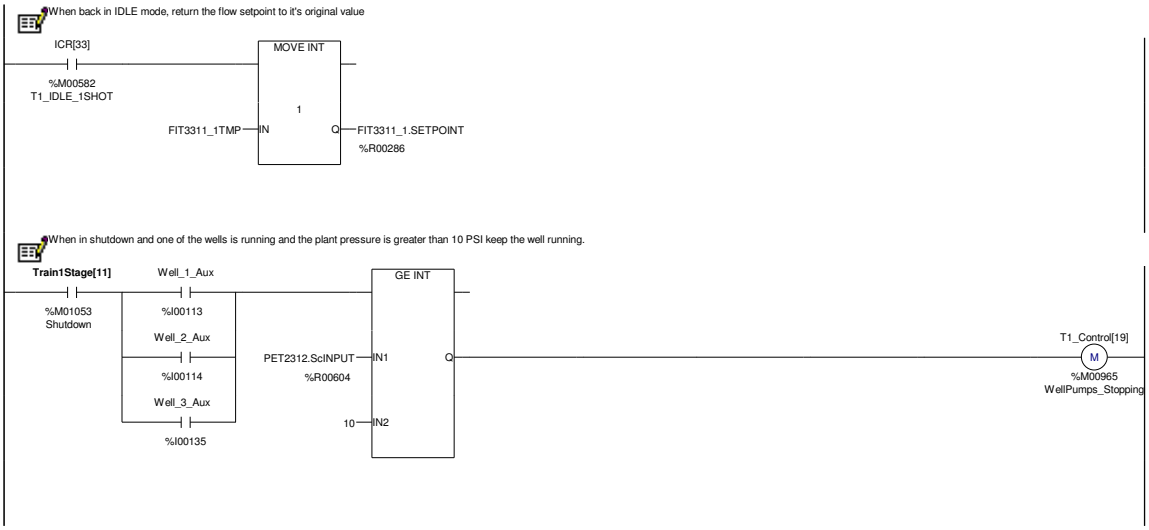
LD Block,'AlarmsTrain1': NCCON 00006, 00007, 00009, 00010, 00012, 00013, 00018, 00020, 00022, 00023, 00024, 00025, 00027, 00029;
LD Block,'Outputs_T1': NCCON 00032;

Train1Stage[12] %M01054 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': SETCOIL 00010;

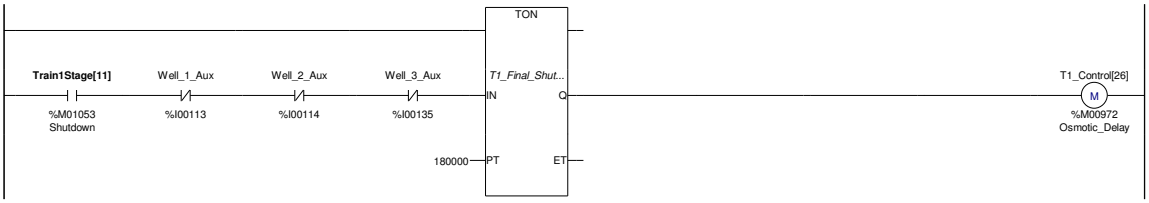
ICR[21] %M00570
LD Block,'Train1_Shutdown': POSCOIL 00012; NOCON 00014;



ICR[21] %M00570 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': POSCOIL 00012;

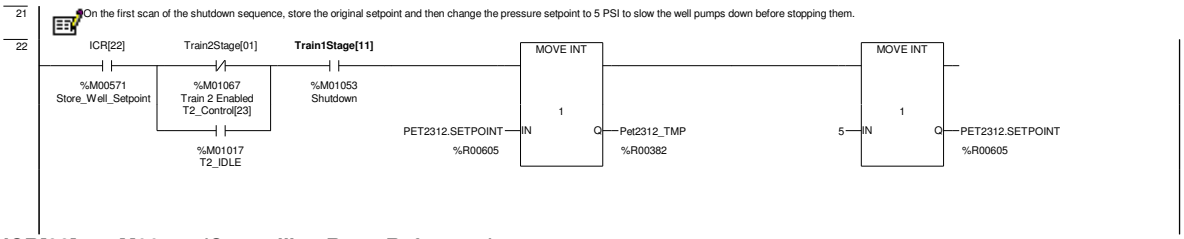


T1_Control[19] %M00965
LD Block,'Outputs_Common': NOCON 00007, 00013, 00017;
LD Block,'Train1_Shutdown': NCCON 00028; NOCON 00005; COIL 00018;
LD Block,'Well_Control': NOCON 00013;

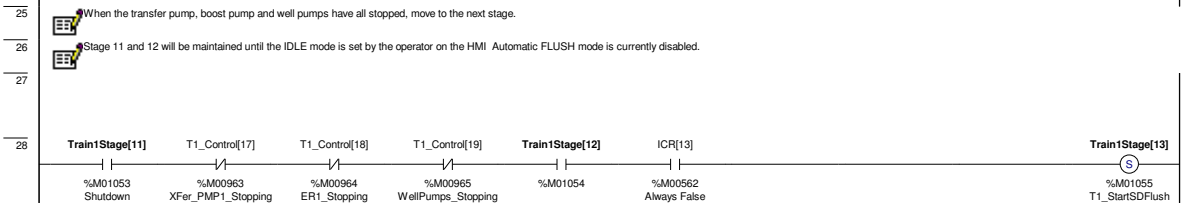


T1_Control[26] %M00972
LD Block,'Train1_Shutdown': COIL 00019;
LD Block,'Outputs_T1': NOCON 00032, 00036;

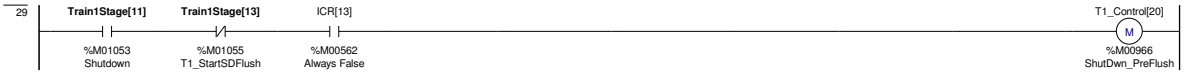
ICR[22] %M00571
LD Block,'Train1_Shutdown': POSCOIL 00020; NOCON 00022;



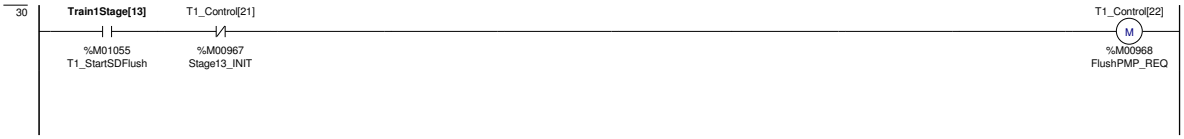
ICR[22] %M00571 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': POSCOIL 00020;



T1_Control[17] %M00963 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': COIL 00005;
T1_Control[18] %M00964 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': COIL 00009;
T1_Control[19] %M00965 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': COIL 00018;
Train1Stage[12] %M01054 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': SETCOIL 00010;
Train1Stage[13] %M01055
LD Block,'Train1_Shutdown': SETCOIL 00028; NCCON 00029; NOCON 00030;
LD Block,'Outputs_T1': NOCON 00003, 00040, 00042, 00044, 00045;



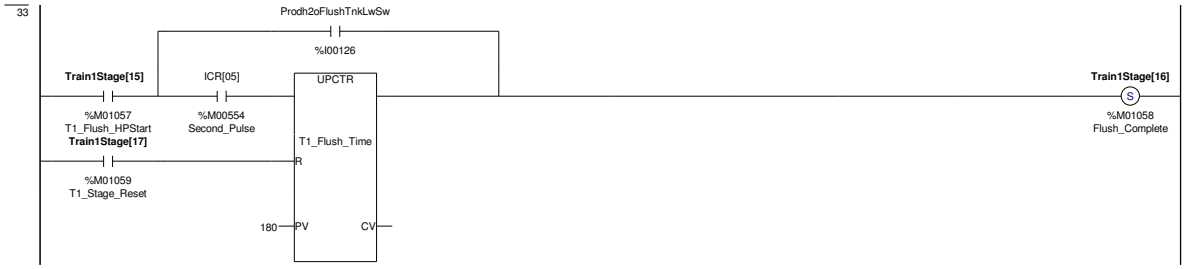
Train1Stage[13] %M01055 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': SETCOIL 00028;
T1_Control[20] %M00966
LD Block,'Train1_Shutdown': COIL 00029;
LD Block,'Outputs_T1': NOCON 00040;



Train1Stage[13] %M01055 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': SETCOIL 00028;
T1_Control[22] %M00968
LD Block,'Outputs_Common': NOCON 00057;
LD Block,'Train1_Shutdown': NOCON 00031; COIL 00030;

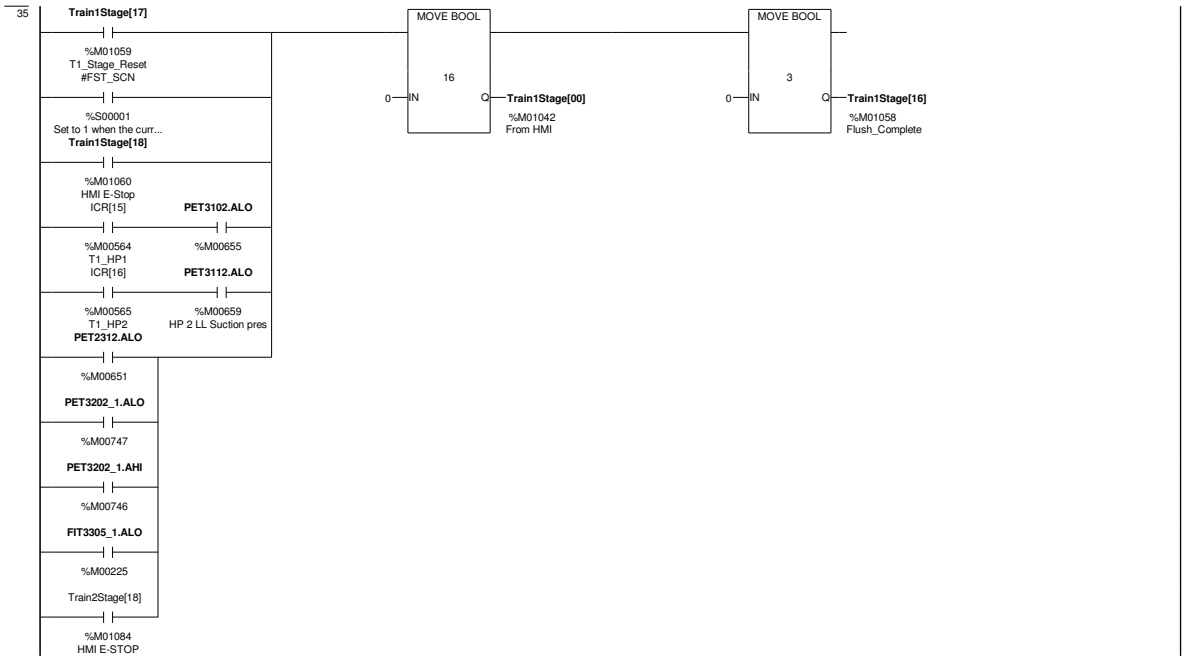
T1_Control[22] %M00968 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': COIL 00030;
Train1Stage[14] %M01056
LD Block,'Train1_Shutdown': SETCOIL 00031; NOCON 00032;
LD Block,'Outputs_T1': NOCON 00005, 00006, 00007, 00010;

Train1Stage[14] %M01056 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': SETCOIL 00031;
Train1Stage[15] %M01057
LD Block,'Train1_Shutdown': SETCOIL 00032; NOCON 00033;
LD Block,'HP_Select': NOCON 00005, 00006;



Train1Stage[15] %M01057 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': SETCOIL 00032;
Train1Stage[16] %M01058
LD Block,'Train1_Shutdown': SETCOIL 00033; MOVE_BOOL 00035; NOCON 00034;
LD Block,'AlarmsCommon': MOVE_BOOL 00010;

Train1Stage[16] %M01058 (Controlling Rung Reference)
LD Block,'Train1_Shutdown': SETCOIL 00033;
Train1Stage[17] %M01059
LD Block,'Train1_Shutdown': SETCOIL 00034; NOCON 00031, 00032, 00033, 00035;
LD Block,'AlarmsTrain1': NCCON 00029;

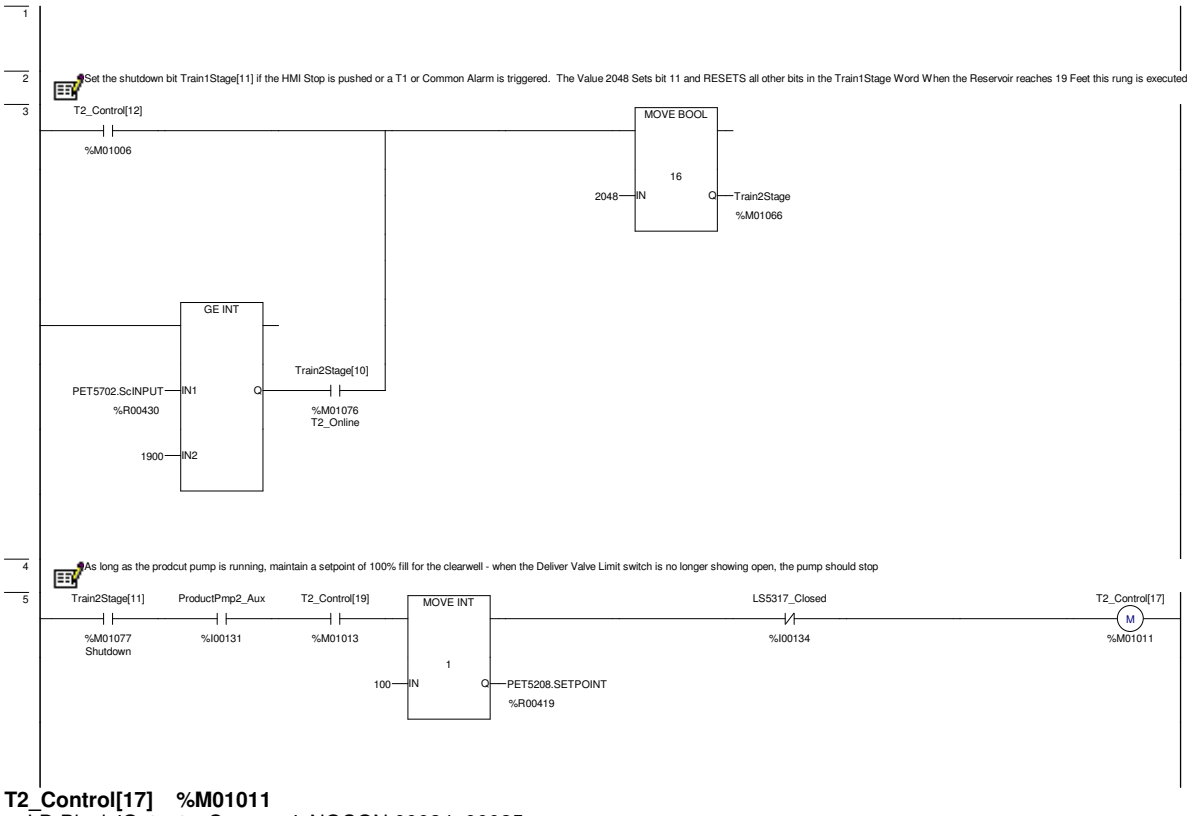


Train1Stage[17] %M01059 (Controlling Rung Reference)

LD Block,'Train1_Shutdown': SETCOIL 00034;

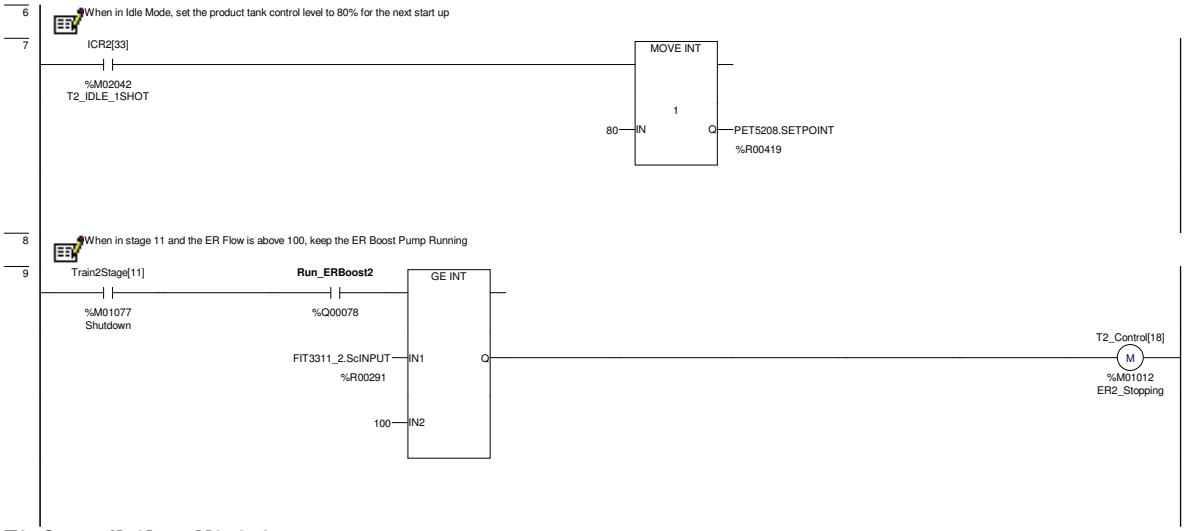
Train1Stage[18] %M01060

LD Block,'Train1_Shutdown': RESETCOIL 00036; NOCON 00035, 00036;
LD Block,'Train1_Sequence': NCCON 00023; NOCON 00019;
LD Block,'AlarmsTrain1': NCCON 00029;
LD Block,'HP_Select': NCCON 00005, 00006;
LD Block,'Outputs_T1': NCCON 00032;
LD Block,'Train2_Shutdown': NOCON 00035;



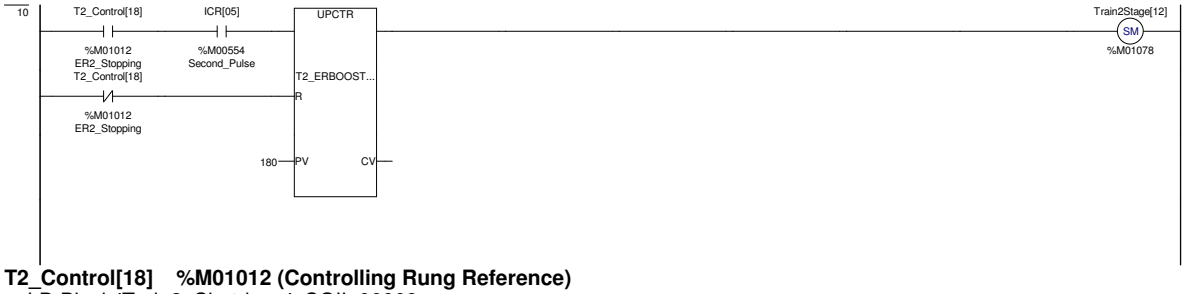
T2_Control[17] %M01011

LD Block,'Outputs_Common': NOCON 00034, 00035;
LD Block,'Train2_Shutdown': NCCON 00028; COIL 00005;



T2_Control[18] %M01012

LD Block,'Outputs_T2': NOCON 00010;
LD Block,'Train2_Shutdown': NCCON 00010, 00028; NOCON 00010; COIL 00009;



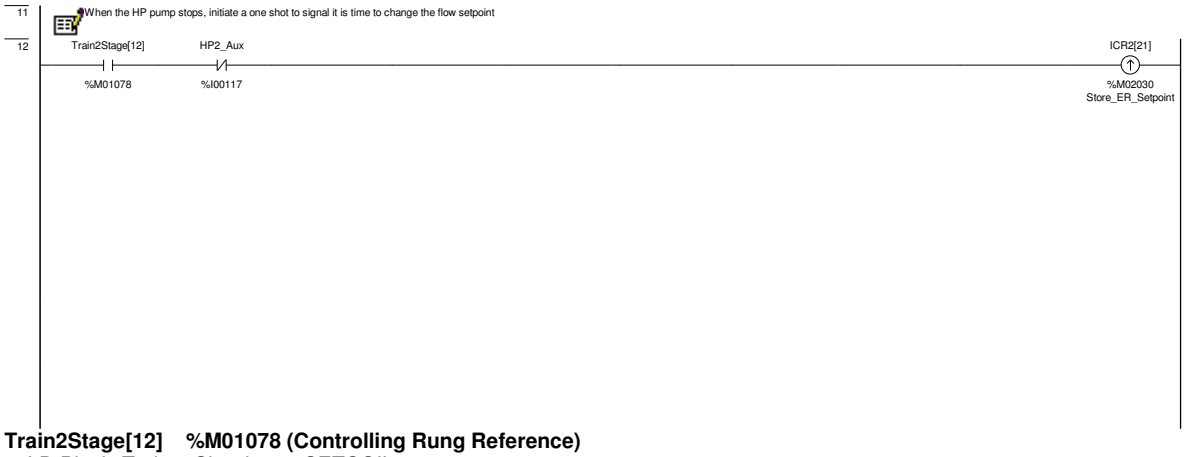
T2_Control[18] %M01012 (Controlling Rung Reference)

LD Block,'Train2_Shutdown': COIL 00009;

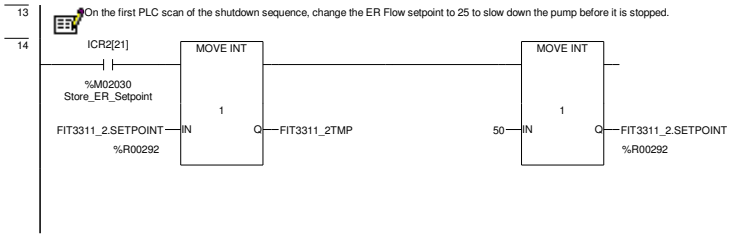
Train2Stage[12] %M01078

LD Block,'Outputs_T2': NCCON 00033;

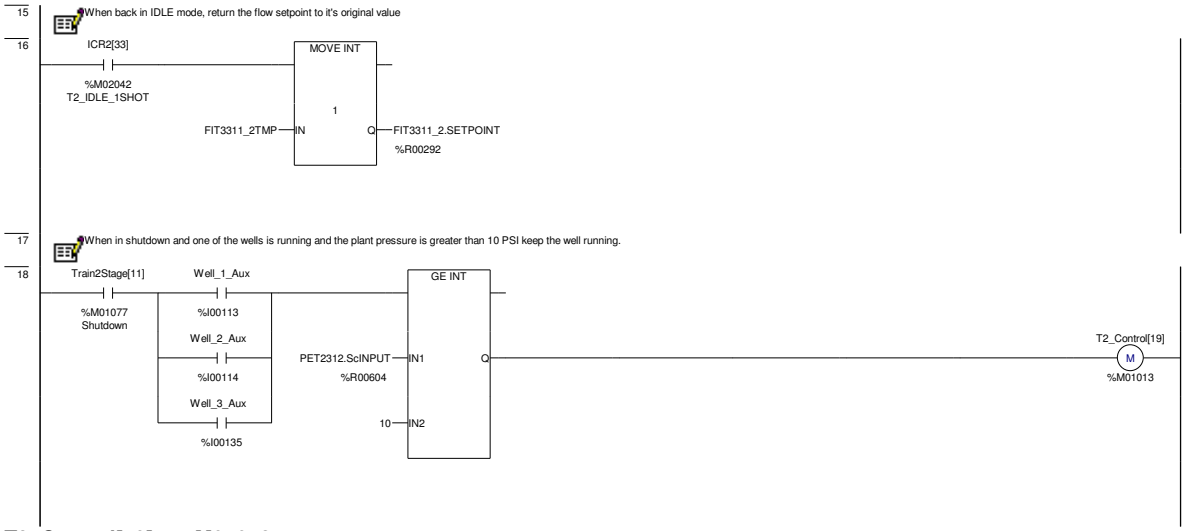
LD Block,'AlarmsCommon': NCCON 00001, 00002, 00003, 00004, 00005, 00006, 00022, 00023, 00024, 00025, 00026, 00027, 00028, 00029, 00030, 00031, 00032, 00033, 00034, 00035, 00036, 00037, 00038, 00039, 00040, 00041, 00042, 00043, 00044, 00045, 00046, 00047, 00048, 00049;
LD Block,'Train2_Shutdown': SETCOIL 00010; NOCON 00012, 00028;



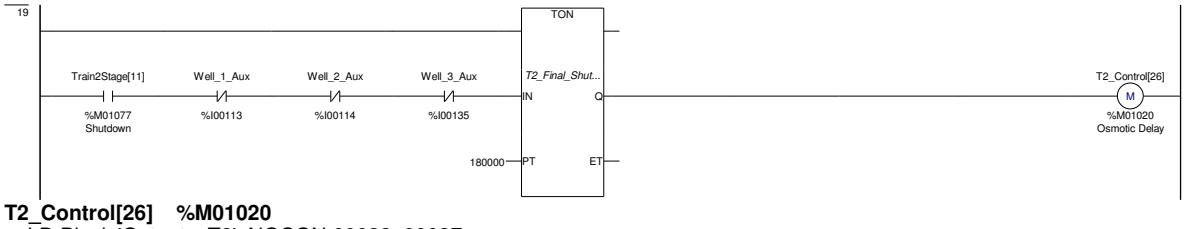
Train2Stage[12] %M01078 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': SETCOIL 00010;
ICR2[21] %M02030
LD Block,'Train2_Shutdown': POSCOIL 00012; NOCON 00014;



ICR2[21] %M02030 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': POSCOIL 00012;



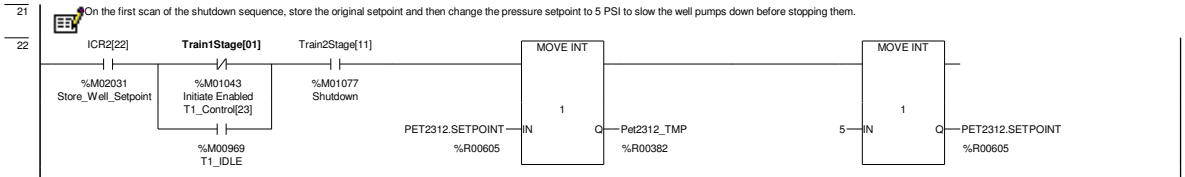
T2_Control[19] %M01013
LD Block,'Outputs_Common': NOCON 00007, 00013, 00017;
LD Block,'Train2_Shutdown': NCCON 00028; NOCON 00005; COIL 00018;
LD Block,'Well_Control': NOCON 00013;



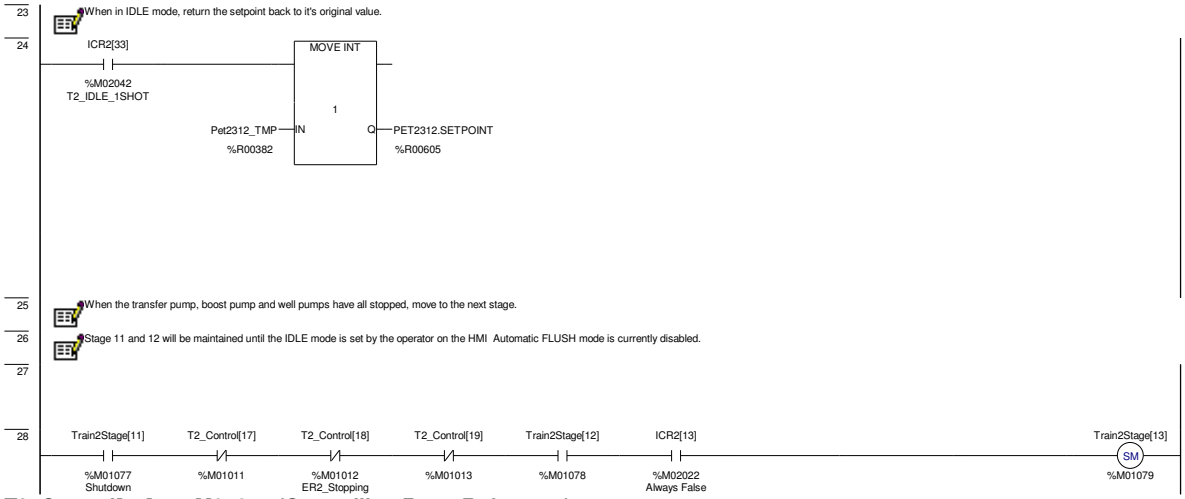
T2_Control[26] %M01020
LD Block,'Outputs_T2': NOCON 00033, 00037;

LD Block,'Train2_Shutdown': COIL 00019;

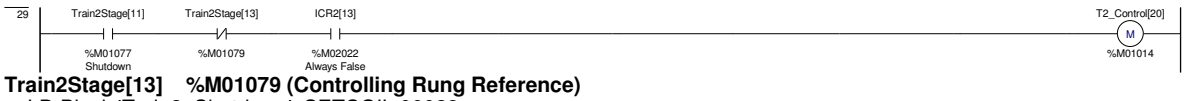
ICR2[22] %M02031
LD Block,'Train2_Shutdown': POSCOIL 00020; NOCON 00022;



ICR2[22] %M02031 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': POSCOIL 00020;



T2_Control[17] %M01011 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': COIL 00005;
T2_Control[18] %M01012 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': COIL 00009;
T2_Control[19] %M01013 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': COIL 00018;
Train2Stage[12] %M01078 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': SETCOIL 00010;
Train2Stage[13] %M01079
LD Block,'Outputs_T2': NOCON 00003, 00041, 00043, 00045, 00046;
LD Block,'Train2_Shutdown': SETCOIL 00028; NCCON 00029; NOCON 00030;

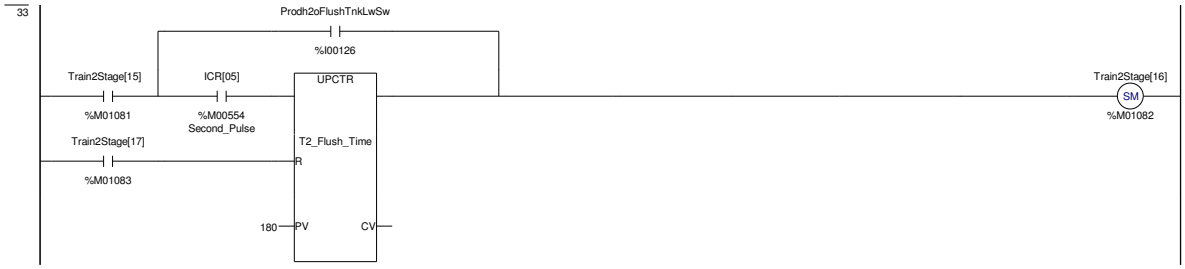


Train2Stage[13] %M01079 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': SETCOIL 00028;
T2_Control[20] %M01014
LD Block,'Outputs_T2': NOCON 00041;
LD Block,'Train2_Shutdown': COIL 00029;

Train2Stage[13] %M01079 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': SETCOIL 00028;
T2_Control[22] %M01016
LD Block,'Train2_Shutdown': NOCON 00031; COIL 00030;

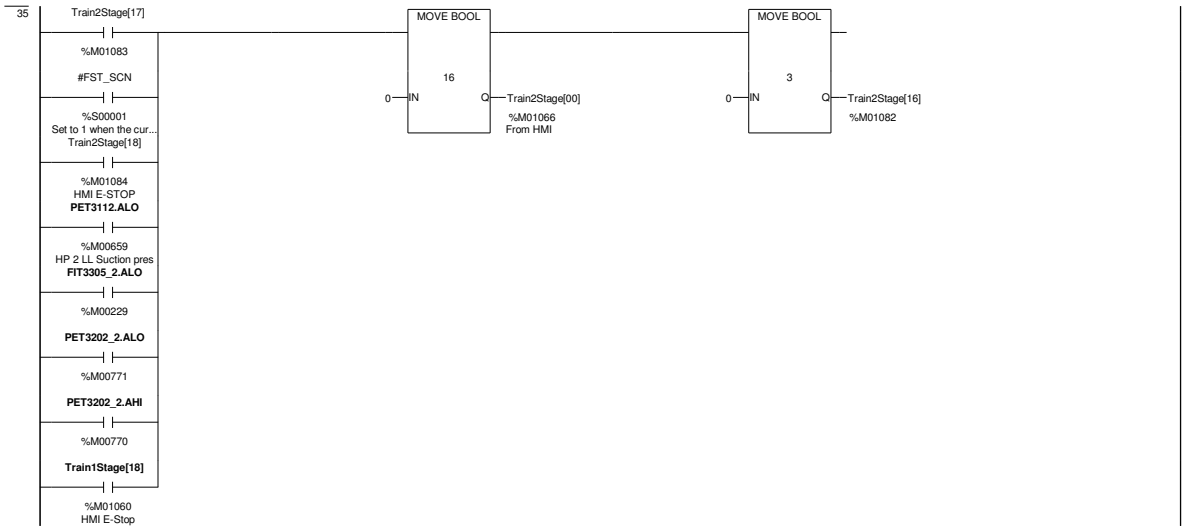
T2_Control[22] %M01016 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': COIL 00030;
Train2Stage[14] %M01080
LD Block,'Outputs_T2': NOCON 00005, 00006, 00007, 00010;
LD Block,'Train2_Shutdown': SETCOIL 00031; NOCON 00032;

Train2Stage[14] %M01080 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': SETCOIL 00031;
Train2Stage[15] %M01081
LD Block,'HP_Select': NOCON 00006;
LD Block,'Train2_Shutdown': SETCOIL 00032; NOCON 00033;



Train2Stage[15] %M01081 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': SETCOIL 00032;
Train2Stage[16] %M01082
LD Block,'AlarmsCommon': MOVE_BOOL 00011;
LD Block,'Train2_Shutdown': SETCOIL 00033; MOVE_BOOL 00035; NOCON 00034;

Train2Stage[16] %M01082 (Controlling Rung Reference)
LD Block,'Train2_Shutdown': SETCOIL 00033;
Train2Stage[17] %M01083
LD Block,'AlarmsTrain2': NCCON 00031;
LD Block,'Train2_Shutdown': SETCOIL 00034; NOCON 00031, 00032, 00033, 00035;

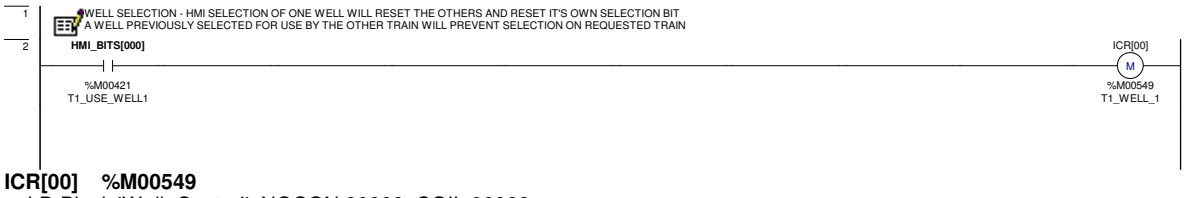


Train2Stage[17] %M01083 (Controlling Rung Reference)

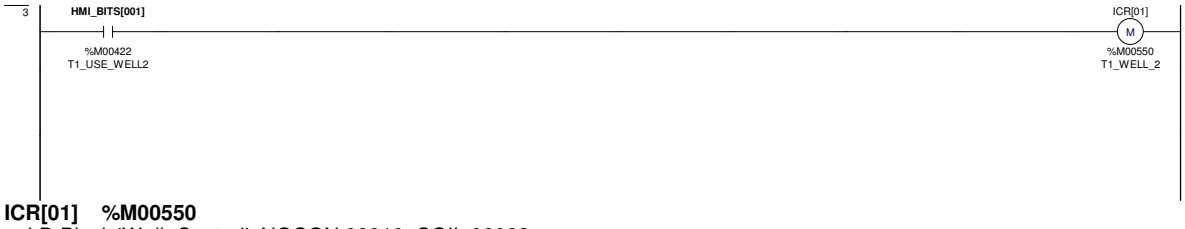
LD Block,'Train2_Shutdown': SETCOIL 00034;

Train2Stage[18] %M01084

LD Block,'AlarmsTrain2': NCCON 00031;
LD Block,'Train2_Sequence': NCCON 00023; NOCON 00019;
LD Block,'Outputs_T2': NCCON 00033;
LD Block,'Train1_Shutdown': NOCON 00035;
LD Block,'Train2_Shutdown': RESETCOIL 00036; NOCON 00035, 00036;

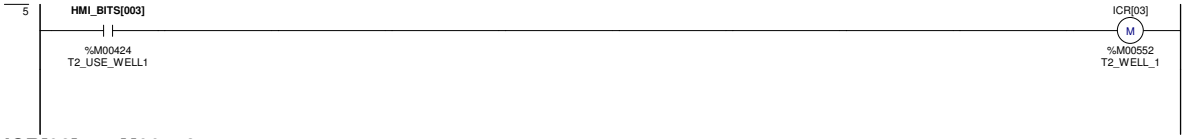


ICR[00] %M00549
LD Block,'Well_Control': NOCON 00009; COIL 00002;

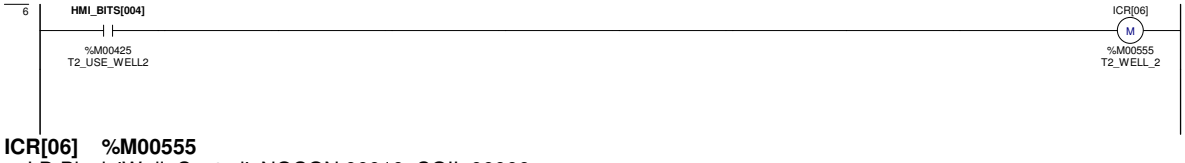


ICR[01] %M00550
LD Block,'Well_Control': NOCON 00010; COIL 00003;

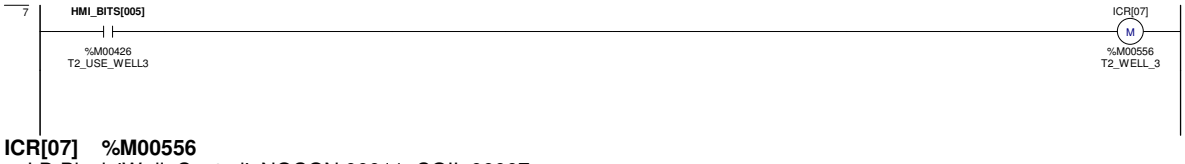
ICR[02] %M00551
LD Block,'Well_Control': NOCON 00011; COIL 00004;



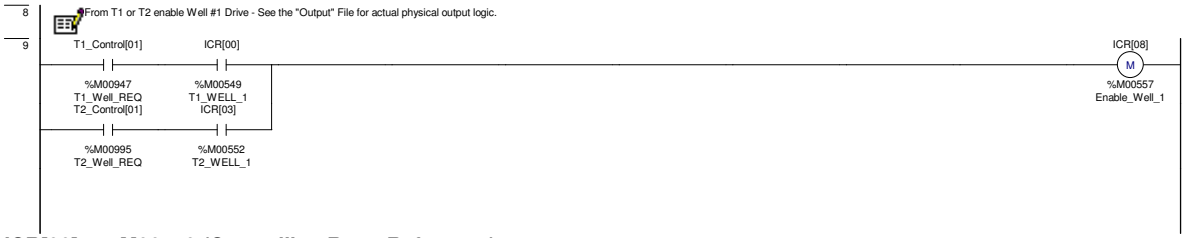
ICR[03] %M00552
LD Block,'Well_Control': NOCON 00009; COIL 00005;



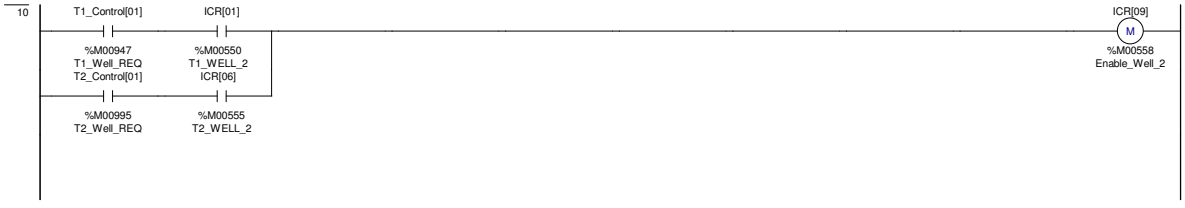
ICR[06] %M00555
LD Block,'Well_Control': NOCON 00010; COIL 00006;



ICR[07] %M00556
LD Block,'Well_Control': NOCON 00011; COIL 00007;



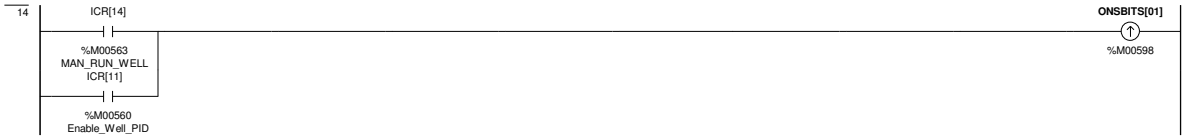
ICR[00] %M00549 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00002;
ICR[08] %M00557
LD Block,'Outputs_Common': NOCON 00007;
LD Block,'Well_Control': NOCON 00013; COIL 00009;
ICR[03] %M00552 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00005;



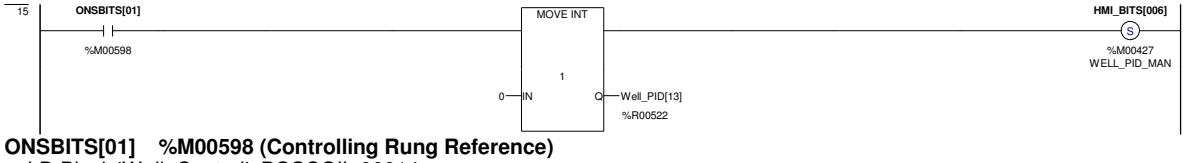
ICR[01] %M00550 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00003;
ICR[09] %M00558
LD Block,'Outputs_Common': NOCON 00013;
LD Block,'Well_Control': NOCON 00013; COIL 00010;
ICR[06] %M00555 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00006;

ICR[02] %M00551 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00004;
ICR[10] %M00559
LD Block,'Outputs_Common': NOCON 00017;
LD Block,'Well_Control': NOCON 00013; COIL 00011;
ICR[07] %M00556 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00007;

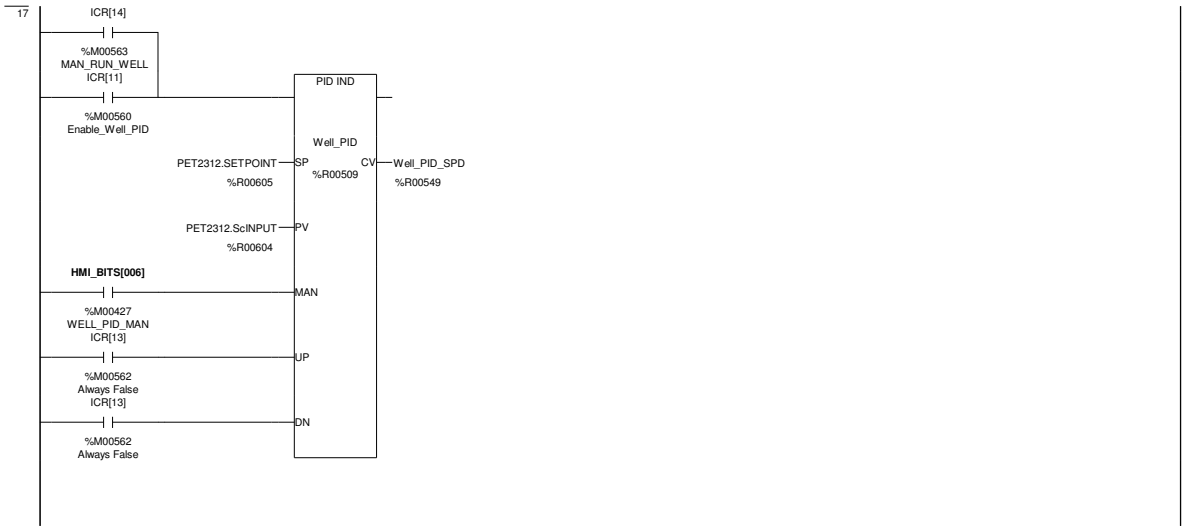
ICR[08] %M00557 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00009;
ICR[11] %M00560
LD Block,'Well_Control': NOCON 00014, 00017, 00019; COIL 00013;
ICR[09] %M00558 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00010;
ICR[10] %M00559 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00011;



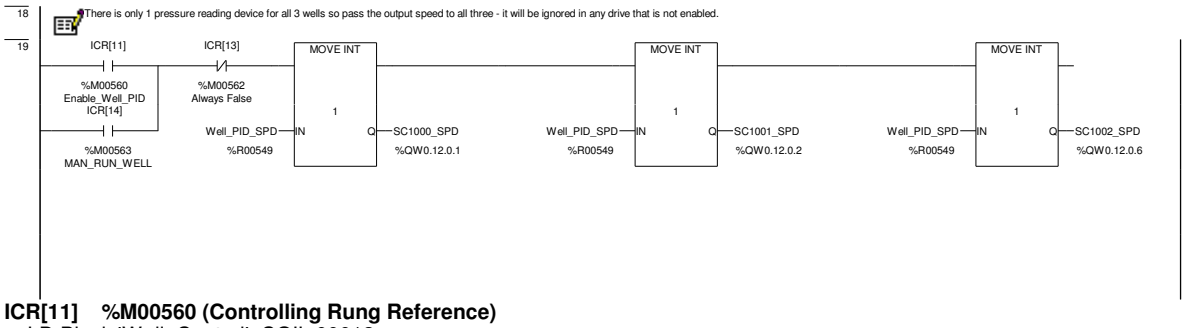
ONSBITS[01] %M00598
LD Block,'Well_Control': POSCOIL 00014; NOCON 00015, 00023;
ICR[11] %M00560 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00013;



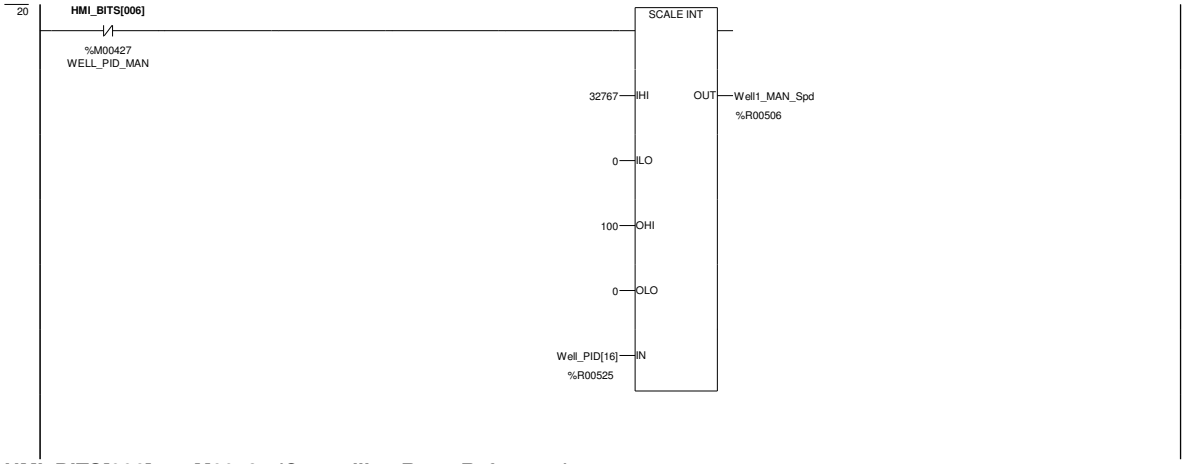
ONSBITS[01] %M00598 (Controlling Rung Reference)
LD Block,'Well_Control': POSCOIL 00014;
HMI_BITS[006] %M00427
LD Block,'Well_Control': RESETCOIL 00023; SETCOIL 00015; NCCON 00020; NOCON 00017, 00021;



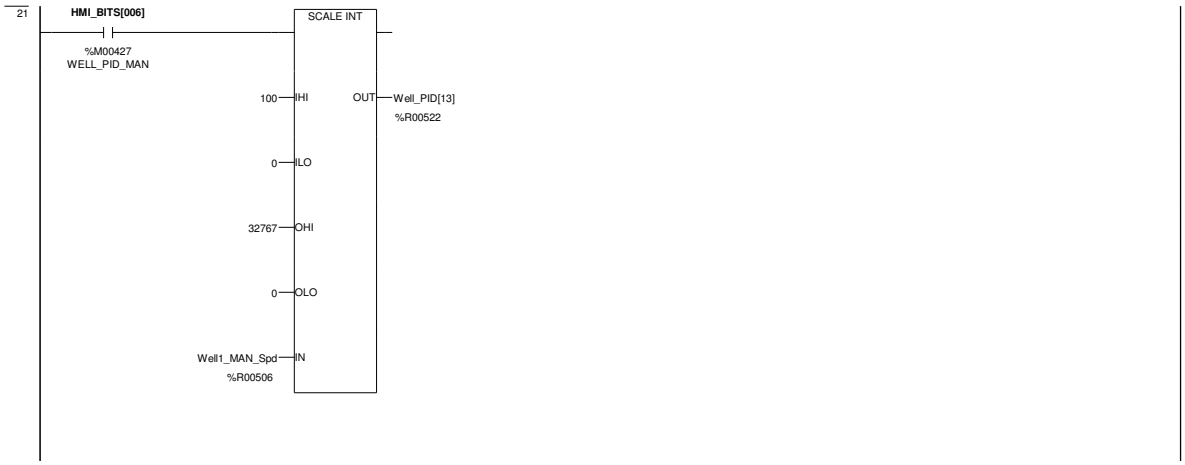
ICR[11] %M00560 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00013;
HMI_BITS[006] %M00427 (Controlling Rung Reference)
LD Block,'Well_Control': SETCOIL 00015;



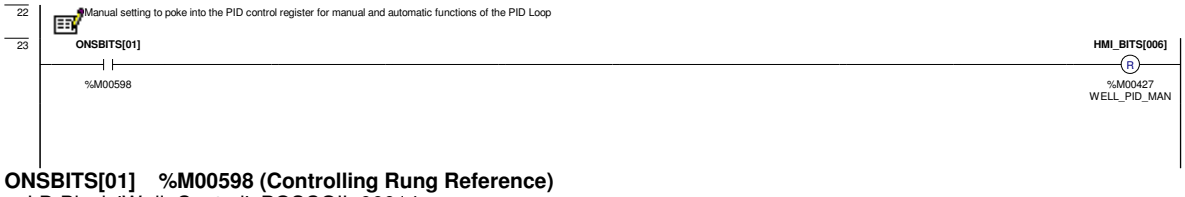
ICR[11] %M00560 (Controlling Rung Reference)
LD Block,'Well_Control': COIL 00013;



HMI_BITS[006] %M00427 (Controlling Rung Reference)
LD Block,'Well_Control': SETCOIL 00015;



HMI_BITS[006] %M00427 (Controlling Rung Reference)
LD Block,'Well_Control': SETCOIL 00015;



ONSBITS[01] %M00598 (Controlling Rung Reference)
LD Block,'Well_Control': POSCOIL 00014;
HMI_BITS[006] %M00427
LD Block,'Well_Control': RESETCOIL 00023; SETCOIL 00015; NCCON 00020; NOCON 00017, 00021;

ANNEX G - PROJECT PERSONNEL QUALIFICATIONS AND REFERENCES

(Note: all sheets form part of the proponent proposal)

Provide a two page CV for key personnel (team leader, managerial and general staff) that will be provided to support the implementation of this project. CVs should demonstrate qualifications in areas relevant to the deliverables.

Company Name: _____

Employee Name	**Title**	**Date Employment Commenced and Total Years of Experience**	**Certifications and Dates Received**

Relevant Experience (From most recent):

Period: From – To (e.g. June 2012 – January 2015)	**Name of activity/ Project/ funding organisation, if applicable:**	**Job Title and Activities undertaken/Description of actual role performed:**

References no.1 **(*minimum of 3*):**	**Name and Title:** **Project:** **Organization:** **Contact Information – Address; Phone; Email; etc.:**	
Reference no.2	**Name and Title:** **Project:** **Organization:** **Contact Information – Address; Phone; Email; etc.:**	
Reference no.3	**Name and Title:** **Project:** **Organization:** **Contact Information – Address; Phone; Email; etc.:**	

		Year 1												Year 2												Year 3			
Item		Apr-2009	May-2009	Jun-2009	Jul-2009	Aug-2009	Sep-2009	Oct-2009	Nov-2009	Dec-2009	Jan-2010	Feb-2010	Mar-2010	Apr-2010	May-2010	Jun-2010	Jul-2010	Aug-2010	Sep-2010	Oct-2010	Nov-2010	Dec-2010	Jan-2011	Feb-2011	Mar-2011	Apr-2011	May-2011	Jun-2011	Jul-2011
Major Equipment	Mechanism																												
Well Pump	Pump	x											x											x					
	External Parts	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Hydraulic section	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Electric cables & sealing elements																												
Media Filters																													
Cartridge Filters																													
High Pressure Pumps																													
Energy Recovery Pressure Exchangers																													
Energy Recovery Boost Pump		x												x											x				
Reverse Osmosis Vessels																													
Reverse Osmosis Membranes																													
Degasifier and Scrubber	Liquid Distributor	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Packing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Mist Eliminator	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure gauges	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Recycle Pumps	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Exhaust Fans	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Chemical Metering Pumps	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Sensors/Probes																												
Product Pumps		xx	x	x	x	x	x	x	xx	x	x	x	x	xx	x	x	x	x	x	xx	x	x	x	x	x	xx	x	x	x
Calcite Pump		xxx	x	x	xx	x	x	xx	x	x	xx	x	x	xxx	x	x	xx	x	x	xx	x	x	xx	x	x	xxx	x	x	xx
Chemical Dosing Pump		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Flushing / Cleaning Pump		xxx	x	x	xx	x	x	xx	x	x	xx	x	x	xxx	x	x	xx	x	x	xx	x	x	xx	x	x	xxx	x	x	xx
Cleaning Filter																													
Instruments	MicroChem 2 Analyzer																												
	Electrode	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Electrode Membrane		x												x												x		
	Electrode surfaces		x												x												x		
	Transmitter																												
	Differential Pressure Instruments																												
	Pressure Gauge																												
	Water Hardness Analyzer			x					x					x					x					x					x
Electrical	GenSet^	xxx	xxx	xxxxx	xxx	xxx	xxx	xxx	xxx	xxxx	xxx	xxx	xxx	xxx	xxx	xxxxx	xxx	xxx	xxx	xxx	xxx	xxxx	xxx	xxx	xxx	xxx	xxx	xxxxx	xxx
	Freedom 2100 Pow-R-Line Switchboards	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Inverter FR-F700	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Components	Distribution Valves	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure sustaining / pressure relief pilot model 1330	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure reducing pilot model 1340	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Y-Strainer	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2" - 16" Non-rising stem resilient wedge gate valves	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Limitorque Actuation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Systems L120 Series	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Tanks (PolyProcessing)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	QT & PLT Industrial & Air Master Series 2 Stage Compressors	xxxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxxx	xxx	xxx	xxxx

*All maintenance procedures should be understood before action is taken, please refer to Owners Manual

Multiple maintenance procedures for

xx e.g. GenSet

x	daily
xx	weekly
xxx	monthly
xxxx	6 monthly
xxxxx	Yearly

^ Refer to owners manual for hours

										Year 4												Year 5							
Item		Aug-2011	Sep-2011	Oct-2011	Nov-2011	Dec-2011	Jan-2012	Feb-2012	Mar-2012	Apr-2012	May-2012	Jun-2012	Jul-2012	Aug-2012	Sep-2012	Oct-2012	Nov-2012	Dec-2012	Jan-2013	Feb-2013	Mar-2013	Apr-2013	May-2013	Jun-2013	Jul-2013	Aug-2013	Sep-2013	Oct-2013	Nov-2013
Major Equipment	Mechanism																												
Well Pump	Pump						x											x											x
	External Parts	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Hydraulic section	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Electric cables & sealing elements																												
Media Filters																													
Cartridge Filters																													
High Pressure Pumps																													
Energy Recovery Pressure Exchangers																													
Energy Recovery Boost Pump										x												x							
Reverse Osmosis Vessels																													
Reverse Osmosis Membranes																													
Degasifier and Scrubber	Liquid Distributor	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Packing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Mist Eliminator	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure gauges	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Recycle Pumps	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Exhaust Fans	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Chemical Metering Pumps	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Sensors/Probes																												
Product Pumps		x	x	xx	x	x	x	x	x	xx	x	x	x	x	x	xx	x	x	x	x	x	xx	x	x	x	x	x	xx	x
Calcite Pump		x	x	xx	x	x	xx	x	x	xxx	x	x	xx	x	x	xx	x	x	xx	x	x	xxx	x	x	xx	x	x	xx	x
Chemical Dosing Pump		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Flushing / Cleaning Pump		x	x	xx	x	x	xx	x	x	xxx	x	x	xx	x	x	xx	x	x	xx	x	x	xxx	x	x	xx	x	x	xx	x
Cleaning Filter																													
Instruments	MicroChem 2 Analyzer																												
	Electrode	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Electrode Membrane										x												x						
	Electrode surfaces										x												x						
	Transmitter																												
	Differential Pressure Instruments																												
	Pressure Gauge																												
	Water Hardness Analyzer					x					x					x					x						x		
Electrical	GenSet^	xxx	xxx	xxx	xxx	xxxx	xxx	xxx	xxx	xxx	xxx	xxxxx	xxx	xxx	xxx	xxx	xxx	xxxx	xxx	xxx	xxx	xxx	xxx	xxxxx	xxx	xxx	xxx	xxx	xxx
	Freedom 2100 Pow-R-Line Switchboards	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Inverter FR-F700	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Components	Distribution Valves	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure sustaining / pressure relief pilot model 1330	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure reducing pilot model 1340	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Y-Strainer	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2" - 16" Non-rising stem resilient wedge gate valves	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Limitorque Actuation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Systems L120 Series	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Tanks (PolyProcessing)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	QT & PLT Industrial & Air Master Series 2 Stage Compressors	xxx	xxx	xxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxx	xxx

						Year 6											
Item		Dec-2013	Jan-2014	Feb-2014	Mar-2014	Apr-2014	May-2014	Jun-2014	Jul-2014	Aug-2014	Sep-2014	Oct-2014	Nov-2014	Dec-2014	Jan-2015	Feb-2015	Mar-2015
Major Equipment	Mechanism																
Well Pump	Pump											x					
	External Parts	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Hydraulic section	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Electric cables & sealing elements																
Media Filters																	
Cartridge Filters																	
High Pressure Pumps																	
Energy Recovery Pressure Exchangers																	
Energy Recovery Boost Pump						xx											
Reverse Osmosis Vessels																	
Reverse Osmosis Membranes																	
Degasifier and Scrubber	Liquid Distributor	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Packing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Mist Eliminator	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure gauges	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Recycle Pumps	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Exhaust Fans	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Chemical Metering Pumps	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Sensors/Probes																
Product Pumps		x	x	x	x	xx	x	x	x	x	x	xx	x	x	x	x	x
Calcite Pump		x	xx	x	x	xxx	x	x	xx	x	x	xx	x	x	xx	x	x
Chemical Dosing Pump		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Flushing / Cleaning Pump		x	xx	x	x	xxx	x	x	xx	x	x	xx	x	x	xx	x	x
Cleaning Filter																	
Instruments	MicroChem 2 Analyzer																
	Electrode	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Electrode Membrane						x										
	Electrode surfaces						x										
	Transmitter																
	Differential Pressure Instruments																
	Pressure Gauge																
	Water Hardness Analyzer		x					x					x				
Electrical	GenSet^	xxxx	xxx	xxx	xxx	xxx	xxx	xxxxx	xxx	xxx	xxx	xxx	xxx	xxxx	xxx	xxx	xxx
	Freedom 2100 Pow-R-Line Switchboards	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Inverter FR-F700	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Components	Distribution Valves	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure sustaining / pressure relief pilot model 1330	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Pressure reducing pilot model 1340	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Y-Strainer	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2" - 16" Non-rising stem resilient wedge gate valves	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Limitorque Actuation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Systems L120 Series	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Tanks (PolyProcessing)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	QT & PLT Industrial & Air Master Series 2 Stage Compressors	xxx	xxxx	xxx	xxx	xxxxxx	xxx	xxx	xxxx	xxx	xxx	xxxxx	xxx	xxx	xxxx	xxx	xxx

Major Equipment	Mechanism	Frequency	Inspection Schedule	Action	Page(s)	NOTE
Well Pump	Well Pump	????	>1 /year (minimum every 2000 operating hours) Earth system to be checked monthly Repairs need to be conducted by specialist's The motor must be switched off prior to undertaking any inspection or work on the unit		28, 29	CAUTION Refer to manual
	External parts	????	Check bolts and nuts and flanges for correct tightening and for being in good conditions Inspect the inlet screen	Replace if necessary Unclog		
	Hydraulic Section	????	Verify if the pump body, discharge system and impeller are damaged or worn out. If the play or clearance between impeller journal and the wear ring is greater than 2mm	Replace component		
	Electric Cables & Sealing Elements	????	O-rings and other sealing components Check power cables for abrasions, cuts, swelling for evident signs of ageing	If damaged replace		CAUTION
Media Filters		????	Check for leaks	Contact Manufacturer		
Cartridge Filters		????	Check for leaks Check for inadequate filtering	Troubleshooting guide	53, 54	
High Pressure Pumps		????	Check for leaks	Contact Specialist		
Energy Recovery Pressure Exchangers		????	Check for leaks PX unit is typically maintenance free Use 'Sample Operating Log.' Troubleshooting	Disassembly and assembly procedure	76 to 85 86 87	
Energy Recovery Boost Pump		Annual 5 years	1. Replace mechanical seal 2. Inspect and replace, if necessary, thrust bearing balance disc. 3. Inspect shaft coupling. A. Annual maintenance per above B. Overhaul fluid end Troubleshooting		99 100	
Reverse Osmosis Vessels						
Reverse Osmosis Membranes						
Degasifier and Scrubber			Inspection to limit postponement of corrective maintenance	Contact specialist	158	
	Liquid Distributor	Daily	Inspect the system in order that corrective maintenance is not postponed		195	
		Monthly	Weir troughs should be inspected for accumulation of scale or slime build-up	Clean trough		
			Spray nozzles should be uniform and have 360 degree arc.	Stop flow to the unit remove header, and clean affected nozzle		
Degasifier and Scrubber	Packing	Monthly	Inspect packing for accumulation of sludge, scale, slime.	Analyze material Recirculate a cleaning solution*	159	
	Mist Eliminator	Monthly	Inspect the final mist eliminator for accumulation of sludge, scale, or slime.	*As above follow the procedure on page 159		
	Pressure gauges	Monthly	Keep clean			
	Recycle Pumps	????	Lubrication of bearings and inspection for leakage	May be necessary to	196	

			and excessive vibrations	open casing. Check Manual first for Troubleshooting		
	Exhaust Fans	????	Check for excessive vibrations and excessive bearing temperature	Follow maintenance instructions		196
			Check fan wheel for wear	Replace if necessary		230
			Check Belts and Drive for wear and check tightness of all set screws and bolts (torque levels on pg. 230)	Clean or Replace if necessary		230
			Check pedestal for cracks and wear			
			Check shaft seals			
			Bearing lubrication as per speed - table shown below		233, 260	

SPEED	TEMPERATURE	CLEANLINESS	GREASING INTERVAL
100 RPM	Up to 120°F.	Clean	6 to 12 Months
500 RPM	Up to 150°F.	Clean	2 to 6 Months
1000 RPM	Up to 210°F.	Clean	2 Weeks to 2 Months
1500 RPM	Over 210°F.	Clean	Weekly
Any Speed	Up to 150°F.	Dirty	1 Week to 1 Month
Any Speed	Over 150°F.	Dirty	Daily to 2 Weeks
Any Speed	Any Temperature	Very Dirty	Daily to 2 Weeks
Any Speed	Any Temperature	Extreme Conditions	Daily to 2 Weeks

NEMA / (IEC) Frame Size	Rated Speed - RPM					
	10000	6000	3600	1800	1200	900
Up to 210 incl. (132)	**	2700 Hrs.	5500 Hrs.	12000 Hrs.	18000 Hrs.	22000 Hrs.
Over 210 to 280 incl. (180)			3600 Hrs.	9500 Hrs.	15000 Hrs.	18000 Hrs.
Over 280 to 360 incl. (225)			* 2200 Hrs.	7400 Hrs.	12000 Hrs.	15000 Hrs.
Over 360 to 5800 incl. (300)			*2200 Hrs.	3500 Hrs.	7400 Hrs.	10500 Hrs.

* Lubrication intervals are for ball bearings. For roller bearings, divide the listed lubrication interval by 2.

** For 6205 and 6806 bearings. For 6807 bearings, consult oil mist lubrication (MN401).
Relubrication interval for 6205 bearing bearing is 1550Hrs. (using grease lubrication).
Relubrication interval for 6806 bearing bearing is 720Hrs. (using grease lubrication).

	Chemical Metering Pumps	Monthly	Check delivery rate is per design Check oil level	Replace in accordance with manufacturer's instruction		
	Sensors/Probes	Weekly	Check accuracy	Re-calibrate if necessary		197
Product Pumps	If pump is fitted with a bearing flange that requires grease, see the stickers on either the bearing flange or coupling guards for proper grease type and greasing schedule.					288

Severity of Service	Ambient Temperature (Maximum)	Environment	Approved Types of Grease
Standard	+104°F (+40°C)	Clean, little corrosion	Grundfos ML motors are greased for life or will have the grease type on the nameplate. Baldor motors are greased with Polyrex EM (Exxon Mobile).
Severe	+122°F (+50°C)	Moderate dirt, corrosion	
Extreme	>+122°F (+50°C) or Class H insulation	Severe dirt, abrasive dust, corrosion	

Motor Lubrication Schedule (for Motors with Grease Nipples)

New motors that have been stored for a year or more should be regreased.

NEMA/(IEC)	Standard Service	Severe Service	Extreme Service	Weight of Grease to Add	Volume of Grease to Add	
						55 annually

Frame Size	Interval	Interval	Interval	Oz./(Grams)	In^3/(Teaspoons)
Up through 210 (132)	5500 hrs.	2750 hrs.	550 hrs.	0.30 (8.4)	0.6 (2)
Over 210 through 280 (180)	3600 hrs.	1800 hrs.	360 hrs.	0.61 (17.4)*	1.2 (3.9)*
Over 280 up through 360 (225)	2200 hrs.	1100 hrs.	220 hrs.	0.81 (23.1)*	1.5 (5.2)*
Over 360 (225)	2200 hrs.	1100 hrs.	220 hrs.	2.12 (60.0)*	4.1 (13.4)*

*The grease outlet plug MUST be removed before adding new grease.

Preventative Maintenance

At regular intervals depending on the conditions and time of operation, the following checks should be made:

1. Pump meets required performance and is operating smoothly and quietly.
2. There are no leaks, particularly at the shaft seal.
3. The motor is not overheating.
4. Remove and clean all strainers or filters in the system.
5. Verify the tripping of the motor overload protection.
6. Check the operation of all controls. Check unit control cycling twice and adjust, if necessary.
7. If the pump is not operated for unusually long periods, the unit should be maintained in accordance with these instructions. In addition, if the pump is not drained, the pump shaft should be manually rotated or run for short periods of time at monthly intervals.
8. To extend the pump life in severe duty applications, consider performing one of the following actions:
   - Drain the pump after each use.
   - Flush the pump , through system, with water or other fluid that is compatible with the pump materials and process liquid.
   - Disassemble the pump liquid components and thoroughly rinse or wash them with water or other fluid that is compatible with the pump materials and process liquid.

If the pump fails to operate or there is a loss of performance, refer to the Troubleshooting Section on pages 15 - 16.

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6mo
5.5

Calcite Pump		Routine	Check level and condition of oil through sight glass on bearing frame Check for unusual noise, vibration and bearing temperature Check for pump and piping leakage Check for seal chamber/back cover plate leakage Mechanical Seal: Should be no leakage Packing: Excessive leakage requires adjustment or possible packing replacement		320	
		Monthly	Check foundation and hold-down bolts for tightness If pump has been left idle, check packing. Replace if necessary. Check shaft alignment and realign if required		320	
		3 months	Oil should be changed every 200hrs or more often, check for cloudiness through the sight glass			
		Annual	Check pump capacity, pressure and power	Replace worn parts		
Chemical Dosing Pump					337	
Flushing/Cleaning Pump		Routine	Check level and condition of oil through sight glass on bearing frame Check for unusual noise, vibration and bearing temperature Check for pump and piping leakage Check for seal chamber/back cover plate leakage Mechanical Seal: Should be no leakage Packing: Excessive leakage requires adjustment or possible packing replacement		424	
Flushing/Cleaning Pump		Monthly	Check foundation and hold-down bolts for tightness If pump has been left idle, check packing. Replace if necessary. Check shaft alignment and realign if required		424	
		3 months	Oil should be changed every 200hrs or more often, check for cloudiness through the sight glass			
		Annual	Check pump capacity, pressure and power	Replace worn parts	424	
Cleaning Filter		Routine	Observe function verify no clogging Look for wear Overall inspection of the filter is to examine for leakage, corrosion and other abnormalities	Refer to manual Replace if necessary Refer to manual	449	
Instruments	MicroChem 2 analyzer	Weekly	Check function	Refer to manual	860, 915, 1248	
	Electrode	Periodically	Remove and rinse with di-ionized water	Refer to manual	860, 877	
	Electrode Membrane	Annually	Change membrane cap and replace filling solution	Refer to manual	877	

Electrode surfaces	Annually	Electrode may have become tarnished and require polishing (gold)	Refer to manual	877	
Transmitter	Routine	Prevent soiling of the sensor input Avoid obstruction to the vent pipe	Refer to manual	950	
Differential Pressure Instruments	Routine	Check for erratic pointer or switch action	Clean (refer to manual)	1090	
Pressure Gauge	????	Check function	Calibrate / replace if necessary (refer to manual)	1097	
Water Hardness analyzer	5 months	Maintenance required when: a. display maintenance date is exceeded b. error message: MF.DIRTINESS or REAGENT LOW (at least every 6 months maintenance is required)	Maintenance work please refer to manual	1172	

Electrical	GenSet				Mechanical inspection, check for loose belts, and fittings, leaking gaskets and hoses - or any signs of mechanical damage	1412	

TABLE 5-1. MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	SERVICE TIME						
	See Engine Schdl.	Daily or after 8 Hours	Weekly or after 50 Hours	Monthly or after 100 Hours	6 Months or after 250 Hours	Yearly or after 500 Hours	4000 – 45000 Hours
General Genset Inspection	X[1]	X[2]					
Check Coolant Heater		X					
Check Oil Level		X					
Check Coolant Level		X					
Check Fuel Level		X					
Check Charge Air Piping		X					
Check Air Cleaner (Clean if required)			X[3]				
Check Battery Charging System			X				
Drain Water and Sediment from Fuel Tank			X[5]				
Drain Exhaust Condensate Trap				X			
Check Starting Batteries				X			
Change Air Cleaner Element					X[3]		
Check Radiator Hoses for Wear & Cracks					X		
Test Generator Insulation Resistance						X[7]	
Grease generator bearing (P7)							X
Drain Fuel Filter(s)	X[1]						
Check Anti-freeze and DCA Concentration	X[1]						
Change Crankcase Oil and Filter	X[1, 6]						
Check Drive Belt Tension	X[1]						
Change Coolant Filter	X[1]						
Clean Crankcase Breather	X[1]						
Change Fuel Filters	X[1]						
Clean Cooling System	X[1]						
Test Rupture Basin Leak Detect Switch						X[8]	

X[1] Refer to Cummins engine Owners Manual for maintenance interval and/or procedure.
X[2] Check for oil, fuel, cooling and exhaust system leaks. Check exhaust system audibly and visually with set running and repair any leaks immediately.
X[3] Perform more often in dusty conditions.
X[4] Visually check belt for evidence of wear or slippage. Replace if hard or brittle.
X[5] Drain 1 cup or more of fuel to remove water and sediment.
X[6] If genset is used for standby applications, change oil every 12 months or 250 hours, whichever comes first.
X[7] This procedure should be followed periodically throughout the life of the generator set, or if the generator has set idle for a period of time with no generator heaters used. Contact your authorized service center.
X[8] Check leak detect switch in sub-base fuel tank of optional enclosure, once a year or as required by safety code. Contact your authorized service center.

Freedom 2100 Pow-R-Line Switchboards					1519		

It is essential to maintain the equipment in satisfactory condition.

To ensure continued quality service, a systematic maintenance schedule is vital. Facility operation and local conditions vary to such an extent that the schedule must be prepared to suit the conditions. The maintenance schedule for individual devices, such as circuit breakers, meters, fusible switches, etc., should be based upon recommendations contained in the individual instruction leaflet for each device. Inspection and test operations should be coordinated with an overall testing program to result in the least operating inconvenience and system shutdowns.

Switchboard Insulation Resistance Testing

Maintenance Before Cleaning

Prior to cleaning, perform an initial Megger or DC test of the switchboard insulation, between phases and ground. Inspect for symptoms which may indicate overheating or weakened insulation. Record test readings. Refer to NEMA publication AB-4 *Guidelines for Inspection and Preventative Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Application.*

Switchboard Insulation Resistance Testing

Maintenance After Cleaning

After cleaning, perform a second Megger or DC test of the switchboard insulation between phases and ground.

Prior to testing, remove all control power fusing and connections to products, which will be damaged in this test. This includes all components with control wire fusing, Transient Voltage Surge Suppression, Surge Protective Devices, metering equipment, etc.

Prior to testing, remove all control power fusing and connections to products, which will be damaged in this test. This includes all components with control wire fusing, Transient Voltage Surge Suppression, Surge Protective Devices, metering equipment, etc.

⚠ WARNING

TO PREVENT DAMAGE TO GROUND FAULT CONTROL CIR-CUITS, METERING CIRCUITS, TRANSIENT VOLTAGE SURGE

Electrical

Inverter FR-F700	Daily	Motor operation fault Improper installation environment Cooling system fault Unusual vibration and noise Unusual overheat and discolouration During operation, check the inverter input voltages using a tester		1673
	Periodic	Check areas inaccessible during operation and requiring periodic inspection	Refer to manual	1673

6.1.2 Periodic inspection

Check the areas inaccessible during operation and requiring periodic inspection.
Consult us for periodic inspection.

1) Check for cooling system fault ..... Clean the air filter, etc.
2) Tightening check and retightening ..... The screws and bolts may become loose due to vibration, temperature changes, etc.
   Tighten them according to the specified tightening torque. *(Refer to page 15.)*
3) Check the conductors and insulating materials for corrosion and damage.
4) Measure insulation resistance.
5) Check and change the cooling fan and relay.

Inspection item

6.1.3 Daily and periodic inspection

Area of Inspection	Inspection Item	Inspection Item	Interval: Daily	Interval: Periodic *2	Corrective Action at Alarm Occurrence	Customer's Check
General	Surrounding environment	Check the ambient temperature, humidity, dirt, corrosive gas, oil mist , etc	○		Improve emvironment	
	Overall unit	Check for unusual vibration and noise	○		Check alarm location and retighten	
	Power supply voltage	Check that the main circuit voltages and control voltages are normal *1	○		Inspect the power supply	
Main circuit	General	(1)Check with megger (across main circuit terminals and earth (ground) terminal).		○	Contact the manufacturer	
		(2)Check for loose screws and bolts.		○	Retighten	
		(3)Check for overheat traces on the parts.		○	Contact the manufacturer	
		(4)Check for stain		○	Clean	
	Conductors, cables	(1)Check conductors for distortion.		○	Contact the manufacturer	
		(2)Check cable sheaths for breakage and deterioration (crack, discoloration, etc.)		○	Contact the manufacturer	
	Transformer/reactor	Check for unusual odor and abnormal increase in whining sound.	○		Stop the device and contact the manufacturer.	
	Terminal block	Check for damage.		○	Stop the device and contact the manufacturer.	
	Smoothing aluminum electrolytic capacitor	(1)Check for liquid leakage.		○	Contact the manufacturer	
		(2)Check for safety valve projection and bulge.		○	Contact the manufacturer	
		(3)Visual check and judge by the life check of the main circuit capacitor *(Refer to page 115)*		○		
	Relay/contactor	Check that the operation is normal and no chatter is heard.		○	Contact the manufacturer	
		(1)Check that the output voltages across phases with the inverter operated alone is balanced		○	Contact the manufacturer	

Control circuit protective circuit	Operation check		(2)Check that no fault is found in protective and display circuits in a sequence protective operation test.		○	Contact the manufacturer	
	Parts check	Overall	(1)Check for unusual odor and discoloration.		○	Stop the device and contact the manufacturer.	
			(2)Check for serious rust development		○	Contact the manufacturer	
		Aluminum electrolytic capacitor	(1)Check for liquid leakage in a capacitor and deformation trance		○	Contact the manufacturer	
			(2)Visual check and judge by the life check of the control circuit capacitor. *(Refer to page 115.)*		○		
Cooling system	Cooling fan		(1)Check for unusual vibration and noise.	○		Replace the fan	
			(2)Check for loose screws and bolts		○	Retighten	
			(3)Check for stain		○	Clean	
	Heatsink		(1)Check for clogging		○	Clean	
			(2)Check for stain		○	Clean	
	Air filter, etc.		(1)Check for clogging		○	Clean or replace	
			(2)Check for stain		○	Clean or replace	
Display	Indication		(1)Check that display is normal.	○		Contact the manufacturer	
			(2)Check for stain		○	Clean	
	Meter		Check that reading is normal	○		Stop the device and contact the manufacturer.	
Load motor	Operation check		Check for vibration and abnormal increase in operation noise	○		Stop the device and contact the manufacturer.	

*1 It is recommended to install a device to monitor voltage for checking the power supply voltage to the inverter.
*2 One to two years of periodic inspection cycle is recommended. However, it differs according to the installation environment. Consult us for periodic inspection.

Components	Distribution Valves Pressure sustaining / pressure relief pilot model 1330	Periodic	Check fittings and bolts should be checked. The body should be inspected for damage or excessive buildup of foreign material		1728	
	Pressure reducing pilot model 1340	Periodic	As above		1731	
	Y-Strainer	Periodic	Routine cleaning and checking of the Y-Strainer		1735	
	2" - 16" Non-rising stem resilient wedge gate valves					

4. Maintenance and Inspection

a. Resilient wedge gate valves require operation (exercise) at least every six months if the valves are not operated regularly under normal conditions. Exercising of the valve consists of fully opening and fully closing the valve.

b. At the time of visual inspections the need to insure that the gate is seating properly can be accomplished by opening and closing the valve while counting the number of turns it takes. If the number of turns is not what is listed in Table 2 then an obstruction or other problem may have occurred. Table 2 has the listing of the number of turns it takes to open the different Matco AWWA valves. See Valve Disassembly instructions if cycling the valve does not allow the valve to seal.

c. All gaskets and joints should be checked for leakage. In general the valves should be inspected for leaks and ease of operation at least every six months and exercised at that time.

d. OS&Y valves should have the exposed stem lubricated at each inspection. Check bolts for tightness.

1743

Limitorque Actuation Systems L120 Series

For Gear Case, inspect lubrication every 18 months or 500 cycles, whichever occurs first.

During an inspection consider the following:

- Quantity – Ensure there is enough lubricant so that the Worm and the Worm Gear are totally immersed in grease regardless of the position. To verify, pull out geared limit switch. Level of grease should be within ½" from bottom of geared limit switch opening.

LUBRICATION
1778

Refer to manual

Tanks (PolyProcessing)

16. MAINTENANCE GUIDELINES

Tanks should be inspected on a routine, scheduled basis and the findings of the inspections recorded. As a very minimum, follow these guidelines:

- Clean the exterior and interior of the tank. You cannot properly inspect a dirty tank.
- Inspect the exterior and the interior of the tank for cracking, crazing, and brittle appearance.
  - Pay particular attention to areas around fittings and where different planes of the tank radius into one another.
  - A bright light source should be used to inspect the interior from the manway opening to avoid a confined space entry.
- Inspect fittings and exterior gaskets for leaks and signs of general corrosion and deterioration.

Confirm that secondary containment is appropriate for chemical stored, adequate in size, and in good repair.

1852

QT & PLT Industrial & Air Master Series 2 Stage Compressors

Maintenance Schedule Checklist Sample

Every 8 Hours (or Daily)

- QT-5, PLT-5, QT-7.5, PLT-7.5, QT-10 & PLT-15 lubricant levels should be kept at the top of the sight glass (add lubricant until it reaches the bottom edge of the lubricant fill opening).
- Maintain lubricant levels of QT-15, QT-25 & QT-54 models between high and low level marks on dipstick. Check the lubricant level several minutes after the compressor has run. (Discoloration or a higher lubricant level reading may indicate the presence of condensed liquids.) If lubricant is contaminated, drain and replace.

1897

- Drain receiver tank, drop legs and traps in air distribution system. Receiver tanks subjected to freezing temperatures may contain ice. Store the compressor unit in a heated area before attempting to drain moisture from the tank.
- Give compressor an overall visual inspection and be sure safety guards are in place.
- Check for any unusual noise or vibration.
- Check for lubricant leaks.
- Check all pressurized components for rust, cracks or leaks. Immediately discontinue use of the equipment and relieve all system pressure if any of these problems are discovered. Do not use the equipment until it has been inspected and repaired by a qualified mechanic.

Every 40 Hours (or Weekly)

- Manually operate the pressure relief valves to be certain they are working.
- Clean the cooling surfaces of the intercooler, aftercooler and compressor.
- Check the compressor for air leaks.
- Check the compressed air distribution system for leaks.
- Inspect lubricant for contamination & change if necessary.
- Clean or replace the air intake filter. Check more often under humid or dirty conditions.

Every 160 Hours (or Monthly)

- Check belt tension

Every 500 Hours (or Every 3 Months)

- Change lubricant (more frequently in harsher environments).
- Torque pulley clamp screws or jamnut.

Every 1000 Hours (or Every 6 Months)

- When Quin-*Cip* lubricant is used, lubricant change intervals may be extended to every 1000 hours or every 6 months, whichever occurs first (change more frequently in harsher conditions).
- Inspect compressor valves for leakage and/or carbon build-up. If excessive sludge build-up exists inside the crankcase, clean the inside of the crankcase as well as the screen. **Never use a flammable or toxic solvent for cleaning. Always use a safety solvent and follow the directions provided.**

Every 2000 Hours (or Every 12 Months)

- Inspect the pressure switch diaphragm and contacts. Inspect the contact points in the motor / starter.

Servicing Reed Valves

QT & PLT Series compressor valve plates and reed valves should be inspected and cleaned on a regular basis. The reed valves are made of stainless steel and can be cleaned with a stiff bristle brush*(not a wire brush!)*. A clean safety solvent may also be used to loosen carbon deposits on the valve plates and reed valves. Handle all parts with care; do not bend, mar or scratch any sealing surfaces.

Lubrication

QT and PLT Series basic compressors and units are normally shipped from the factory *with* break-in lubricant in the crankcase. Before starting your compressor, check the lubricant level in the crankcase. The lubricant level of QT-5, PLT-5, QT-7.5, PLT-7.5, QT-10 & PLT-15 compressors must reach the bottom edge of the lubricant fill opening. The lubricant level of QT-15, QT-25 & QT-54 compressors must register between the high and low marks on the dipstick. **Replace the break-in lubricant after 100 hours of operation with Quin-*Cip* lubricant!**

Quin-*Cip* lubricant has proven under extensive testing to minimize friction and wear, limit lubricant carryover, and reduce carbon and varnish deposits. It will support the performance characteristics and life designed into all Quincy compressors and is highly recommended. Refer to the charts below to determine the correct amount of lubricant and viscosity to use for your model and application.

MAINTENANCE SCHEDULE CHECKLIST

Use this form to develop a routine maintenance schedule and record of performed maintenance. In the numbered columns enter the initials of the person who performed the maintenance and the date. Enter additional maintenance procedures in the spaces provided in the left hand column as needed per your application.

Equipment operating under humid or dirty conditions may require shorter intervals between scheduled maintenance.

The instruction manual provided with Quincy Compressor products, as well as any instructions supplied by manufacturers of supporting equipment, should be read and understood prior to performing maintenance.

NOTE: Make your entries on a copy of this form. Retain this original form to make more copies in the future.

Suggested Weekly (40 hrs.) Intervals

Maintenance Procedures	1	2	3	4	5	6	7	8	9	10	11	12
•manually test pressure relief valves												
•												
•clean surfaces of intercooler												
•												
•check distribution system for leaks												
•												
•check for contaminated lubricant *												
•												
•check for compressor/vacuum leaks												
•												
•												

Suggested Monthly (160 hrs.) Intervals

Maintenance Procedures	1	2	3
•check belt tension (if applicable)			
•			
•torque sheave fasteners (if applicable)			
•			
•change lubricant (& filter if applicable)*			
•			

**QRD Series excluded*

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1913

Item		Procedure	TIMING			Routine	Periodic
Major Equipment	Mechanism		Daily	40hrs	160hrs		
Well Pump	Pump						
	External Parts						
	Hydraulic section						
	Electric cables & sealing elements						
Media Filters							
Cartridge Filters							
High Pressure Pumps							
Energy Recovery Pressure Exchangers							
Energy Recovery Boost Pump							
Reverse Osmosis Vessels							
Reverse Osmosis Membranes							
Degasifier and Scrubber	Liquid Distributor						
	Packing						
	Mist Eliminator						
	Pressure gauges						
	Recycle Pumps						
	Exhaust Fans						
	Chemical Metering Pumps						
	Sensors/Probes						
Product Pumps							
Calcite Pump							
Chemical Dosing Pump							
Flushing / Cleaning Pump							
Cleaning Filter							
Instruments	MicroChem 2 Analyzer						
	Electrode						
	Electrode Membrane						
	Electrode surfaces						
	Transmitter						
	Differential Pressure Instruments						
	Pressure Gauge						

	Water Hardness Analyzer
Electrical	GenSet
	Freedom 2100
	Pow-R-Line Switchboards
	Inverter FR-F700
Components	Distribution Valves
	Pressure sustaining / pressure relief pilot model 1330
	Pressure reducing pilot model 1340
	Y-Strainer
	2" - 16" Non-rising stem resilient wedge gate valves
	Limitorque Actuation Systems L120 Series
	Tanks (PolyProcessing)
	QT & PLT
	Industrial & Air Master Series 2 Stage Compressors

*All maintenance procedures should be understood before action is taken, please refer to Owners Manual

Comments
Refer to Owners manual*

ANNEX I - LOCAL BENEFITS

(SOCIAL, ECONOMIC AND ENVIRONMENTAL)

All pages of this form must be completed and returned with the Proponent's response.

This form is used to gather information to influence and help the economic transformation and enable meaningful participation of Bermudians and "specified business" in Bermuda's economy. This form looks at the ownership, management structures, and skill development opportunities and to learn more about the businesses bidding on Government Contracts. The Government's aim is to increase access to local economic activities and encourage skills training opportunities for Bermudians and the Government's use of specified businesses.

Rated criteria in the Government's Standard Evaluation Matrix Section 3 is equivalent to mandatory 30% of the overall score. It helps the public officers to measure, promote equal opportunities, and optimize the participation of specified businesses.

Date: ……..

Ownership:

1. **Bermudian Owned Business**……☐ Yes ☐ No

2. Are you defined as a "Specified Business" in Bermuda (Small or Medium Sized)?
☐Yes ☐No
☐ Other_____

Definition - Reference the Code of Practice Project Management and Procurement - (page 8 and 9) **"specified business"** means a Bermudian-owned and owner-operated business enterprise with such characteristics as the Bermuda Economic Development Corporation may determine and – (A) gross annual sales of less than one million dollars, or an annual payroll of less than five hundred thousand dollars; or (B) a least three of the following attributes: (i) gross annual revenue of between $1,000,000 and $5,000,000; (ii) net assets of less than $2,500,000; (iii) an annual payroll of between $500,000 and $2,500,000; (iv) between a minimum of 11 and a maximum of 50 employees; and (v) been in operation for a minimum of 10 years.

3. Provide a copy of the Certificate of Incorporation (if applicable).

Copy attached ☐ Yes ☐ No

4. Number of employees/Bermudians

Please indicate the total number of persons employed by the company and the number and percentage of Bermudian employees.

NUMBER OF NON-BERMUDIANS:	
NUMBER OF BERMUDIANS:	
NUMBER OF EMPLOYEES:	
PERCENTAGE OF BERMUDIANS:	

Management Control

5. INCUMBENCY CERTIFICATE

The undersigned being the secretary of the company has named below (the "Company"), a company duly organised and existing under the laws of the Islands of Bermuda and having it's registered office as set out below **DO HEREBY CERTIFY** that the following is a true and correct listing of the Directors and Officers of the Company in full force and effect as of the date hereof.

DIRECTORS	ALTERNATE DIRECTORS
List names and titles	List names and titles

OFFICERS

List names and titles

IN WITNESS WHEREOF I have hereunto set my signature in accordance with the Bye-Laws of the Company.

Company Name: ……..

Skill Development - Apprenticeships/training opportunities

6. Do you offer apprenticeships/training opportunities? _____

7. Does your business offer Bermudian's apprenticeships/training opportunities?
☐Yes ☐ No

8. Does your business offer Bermudian's internship opportunities?
☐Yes ☐No

9. If yes, to questions 8 and 9, what apprenticeship or training opportunities exist, please indicate below. (add more lines as needed)

NUMBER	NAME	NON BERMUDIAN	BERMUDIAN	APPRENTICESHIPS OR TRAINING OFFERED BY YOUR COMPANY (month/year)

Preference Procurement

10. Will the proponent use Bermuda specified businesses in their supply chain?

Yes _____ No _____

If no, then please provide an explanation_____

11. Will the proponent use Bermuda specified business sub-contractors (if applicable)?

Yes _____ No _____

If no, then please provide an explanation_____

Enterprise and Supplier Development

Safety, Health and Environmental Policies

12. Safety and Health, Sustainability and Environmental Policies

Please indicate whether the business has a:

a) Safety and Health Policy,
☐Yes ☐ No, if yes, then please provide a copy.

b) Sustainable Goods and Services Policy
☐ Yes ☐No, if yes, then please provide a copy.

c) Environmental Policy.
☐ Yes ☐No, if yes, then please provide a copy.