Installing the Pall Aria™ AP-3

Water Treatment System

QUU

(Boonah)

Queensland Urban Utilities

Regional Lagoons Upgrade Project

Manual

Manuals Index

O&M Manuals

QPDocId	Region	Function	Title	Link
TMS311	Scenic Rim	General	Boonah STP ST56 Microfiltration (A090-0320-002 Pall Base Operations & Maintenance Manual OM Manual) General	TMS311
TMS312	Scenic Rim	General	Boonah STP ST56 Microfiltration (A090-0402-001 HMI Software Screens Appendix B) General	TMS312
TMS313	Scenic Rim	General	Boonah STP ST56 Microfiltration (A090-0321-001 System Functional Description Appendix C) General	TMS313
TMS314	Scenic Rim	General	Boonah STP ST56 Microfiltration (A090-0305-001 AP3 Installation Manual - Boonah Appendix D) General	TMS314
TMS315	Scenic Rim	General	Kalbar STP ST59 Microfiltration (A090-0320-002 Pall Base Operations & Maintenance Manual OM Manual) General	TMS315
TMS316	Scenic Rim	General	Kalbar STP ST59 Microfiltration (A090-0402-001 HMI Software Screens Appendix B) General	TMS316
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TMS319	Lockyer Valley	General	Forest Hill STP ST52 Microfiltration (A090-0320-002 Pall Base Operations & Maintenance Manual OM Manual)	TMS319
TMS320	Lockyer Valley	General	Forest Hill STP ST52 Microfiltration (A090-0402-001 HMI Software Screens Appendix B)	TMS320
TMS321	Lockyer Valley	General	Forest Hill STP ST52 Microfiltration (A090-0321-001 System Functional Description Appendix C)	TMS321
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TMS325	Lockyer Valley	General	LaidleySTP ST53 Microfiltration (A090-0321-001 System Functional Description Appendix C)	TMS325
TMS326	Lockyer Valley	General	LaidleySTP ST53 Microfiltration (A090-0305-001 AP3 Installation Manual - Boonah Appendix D)	TMS326

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Vendor Manuals

QP	Vendor	File	Description	Boonah	Kalbar	Forest Hill	Laidley	Link
VM213	ACP	A090-070404-001	Compressed Air Pipe Manual	x	x	x	x	VM213
VM256	Alpha	A090-070422-001	FXM650 1100 2000 UPS Installation & Operation Manual	x	x	x	x	VM256
VM214	Amiad	A090-070405-001	Filtomat M100-750 Series Brochure	x	x	x	x	VM214
VM215	Amiad	A090-070405-002	Filtomat M100-750 Series Maintenance Instructions	x	x	x	x	VM215
VM216	Amiad	A090-070405-003	Filomat Inspection Certificate	x	x	x	x	VM216
VM255	ARI	A090-070421-001	D-021 ARV Data Sheet	x	x	x	x	VM255
VM217	Asahi Kasei	A090-070406-001	UNA-620A MF Module Operating Instruction	x	x	x	x	VM217
VM257	Atlas Copco	A090-070423-001	FXE1 Refrigerant Compressed Air Dryers - Instruction Book	x	x	x	x	VM257
VM258	Atlas Copco	A090-070423-002	GX 2-5 FM. Dimension drawing (2202 2609 60 ed. 01)	x	x	x	x	VM258
VM259	Atlas Copco	A090-070423-003	GX2-GX3 Instruction Book	x	x	x	x	VM259
VM260	Atlas Copco	A090-070423-004	PD & DD Filters Instruction Manual	x	x	x	x	VM260
VM261	Atlas Copco	A090-070423-005	Receiver VAR565-1170WP. 9724-5037-52	x	x	x		VM261
VM262	Atlas Copco	A090-070423-006	GX2-5 electrical drw	x	x	x	x	VM262
VM263	Atlas Copco	A090-070423-007	Dryer FXe1-3 Service Diagram	x	x	x	x	VM263
VM264	Atlas Copco	A090-070423-008	Dryer Instruction Book FXe1-5 EN	x	x	x	x	VM264
VM265	Atlas Copco	A090-070423-009	Dryer Spare Parts Book FXe1-5	x	x	x	x	VM265
VM266	Atlas Copco	A090-070423-010	FX1 to 5 Dimension drawing	x	x	x	x	VM266
VM267	Atlas Copco	A090-070423-011	1000 L 10barg VAR STD	x			x	VM267
VM218	Aussie Pumps	A090-070407-001	B2KQ-A_EAR4 Data Sheet	x	x	x		VM218
VM219	Aussie Pumps	A090-070407-002	B3XR-A-ST_EAS1 Data Sheet	x			x	VM219
VM220	Aussie Pumps	A090-070407-003	GMP Pump Manual	x	x	x	x	VM220
VM221	Aussie Pumps	A090-070407-004	GMP Pump Operating Instructions	x	x	x	x	VM221
VM268	Bourke Valves	A090-070424-001	Certificate of Conformance	x	x	x	x	VM268
VM222	Bray Valves	A090-070408-001	S20 21 Data Sheet	x	x	x	x	VM222
VM223	Bray Valves	A090-070408-002	S30 31 Data Sheet	x	x	x	x	VM223
VM224	Bray Valves	A090-070408-003	S92-93 Data Sheet	x	x	x	x	VM224

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VM225	Bray Valves	A090-070408-004	S6A Dimensional Drawing	x	x	x	x	VM225
VM226	Bray Valves	A090-070408-005	S30-S92-S50 Dimensional Drawing	x	x	x	x	VM226
VM227	Bray Valves	A090-070408-006	S31-S92-S50 Dimensional Drawing	x	x	x	x	VM227
VM228	Bray Valves	A090-070408-007	Pneumatic Actuators Product Guide	x	x	x	x	VM228
VM229	Bray Valves	A090-070408-008	RSBV Product Guide	x	x	x	x	VM229
VM230	BVCI	A090-070409-001	2500L Round Squat Corrugated Tank	x	x	x	x	VM230
VM231	BVCI	A090-070409-002	5000L Round Corrugated Tank	x				VM231
VM232	Caps	A090-070410-001	SRV390 Conrader DataSheet	x				VM232
VM233	Caps	A090-070410-002	Equip - Air receiver -GA drawing	x				VM233
VM328	Cashco	A090-070439-001	Cashco - Installation Manual - Pressure Reducing Regulators - Models D & DL	x	x	x	x	VM328
VM330	Condamine Electric	A090-070441-002	Electrical Safety Compliance Certificate - Boonah	x				VM330
VM331	Condamine Electric	A090-070441-003	Electrical Safety Compliance Certificate - Kalbar		x			VM331
VM329	Condamine Electrical	A090-070441-001	Electrical Safety Compliance Certificate - Forest Hill			x		VM329
VM332	Condamine Electrical	A090-070441-004	Forrest Hill Electrical Certificate			x		VM332
VM333	Condamine Electrical	A090-070441-005	Laidley Electrical Certificate				x	VM333
VM209	Control IT	A090-070401-009	ITP	x	x	x	x	VM209
VM325	Danfos	A090-070436-001	VLT Aqua Drive Operating Instructions	x	x	x	x	VM325
VM269	Emerson	A090-070425-001	Calibration Certificate - Serial 02813759	x				VM269
VM270	Emerson	A090-070425-002	Calibration Certificate - Serial 02813760	x				VM270
VM271	Emerson	A090-070425-003	Calibration Certificate - Serial 02832612	x				VM271
VM272	Emerson	A090-070425-004	Calibration Certificate - Serial 02832616	x				VM272
VM273	Emerson	A090-070425-005	3900 Manual	x	x	x	x	VM273
VM234	EzyStrut	A090-070411-001	ET3_ET5 Cable Tray Assembly Guide	x	x	x	x	VM234
VM294	Festo	A090-070431-001	Analog Modules	x	x	x	x	VM294
VM295	Festo	A090-070431-002	CPX - Pin Assignment Instructions	x	x	x	x	VM295
VM296	Festo	A090-070431-003	CPX IO and valve blocks - Analogue IO Modules	x	x	x	x	VM296
VM297	Festo	A090-070431-004	CPX IO and valve blocks - Digital IO Modules	x	x	x	x	VM297
VM298	Festo	A090-070431-005	CPX IO and valve blocks - Install & Commisisoning Manual	x	x	x	x	VM298
VM299	Festo	A090-070431-006	CPX IO and valve blocks - Manual	x	x	x	x	VM299

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QP	Vendor	File	Description	Boonah	Kalbar	Forest Hill	Laidley	Link
VM300	Festo	A090-070431-007	CPX Mounting - Data Sheet	x	x	x	x	VM300
VM301	Festo	A090-070431-008	CPX_EN	x	x	x	x	VM301
VM302	Festo	A090-070431-009	CPX-BG-RW-10X Assembly Instructions	x	x	x	x	VM302
VM303	Festo	A090-070431-010	CPX-FB32 IO and valve blocks - Electronics Manual	x	x	x	x	VM303
VM304	Festo	A090-070431-011	CPX-FEC IO and valve blocks - Electronics Manual	x	x	x	x	VM304
VM305	Festo	A090-070431-012	MSB Operating Instructions	x	x	x	x	VM305
VM306	Festo	A090-070431-013	MSF - MS6 Operating Instructions	x	x	x	x	VM306
VM307	Festo	A090-070431-014	MS-LFR Accessories - Data Sheet	x	x	x	x	VM307
VM308	Festo	A090-070431-015	MS-LFR Filter Regulator - Data Sheet	x	x	x	x	VM308
VM309	Festo	A090-070431-016	MS-W Operating Instructions	x	x	x	x	VM309
VM310	Festo	A090-070431-017	SDE1 Pressure Switch - Data Sheet	x	x	x	x	VM310
VM311	Festo	A090-070431-018	SDE1 Pressure Switch - Install Manual	x	x	x	x	VM311
VM312	Festo	A090-070431-019	SDE1 Pressure Switch - Manual	x	x	x	x	VM312
VM313	Festo	A090-070431-020	SDE1-SH Pressure Switch Protective Hood - Data Sheet	x	x	x	x	VM313
VM314	Festo	A090-070431-021	Universal Connecting Cables - Data sheet	x	x	x	x	VM314
VM315	Festo	A090-070431-022	VTSA Valve Terminal - Manual	x	x	x	x	VM315
VM316	Festo	A090-070431-023	QS Series Pneumatic Fittings	x	x	x	x	VM316
VM317	Festo	A090-070431-024	Silencers	x	x	x	x	VM317
VM274	GMP	A090-070426-001	Self Priming End Centrifugal Electric Pumps Installation Instructions	x	x	x	x	VM274
VM235	Grundfos	A090-070412-001	522 Injection Valve - Operation Manual	x	x	x	x	VM235
VM236	Grundfos	A090-070412-002	DD Chemical Tanks	x	x	x	x	VM236
VM237	Grundfos	A090-070412-003	Foot Valve IOM	x	x	x	x	VM237
VM238	Gruvlok	A090-070413-001	Fig 7305 HDPE Coupling	x	x	x	x	VM238
VM239	Gruvlok	A090-070413-002	Fig 7307 HDPE Transition Coupling	x	x	x	x	VM239
VM240	Gruvlok	A090-070413-003	HDPE Coupling Manual	x	x	x	x	VM240
VM275	Hach	A090-070427-001	Calibration Test Certificate - SC200 Controller - 1206C0043665	x				VM275
VM276	Hach	A090-070427-002	Calibration Test Certificate - SC200 Controller - 1210C0049992	x				VM276
VM277	Hach	A090-070427-003	FT660 SC User Manual	x	x	x	x	VM277
VM278	Hach	A090-070427-004	sc200 Controller User Manual	x	x	x	x	VM278

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VM279	Hach	A090-070427-005	1720E Users Manual	x	x	x	x	VM279
VM241	Harvel	A090-070414-001	Sch. 80 PVC-U Data Sheet	x	x	x	x	VM241
VM327	Hershey	A090-070438-001	Valve - Catalog 2011.05	x	x	x	x	VM327
VM242	Jaco	A090-070415-001	Compression Fittings Catalogue	x	x	x	x	VM242
VM212	Johnson Screens	A090-070403-001	S 12-69 Intake Screen Drawing	x	x	x	x	VM212
VM280	Kelco	A090-070428-001	F20 Modular Flow Switches Installation & Operating Guide Lines	x	x	x	x	VM280
VM243	Lowara	A090-070416-001	SHE Pumps Catalogue	x	x	x	x	VM243
VM244	Lowara	A090-070416-002	SHE Pumps Operating Instructions	x	x	x	x	VM244
VM245	Lowara	A090-070416-003	SV-CO-FH-FC-SH-CEF-COF - Safety Instructions	x	x	x	x	VM245
VM323	Maric	A090-070434-001	CFF Brochure	x	x	x	x	VM323
VM246	Merriman	A090-070417-001	Line Strainer 305	x				VM246
VM247	Merriman	A090-070417-002	Y-strainer	x				VM247
VM248	Pall	A090-070418-001	MF Fiber Information Sheet	x	x	x	x	VM248
VM322	Pall Beijing	A090-070433-001	Quality Documentation	x	x	x	x	VM322
VM318	Perfab	A090-070432-001	Material Data Record - Laidley				x	VM318
VM319	Perfab	A090-070432-002	Material Data Record - Forest Hill			x		VM319
VM320	Perfab	A090-070432-003	Material Data Record - Kalbar		x			VM320
VM321	Perfab	A090-070432-004	Material Data Record - Boonah	x				VM321
VM281	Rosemount	A090-070429-001	644H Temperature Transmitter with 4-20mA Hart Quick Start Guide	x	x	x	x	VM281
VM282	Rosemount	A090-070429-002	2088, 2090P & 2090F Pressure Transmitter with 4-20 mA Hart Quick Installation Guide	x	x	x	x	VM282
VM283	Rosemount	A090-070429-003	8700 Series Magnetic Flowmeter Sensors - Quick Intallation Guide	x	x	x	x	VM283
VM284	Rosemount	A090-070429-004	8732e Magnetic Flowmeter System - Quick Installaiton Guide	x	x	x	x	VM284
VM285	Rosemount	A090-070429-005	Declaration of Conformity	x	x	x	x	VM285
VM286	Rosemount	A090-070429-006	Magnetic 8732 Flowmeter Factory Configuration - Serial No 0354479	x	x	x	x	VM286
VM287	Rosemount	A090-070429-007	Magnetic 8732 Flowmeter Factory Configuration - Serial No 0354480	x	x	x	x	VM287
VM288	Rosemount	A090-070429-008	148TemperatureTransmitter_RevAA	x	x	x	x	VM288

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QP	Vendor	File	Description	Boonah	Kalbar	Forest Hill	Laidley	Link
VM289	Rosemount	A090-070429-009	644HeadandRailMountTemperatureTransmitters_RevJA	x	x	x	x	VM289
VM290	Rosemount	A090-070429-010	RTD&ThermcoupleAssemblies_RevBA		x	x	x	VM290
VM324	Solberg	A090-070435-001	F Series Filters	x	x	x	x	VM324
VM249	Spears	A090-070419-001	Saddle	x	x	x	x	VM249
VM250	Spears	A090-070419-002	Sch.80 Fittings	x	x	x	x	VM250
VM251	Spears	A090-070419-003	True Union Valves	x	x	x	x	VM251
VM252	Spears	A090-070419-004	Y-strainer	x	x	x	x	VM252
VM326	Spill Station Australia	A090-070437-001	Bunding Information	x	x	x	x	VM326
VM210	TEE	A090-070402-001	CIP Tank Heater - General Arrangement - TIH1001500	x			x	VM210
VM211	TEE	A090-070402-002	CIP Tank Heater - General Arrangement - TIH1001200	x	x	x		VM211
VM291	Vega	A090-070430-001	PLICCOM Operating instructions	x	x	x	x	VM291
VM292	Vega	A090-070430-002	Vegason 61 Operating Instructions	x	x	x	x	VM292
VM293	Vega	A090-070430-003	Vegason 61 Product Info	x	x	x	x	VM293
VM253	Wilden	A090-070420-001	P25 Manual	x	x	x	x	VM253
VM254	Wilden	A090-070420-002	Declaration of Conformity	x	x	x	x	VM254
VM334	Control IT	A0901-070401-001	Checklist MCP - Boonah	x				VM334
VM335	Control IT	A0901-070401-005	Commissioning MCP - Boonah	x				VM335
VM336	Control IT	A0901-070401-010	Compliance Certificate - Boonah	x				VM336
VM337	Control IT	A0902-070401-002	Checklist MCP - Kalbar		x			VM337
VM338	Control IT	A0902-070401-006	Commissioning MCP - Kalbar		x			VM338
VM339	Control IT	A0902-070401-011	Compliance Certificate - Kalbar		x			VM339
VM340	Control IT	A0903-070401-003	Checklist - MCP - Laidley				x	VM340
VM341	Control IT	A0903-070401-007	Commissioning MCP - Laidley				x	VM341
VM342	Control IT	A0903-070401-012	Compliance Certifiate - Laidley				x	VM342
VM343	Control IT	A0903-070401-013	Cabinet & Panel Checklist - MCP - Laidley				x	VM343
VM344	Control IT	A0903-070401-014	Commissioning Checklist - MCP - Laidley				x	VM344
VM345	Control IT	A0904-070401-004	Checklist MCP - Forest Hill			x		VM345
VM346	Control IT	A0904-070401-008	Commissioning MCP - Forest Hill			x		VM346
VM347	Control IT	A0904-070401-015	Compliance Certificate - Forest Hill			x		VM347

PALL CORPORATION PROJECT NUMBER:	A090
DOCUMENT REVISION LEVEL:	0
DOCUMENT ISSUE DATE:	16/04/2013

IMPORTANT – READ THIS FIRST

If a PASS Australia Engineer is not present at the time of equipment installation, do not begin installation without first contacting PASS Australia.

Pall Corporation is not responsible for problems occurring or damage resulting from installing the Pall Aria™ AP system not supervised by PASS Australia or without approval from PASS Australia. Such Pall Aria™ AP system installations may void all warranties.

Direct all questions and/or inquiries to PASS Australia:

Telephone: 02 4340 8900

Fax: 02 4340 8999

Throughout this manual, the word "customer" refers to QUU.

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REVISION HISTORY

TABLE A - PALL REVISION HISTORY

Revision	Date	Originator	Description
0		PASS Australia	Document Release.

TABLE B - OPERATOR REVISION SHEET

Revision	Date	Originator	Description

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1 SAFETY INFORMATION

1.1 USER'S RESPONSIBILITY

It is the user's responsibility to follow and enforce all safety procedures and regulations required by the governing agency of the locality where the Pall Aria™ AP Water Treatment System is being installed.

Pall Corporation is not responsible for any personal injury and/or damage to any equipment caused by anyone not following the required safety procedures and regulations.

1.2 STATEMENT OF PROPER USE

Pall Aria™ Water Treatment Systems are highly flexible membrane filtration systems designed and engineered by Pall Corporation for filtering ground and surface waters for potable water supply and industrial uses and filtering secondary wastewater effluent for reuse. The Pall Aria™ AP series systems separates particulate matter from soluble components and removes contaminants from water.

DO NOT convert or alter the **Pall Aria™** Water Treatment System for any purpose other than its intended one without first contacting Pall Corporation. Pall Corporation is not responsible for any of its equipment altered by others without Pall Corporation's prior approval.

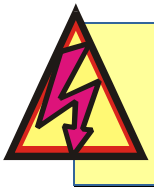
1.3 DOCUMENT INDICATORS AND SYMBOLS

IMPORTANT

Important indicators identify that the product documentation contains important operating and maintenance instructions and/or information that can help in the efficient use of the Pall Aria™ Water Treatment System.

CAUTION

Caution indicators identify the potential for hardware or product damage and provide information for prevention.



This lightning symbol indicates that a dangerous voltage or other electrical hazard is present and may constitute a risk of electrical shock with the potential for BODILY HARM.

WARNING!

STOP WARNING SYMBOLS INDICATE THE SERIOUS POTENTIAL FOR BODILY HARM AND PROVIDE INFORMATION FOR PREVENTION.

IMPORTANT

The symbols and their explanations throughout this manual provide emphasis to important aspects of the safe operation of the Pall Corporation AP system. However, it is important to remember that all information contained in this manual is essential for the safe and efficient operation of this system.

Pall Corporation equipment is designed and fabricated to function in a safe manner when operated as described in this manual. However, like any mechanical device, the performance of this equipment depends upon using sound and prudent operating, maintenance, and servicing procedures under properly trained supervision.

For personal protection, and the protection of others, form safe working habits and follow all safety procedures at the installation facility and regulations required by the governing civil authority where the **Pall Aria™** Water Treatment System is being installed.

IMPORTANT

Pall Corporation is not responsible for personal injuries or equipment damage incurred by not following the required safety regulations and procedures of the facility and/or governing civil authority where the Pall Aria™ Water Treatment System is being installed.

CAUTION

When the Pall Aria™ Water Treatment System becomes operational, all operators must be properly trained by Pall Corporation or someone authorised by Pall Corporation.

Damage to any part of the **Pall Aria™** Water Treatment System caused by an untrained operator voids all warranties. Further, any damage to any part of the Pall Aria™ Water Treatment System caused by the modifying or loading of computer software onto the Pall Aria™ Water Treatment System computers unauthorised by Pall Corporation voids all warranties.

NEVER Assume… **ALWAYS** Verify!

2 TECHNICAL AND INSTALLATION SUPPORT

CAUTION

Prior to beginning installation of the Pall Aria™ AP system, contact the assigned Pall Corporation project manager or contract administrator to ensure that installation personnel and/or contractors are working from the most recent drawing set.

Pall Corporation is not responsible for problems occurring or damage resulting during the installation of the Pall Aria™ AP systems.

Installation services (under separate contract) are available from Pall Corporation. Contact PASS Australia for more information.

2.1 PASS AUSTRALIA CONTACT INFORMATION

To obtain technical support:

Pass Australia
6 Chivers Road
Somersby
NSW, 2250

Telephone: **02 4340 8900**
Fax: **02 4340 8999**

Another excellent source of information is Pall Corporation's Internet site: http://www.Pall.com. Customers may also want to contact their local Pall Corporation representative, if available.

When contacting PASS Australia for support, provide:

1. **The Pall Project Number (for Pall Aria™ AP systems).**
2. **Precise information on the problem or question.**

Note – The Pall Corporation Project Number is located on the control panel identification label, as well as most of the project drawings.

3 SYSTEM SPECIFICATIONS

3.1 PALL ARIA™ DRAWING IDENTIFIERS

Pall Corporation provides the necessary system drawings for assembly and installation of the Pall Aria™ AP system. Drawing number sequences appear with a key number that is the last digit in the first line of the drawing name (Figure 3.1). The key number designates the character of the drawing. In Figure 3.1, the key number [01] designates the drawing as Filter Skid Assembly.

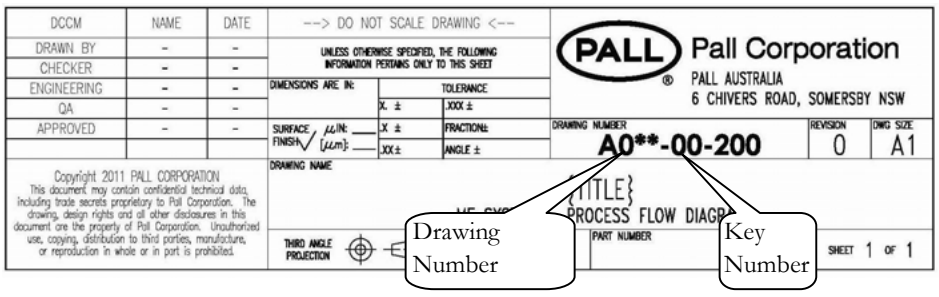


FIGURE 3.1 – DRAWING NUMBER AND KEY NUMBER EXAMPLE

Other examples of key numbers are in "Table 3.2 – Pall Aria™ Drawing Key Number Identifiers" (next page). These key numbers are representative and may not be the exact or total list the customer may receive due to options purchased. Throughout this manual, the drawing key number appears in brackets, e.g. [01].

Drawing Description	Revision	Key letter
Mechanical Drawing		01
Electrical Drawing		03
PID Drawing		00

TABLE 3.2 – PALL ARIA™ DRAWING KEY NUMBER IDENTIFIERS

3.2 PALL ARIA™ AP-3 SYSTEM DATA

This manual provides guidelines for installing an on skid Pall Aria™ AP-3 Water Treatment System. The purchased system may vary from the system pictured and described in this installation manual. In particular, there are two (2) different standard orientations for the module rack(s). Refer to the supplied Pall drawings for piping connections, line sizes, and other specifications applicable to the purchased Pall Aria™ AP system.

Pall Aria™ AP-3 system specifications depend on options purchased and site conditions. For specific specifications on the purchased Pall Aria™ AP-3 Water Treatment System, see the separate Operation and Maintenance manual. Because of customer purchased options and continuing system upgrades, the purchased system may vary slightly from the system pictured and described in this installation manual. Direct all questions to PASS Australia.

Dimensions, weights, values, and other calculations provided in this document are approximate and rounded to the nearest inch ("), gallon (gal), pounds per square inch (psi), gallons per minute (gpm), and pound (lb). Metric equivalents: millimeters (mm), liters (ltr), kilopascal (kPa), liters per second (lps), and kilogram (kg). In some cases, certain values are shown in tenths or hundredths.

Contact PASS Australia with any questions.

3.3 IDENTIFYING RACK ORIENTATION

Each Pall Aria™ Water Treatment System skid is equipped with one or more racks of microfiltration modules and is oriented in a specific angled position from the AP-3 skid. Refer to the supplied drawings for the purchased system for the specific orientation.

For skid and system connection sizes not listed in this manual, refer to the Pall Aria™ AP-3 drawings.

3.4 SPECIFICATIONS

Pall Corporation recommends utilising the information in this section in conjunction with the Pall Aria™ Water Treatment System Operation and Maintenance manual and the system drawings provided separately.

CAUTION

There are two drains on Pall Aria™ AP3 MF systems. Both these drains must discharge below the skidded MF system. This means that drain piping must be free draining. Miscellaneous drain piping must be free draining and freely vented. The process high flow drain piping must be free draining and is vented on the MF system by the systems valves when necessary. The drain lines are not designed to be tied together once they leave the MF system. Do not tie these drain lines together. Also, these drain lines must not be run up overhead. All drain processes utilise gravity to drain the skid.

Any solution drained from the system into a common drain must meet the requirements/standards set by the governing authority for waste disposal in the affected community/area.

IMPORTANT

The specifications contained in this section are for one Pall Aria™ AP-3 skid only. As already stated, the off-skid module rack is available in two (2) different orientations depending on customer preference and site limitations. *(Continued On Next Page)*

In any module rack orientation, the skid and module rack connections and piping named in this manual are the same. The difference is in the angle and/or length of some piping connections to conform to the module rack orientation. Exact depictions of the piping connections appear on the Pall Aria™ AP-3 drawings for the purchased system, specifically the [01] drawing.

Because of this and the other options available for the Pall Aria™ AP-3, only basic system specifications are included here. Refer to the purchased Pall Aria™ AP-3 system drawings and the separate operation and maintenance manual for project specific information. Contact PASS Australia with any questions.

3.4.1 PALL ARIA™ AP-3 ASSEMBLED SKID OVERALL DIMENSIONS

Refer to Pall Corporation Pall Aria™ AP system drawing.

Dimension	AP-3 Skid
Width	2150mm
Length	3910mm
Height	3120mm

These dimensions refer to the AP-3 skid only and not the associated module rack, tanks, or the piping that connects these items together. Dimensions are approximate and subject to change.

3.4.2 MATERIALS OF CONSTRUCTION

Product	Types
Wetted Materials	304 Stainless steel, PPH, PE, and EPDM (Elastomers), PVC
System Electrical Enclosures	SS304
System Tank	PPH
System Piping	PVC, PE
System Fittings	PVC, PE

3.4.3 ENVIRONMENTAL

Conditions	Range
Maximum Operating Pressure	310.26kPa
Operating Temperature	0.6—40℃
Storage Temperature	0.6—50℃
Operating Humidity(Non-Condensing)	10—90% Relative
Storage Humidity(Non-Condensing)	10—90% Relative

3.4.4 UTILITIES

Refer to Pall Corporation Pall Aria™ AP system drawings as applicable.

Conditions	Range
Electrical Supply	Varies, refer to Pall Corporation electrical system drawings.
Instrument Grade Air	827.4 kPa Minimum Delivery Pressure, 3scfm per Module for A/S +0.5 scfm continuously for automated valves. The air must be instrument grade, clean, dry, and oil-free.

3.4.5 TANK VOLUMES (MAXIMUM)

Refer to Pall Corporation Pall Aria™ AP system drawing.

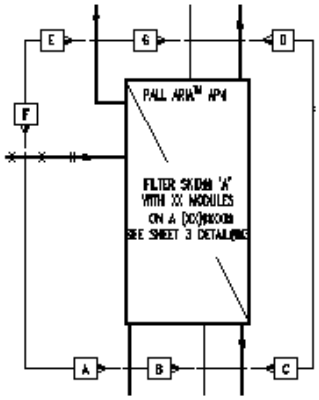
Off-skid Tanks	Range
Dimension	**AP-3 Skid**
Feed Tank T-1	833L
RF Tank T-2	1325L

3.4.6 PALL ARIA™ AP-3 BATTERY LIMIT TABLES

Refer to the Battery Limit Tables on the Pall Aria™ AP system drawings and the specific installation sections of this manual for all skids' connection types, sizes, and other relevant information.

The Battery Limit Tables on the drawings contain an "Item" column with letter and number designations that correspond with the same "Item" designator on the drawings battery limits. Battery limit boundaries on the drawing are designated by a "Phantom" line (—— - - ——) drawn around the battery limit.

For example, Table 3.3 (below) shows the Battery Limit Table to the right and a portion of the drawing that contains the corresponding battery limit item tags to the left. In this example, battery limit "Item A" from the table corresponds to the graphic location of "Item A" on the same drawing. These battery limits are consistent throughout the mechanical drawing package.



ITEM/#	DESCRIPTION	TYPE	MAT'L	ZONE
SCOPE LIMIT TABLE				
Y1/Y2	CHLORINE ANALYZER (AIT-33) (AIT-33)	1" [25] NPT	PVC	C2/E3
Y1/Y2	pH/TEMP. MONITORING SYSTEM (AIT-56B36) pH/	1" [25] NPT	PVC	C2/E3
T1/T2	TURBIDIMETER OFF SKID (AIT-52) (AIT-31)	3/8" [10] & 1/2" [15] TUBE	—	C4&E6/D4&E2
P1/P2	PARTICLE COUNTER (AIT-55 & 35)	1/4" [6] MNPT/1/2" [15] TUBE	—	C4&E6/E4
M5	NEUTRALIZATION TANK OVERFLOW	4" [100] SW	PVC	E3
M4	NEUTRALIZATION TANK DISCHARGE	3" [75] FLANGE	PVC	E4
M3	NEUTRALIZATION CIP TRANSFER INLET	1" [25] SW	PVC	E4
M2	NEUTRALIZATION SUMP INLET	2" [50] SW	PVC	E4
M1	NEUTRALIZATION TANK INLET	6" [150] SW	PVC	E4
L2B	CIP XFER SYSTEM MANIFOLD(TO AP SKID5)	1" [25] SW UNION	PVC	E3
L2A	CIP XFER SYSTEM MANIFOLD(TO AP SKID5)	1" [25] SW UNION	PVC	C3
J1	COMPRESSED AIR CIP/EFM	1/2" [15] FNPT	SST	E3
H4	EFM SKID OUTLET(TO NEUTRALIZATION)	1" [25] FLG	PVC	C5
H3	HOT WATER TANK DRAIN	1" [25] FLG	PVC	C5
H2	HOT WATER TANK OVERFLOW DRAIN	1" [25] SW	PVC	E3
H1	EFM SKID INLET	1" [25] FLG	PVC	E3
G	NaOCl FOR RF EFM	1/2" [15] FNPT	PE	C4/C5
F	AIR SUPPLY FOR AIR SCRUB	1 1/2" [40] FNPT	SST	C4/C5
E	CIP MAKE UP WATER/EFM WATER	1" [25] FLANGE	PVC	C4/C5
D	FILTRATE FORWARD	4" [100] FLANGE	PVC	D5/D6
C	MISC. DRAIN	4" [100] FLANGE	PVC	D5/D6
B	CIP/RF/AS DRAIN CIP/RF/AS	6" [150] FLANGE	PVC	D4/D5
A	FEED	4" [100] FLANGE	PVC	D4/D5

TABLE 3.3 – PALL ARIA™ DRAWING BATTERY LIMIT ITEM IDENTIFIERS

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4 RECEIVING AND UNPACKING THE PALL ARIA™ AP-3 SYSTEM

CAUTION

When moving or working with HDPE components (including manifolds) installers must protect all sealing surfaces from any damage including impacting these components with any other objects or surfaces. The slightest scratch, gouge, indentation, or any other imperfection in these surfaces causes leaks between gasket sealed couplings or other HDPE sealing devices.

Failure by the customer or the customer's contracted installers to properly protect any sealing surface voids the warranty.

4.1 RECEIVING AND INSPECTION OF THE PALL ARIA™ AP-3 SYSTEM

The Pall Aria™ Water Treatment System arrives in several containers. Unloading and movement of the containers require a forklift with at least a 3-ton (6000 lb/2722 kg) capacity. Refer to sheet 1 of the [01] drawings for specific weight tables.

As soon as they are received, remove each container, open, and inspect contents for damage. If any damage is observed or suspected and a Pall Corporation representative is not on-site, contact Pall Water Processing at 02 4340 8900 immediately.

Ownership of parts and/or equipment shipped Free On Board (F.O.B.) from Pall Corporation is transferred to the purchaser upon placement on board the carrier.

IMPORTANT

Pall Corporation is not responsible for any damage to its equipment occurring from F.O.B. carrier transportation.

Failure to inspect all Pall Corporation shipping containers and their contents for damage upon arrival at the purchaser's designated site may void all warranties.

Pall Corporation is not responsible for and cannot handle shipping claims against the carrier. All shipping claims must be owner-processed with the carrier. Pall Corporation will make every effort to assist the owner in any way possible.

Personnel receiving the shipment must note on the delivery receipt any indication of damage or careless handling by the carrier. If possible, receiving personnel should take pictures of damaged equipment. Obtaining the delivery person's signed agreement facilitates future damage claims.

4.2 EQUIPMENT STORAGE

After equipment inspection, if installing the unit immediately, reseal and move all containers except the Microza® modules to the installation site.

If the equipment is not going to be installed within 72 hours, the storage area must be inside and temperature controlled to protect the equipment from extreme heat and cold and other harsh weather conditions. Seal all nozzles and tape all openings. Retain the original factory-supplied shipping materials.

The Microza® modules require storage under more controlled and secure conditions until ready for installation on the module rack. See next Section 4.3, "Storage and Preservation of the Microza® Microfiltration Modules".

See Section 4.4 "Returned Goods Authorisation" for information on returning damaged equipment to Pall Corporation.

4.3 STORAGE AND PRESERVATION OF THE MICROZA® MICRO-FILTRATION MODULES

CAUTION

When moving or working with HDPE components (including manifolds) installers must protect all sealing surfaces from any damage including impacting these components with any other objects or surfaces. The slightest scratch, gouge, indentation, or any other imperfection in these surfaces causes leaks between gasket sealed couplings or other HDPE sealing devices.

The Microza® microfiltration module membranes can dry out if left unattended. This adversely affects their performance. As a result, the modules are shipped containing a storage solution to preserve the membranes. This solution must be maintained in the modules until put into service. For that reason, after receiving the modules and before they are stored, the shipping containers must be opened and the modules inspected for leaks or damage of any kind. If any module leakage or damage is noticeable or suspected, contact PASS Australia immediately.

After inspection, reseal the modules in their containers and place in an enclosed storage area that provides adequate protection from extreme heat (no exposure to direct sunlight) and cold (no temperatures below freezing). Do not store the modules outside.

Failure to adhere to this caution results in the voiding of all module warranties!

DO NOT drop or expose either the modules or their shipping containers to shock or impact. There may be damage to the membrane even if no visible damage to the module case is evident.

After system installation, if the system is to be shut down for a short time (less than 48 hours), the Microza® modules membranes must be kept wet

(Continued On Next Page)

with clear water. If the system is to be shut down for more than 48 hours refer to the section "Long-Term Shutdown and System Lay-Up" in the separate Operation and Maintenance manual for more storage procedures.

DO NOT move or in any way transport the Pall Aria™ AP-3 module racks with the Microza® modules installed. Any vibration or shock may damage the module membrane. Always remove the modules from the rack for system transportation.

4.4 RETURNED GOODS AUTHORISATION

As already stated, all contents of shipping containers must be inspected upon arrival (see Section 4.1 "Receiving and Inspection of the Pall Aria™ AP-3 System" on page 24.

When returning material or equipment for repair or credit:

1. BEFORE making any returns, contact Pall Water Processing at 02 4340 8900 to discuss potential returns. Valid return situations are assigned an authorisation number. A Return Goods Authorisation Sticker is mailed to the contact name and location indicated by the customer.

2. Pall Corporation can not accept any equipment returns without a valid Return Goods Authorisation Sticker issued from Pall Contract Administration.

3. Attach the Return Goods Authorisation Sticker to the outside of the shipping container. If returning more than one container, each container must have a Return Goods Authorisation Sticker.

4. Return subject equipment or material to the address listed on the Return Goods Authorisation Sticker unless otherwise directed. Prepay all freight associated with returning the subject equipment or material to the designated return address.

IMPORTANT

When returning any equipment, it is the customer's responsibility to make sure those responsible follow proper packing and shipping procedures. For packaging assistance, contact Pall Water Processing at 02 4340 8900.

Return Goods Authorisation does not constitute in itself a guarantee of the issuing of credit by Pall Corporation. Final disposition of credit allowance rests with Pall after receipt and inspection of subject material or equipment. Pall Corporation does not accept returned material or equipment without proper authorisation. Pall Corporation returns any such shipments at the customer's expense.

4.5 DIMENSIONS, WEIGHTS, AND CONTENTS OF SHIPPING CONTAINERS

IMPORTANT

Pall Corporation reserves the right to change shipping container material, sizes, and weights as required. For customer reference, the "Crated Material List" (CML) is prominently displayed on two sides of each Pall Aria™ AP-3 container. The CML lists the size (length/width/height), weight, and contents of the container. For further reference, see the other project shipping documentation.

Contact Pall Water Processing at 02 4340 8900 for current information on the Pall Aria™ AP system shipping containers for the purchased system.

Inspect all containers for shipping damage immediately on arrival. See Section "Receiving and Inspection of the Pall Aria™ AP-3 System" for more information.

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5 INSTALLATION

5.1 INTRODUCTION

IMPORTANT

This section describes installation procedures for a typical single module rack Pall Aria™ AP-3 Water Treatment System with a Quad module rack orientation. If the purchased Pall Aria™ AP-3 system has more than one rack and/or a different module rack orientation, see the system drawings for exact assembly and installation information.

In the two (2) standard module rack orientations (0° and 90°), the skid and module rack connections and piping tag numbers named in this manual are the same. The difference is in the angle and/or length of some piping connections to conform to the module rack orientation. Exact depictions of the piping connections appear on the Pall Aria™ AP-3 drawings for the purchased system.

Throughout the entire Pall Aria™ system installation use the supplied Pall Aria™ AP-3 drawings. In all instances, the Pall Aria™ AP-3 system drawings take precedence over the information supplied in this manual. Contact PASS Australia with any questions. *(Continued On Next Page)*

After the Pall Aria™ AP-3 system has been in operation, it is important that operators periodically check all connections for leakage.

WARNING!

PERSONNEL INSTALLING THE PALL ARIA™ WATER TREATMENT SYSTEM MUST FOLLOW THE IN-PLACE SAFETY PROCEDURES AT THE FACILITY WHERE THE INSTALLATION IS TAKING PLACE.

DANGER – SETTING AND POSITIONING THE MODULE RACK TREES REQUIRES MORE THAN ONE INSTALLER AND SUPPORTING EQUIPMENT (CRANE, FORK LIFT, OR OTHER APPROPRIATE DEVICE). NEVER LEAVE THE TREES UNSUPPORTED WHEN WORKING ON OR AROUND THE TREES.

DANGER – FAILING TO PROPERLY SUPPORT THE MICROFILTRATION MODULES DURING INSTALLATION MAY CAUSE BODILY INJURY AND/OR EQUIPMENT DAMAGE. TO AVOID THIS, PALL CORPORATION REQUIRES TWO PEOPLE TO INSTALL THE MICROFILTRATION MODULES.

PALL CORPORATION IS NOT RESPONSIBLE FOR ANY INJURIES OR EQUIPMENT DAMAGE BY INSTALLERS FAILING TO PROPERLY SUPPORT ANY EQUIPMENT/COMPONENTS OR NOT FOLLOWING SAFETY PROCEDURES DURING INSTALLATION.

CAUTION

DO NOT install the Microza® modules or attempt to operate the **Pall Aria™** Water Treatment System until after the installation of all utilities, instruments, and interconnecting piping and the **Pall Aria™** System has had an initial flushing. The **Pall Aria™** Water Treatment System requires flushing after these installations/connections are complete and before module installation. Refer to the Section 5.11"Initial System Manual Flush

(Continued On Next Page)

Procedure" on page 58 for further information.

Do not install the microfiltration modules unless a PASS Australia representative is on-site or without approval from PASS Australia.

IMPORTANT NOTE ON PROTECTING THE HDPE COMPONENTS:

When moving or working with HDPE components (including manifolds) installers must protect all sealing surfaces from any damage including impacting these components with any other objects or surfaces. The slightest scratch, gouge, indentation, or any other imperfection in these surfaces causes leaks between gasket sealed couplings or other HDPE sealing devices.

Failure by the customer or the customer's contracted installers to properly protect any sealing surface voids the warranty

IMPORTANT NOTE ON BUTTERFLY VALVE INSTALLATIONS:

It is the installers' responsibility to make sure the disks on elastomer-seated butterfly valves are at least partially open when tightening flange bolts. Failure to adhere to this procedure causes premature failure and voids all warranties on the valve. If unsure of the valve's nomenclature, contact PASS Australia before installation.

SUPPORT FOR PIPING RUNS:

The **Pall Aria™** AP-3 & APC-3 comes with piping supports for the Pall Corporation supplied components. It is the customer's responsibility to supply piping supports for piping runs installed by others to connect to the **Pall Aria™** AP-3 system. Do not use the AP-3 connections alone to support piping runs. If unsure of necessary supports, contact PASS Australia for clarification before installation.

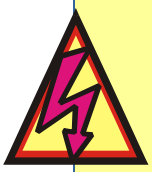
5.2 CHOOSE A LOCATION

Place the Pall Aria™ Water Treatment System in a location that provides:

1. Adequate access to all sides of the Pall Aria™ system (refer to Section 5.4 "Pre-Installation Layout for the Pall Aria™ AP-3 Skid and Module Rack" on page 35).
2. Proper drainage for safe chemical recovery/ drainage of all fluids.
3. Access to safety and chemical disposal equipment.

CAUTION

Any solution drained from the system into a common drain must meet the requirements/standards set by the governing authority for waste disposal in the affected community/area.



To make certain of the safe and efficient operation of the equipment and the following of existing laws and regulations, utility connections must be made by qualified personnel only. Pall Corporation REQUIRES that certified electricians complete all wiring connections.

If required, Ethernet cable run to and between Pall equipment must be Category 5 unshielded twisted pair data cable (Belden catalog # 1583B or equal).

Ethernet cable must be protected by installation in a PVC conduit or a suitable cable tray. Do not use a metal conduit. Telephone lines connecting to Pall Aria™ AP equipment must be surge protected.

If the main control panel is UPS protected, turning the disconnect switch to the off position does not fully de-energise the panel. Refer to the panel electrical drawings and schematics for means to disconnect the UPS output power.

If questions or problems arise during installation and a Pall representative is not on-site, contact PASS Australia.

IMPORTANT

If a housekeeping pad of concrete, cement, or other construction material is required under the main skid, installers must pour the pad to a size large enough for the operator to stand on to operate the system at the control panel HMI.

5.3 REQUIRED TOOLS FOR INSTALLATION

At a minimum, make sure the following tools are available prior to installation:

- A crane and/or fork lift (rated for the appropriate lifting capacity) for moving the skid into place
- 18" strap wrench
- (2) 12 foot step ladders
- (2) ½" wrenches
- (2) ⅝" wrenches
- $^{9}/_{16}$" wrench
- $^{11}/_{16}$" wrench
- ¾" wrench
- $1^{1}/_{16}$" wrench
- 1⅛" wrench
- 1⅝" wrench
- 4 foot level and square
- String level
- Plumb bob

- Measuring tape
- Nickel-based anti-seize compound
- PVC solvent and glue
- Hammer drill with appropriate bit for anchor bolts
- Clean cloths
- Hammers, bars, and cordless screwdriver for uncrating the skid
- Torque wrench (25 – 250 ft-lb.)
- 8" adjustable wrenches
- Set of flat blade and Phillips screwdrivers
- Lubricant (NSF approved for potable water)

5.4 PRE-INSTALLATION LAYOUT FOR THE PALL ARIA™ AP-3 SKID AND MODULE RACK

IMPORTANT

A reference in this installation manual to the front side of the skid always indicates viewing the skid from the side where the control panel is mounted. References in this manual to the skid left side, right side, etc, are oriented from the control panel or front side of the skid.

Refer to the Filter Skid Assembly [01] drawing for the skid and rack configuration. This drawing also indicates the locations of the mounting plates for the AP-3 skid and module rack(s). The locations of the mounting plates are on the INSIDE of the skid.

Starting at a convenient wall, measure to the right rear corner of where the skid is to be. Make sure there is AT LEAST 36 inches (92 cm) clearance (recommended) between the skid and the wall (and any other equipment, optional skids, etc).

CAUTION

Required clearances and component dimensions are subject to change so it is important that installers check the system drawing [M] for the layout dimensions of all mounting positions of the skid and module rack(s), and all interconnecting piping to insure that distances between skid and rack mounting positions are not greater than the maximum length of the interconnecting piping.

Once the first measurement is obtained, mark out on the floor a rectangular box that is 392 cm x 215 cm. This is the overall skid location, not the anchor bolt locations (see Section 5.5 "Placing and Anchoring the AP-3 Skid" on page 37 for locating the anchor bolts).

Using the dimensions on the Filter Skid Assembly [01] drawing, mark out on the floor the location of the housekeeping pads for the module rack(s). Again, using the supplied Pall Aria™ system drawings, locate and mark on the floor the location of any additional skids for optional purchased equipment (e.g. CIP skid, EFM skid, etc).

CAUTION

The module rack trees are shipped unassembled. During assembly installers will be required to anchor the module rack trees to their bases for safety and unloosen it at times to make adjustments for manifolds and piping alignment. Use extreme caution during this evolution. Never leave the module rack trees unrestrained. Always ensure that the module rack trees are secure to their foundation.

IMPORTANT

Sizing, supplying, and installing the anchor bolts for securing the module rack trees to the housekeeping pads are the customer's responsibility.

After leveling the module rack trees, shim and grout as needed.

5.5 PLACING AND ANCHORING THE AP-3 SKID

To anchor the Pall Aria™ AP-3 skid, the customer must select anchor bolts of the appropriate size and grade based on local codes, regulations, and building specifications. Site conditions vary and each installation is unique. Pall Corporation recommends consulting a civil engineer for proper anchor bolt sizing.

WARNING!

WHENEVER LIFTING, MOVING, OR PLACING THE SKID, INSTALLERS MUST UTILISE APPROPRIATE AND PROPERLY RATED LIFTING AND MOVING EQUIPMENT, FOLLOW ALL SAFETY PROCEDURES, AND MAINTAIN PROPER SUPPORT FOR THE SKID. FAILURE TO ADHERE TO THE ABOVE WARNING COULD RESULT IN PHYSICAL INJURY AND/OR DAMAGE TO SYSTEM COMPONENTS AND VOID ALL WARRANTIES.

5.5.1 PLACING AND ANCHORING THE VALVE SKID

Instructions:

1. Using a crane or forklift, move the skid into position and place it over the marked locations for the skid.

2. Once the skid is in place, check that the skid is square and positioned properly then mark the location for each of the anchor bolts through the skid mounting plates (Refer to Figure 5.1 for typical frame anchor bolt holes location).

3. Using a crane or forklift, move the skid to expose the anchor bolt location marks, leaving clearance for hammer drill operation.

4. Drill holes for the anchor bolts.

5. Using a crane or forklift, move the skid back over the holes.

6. Once the skid is in position, install anchor bolts and loosely tighten nuts onto the bolts.

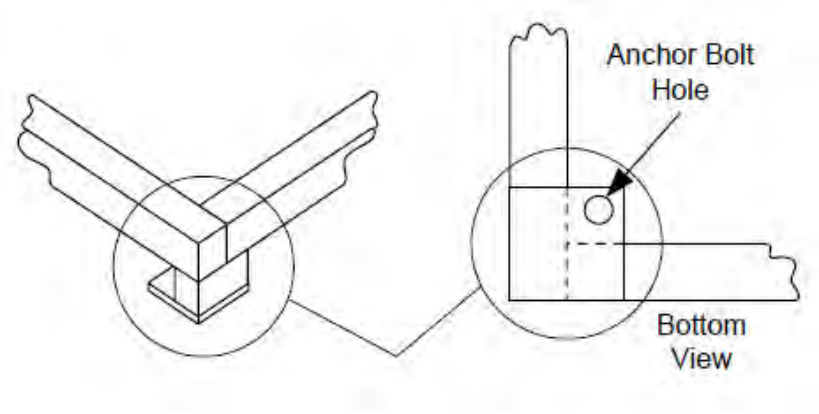


FIGURE 5.1 – TYPICAL FRAME ANCHOR BOLT HOLE LOCATION

7. Check the skid and make sure it is level. If necessary, shim up each side of the skid using steel shims. After the unit is level, tighten and torque the anchor bolts, firmly attaching the skid to the foundation.

8. Till now, the valve skid installation is finished (Refer to Figure 5.2).

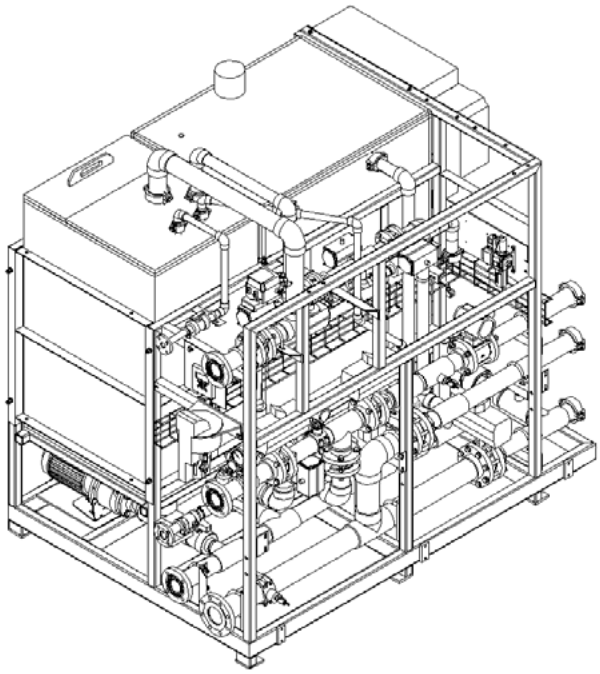


FIGURE 5.2 – VALVE SKID INSTALLATION FINISHED

5.5.2 PLACING AND ANCHORING THE MODULE RACK

CAUTION

The module rack trees are shipped unassembled (Refer to Figure 5.7). During assembly installers will be required to anchor the module rack trees to their bases for safety and unloosen it at times to make adjustments for manifolds and piping alignment. Use extreme caution during this evolution. Never leave the module rack trees unrestrained. Always ensure that the module rack trees are secure to their foundation.

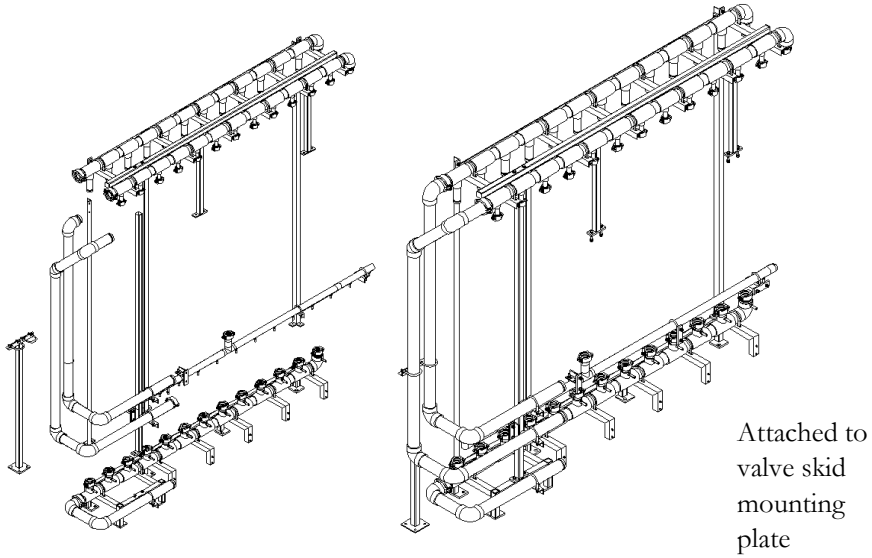


FIGURE 5.3 – MODULE RACK ASSEMBLY

Instructions:

1. Using a crane or forklift, move module rack skid into position and attach it to the valve skid, and then marked location for the module rack (Refer to Figure 5.4).

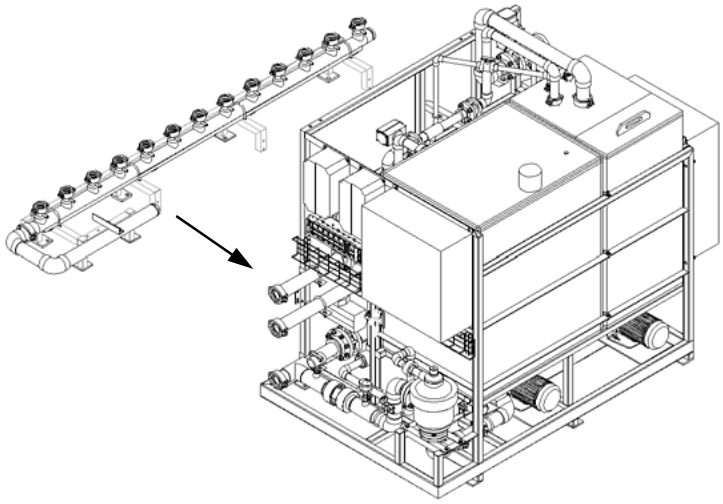


FIGURE 5.4 – MODULE RACK ATTACHED TO THE VALVE SKID

2. Once the module rack skid is in place, check that the skid is square and positioned properly then mark the location for each of the anchor bolts through the skid mounting plates (Refer to Figure 5.1 for typical frame anchor bolt holes location).

3. Using a crane or forklift, move the rack to expose the anchor bolt location marks, leaving clearance for hammer drill operation.

4. Drill holes for the anchor bolts.

5. Using a crane or forklift, move the module rack back over the holes.

6. Once the rack is in position, install anchor bolts and loosely tighten nuts onto the bolts.

7. Check the rack and make sure it is level. If necessary, shim up each side of the skid using steel shims. After the unit is level, tighten and torque the anchor bolts, firmly attaching the rack to the foundation.

8. Attach the module rack to the valve skid (Refer to Figure 5.4).

9. Attach the upper manifolds and frame support frame to the module rack (Refer to FIGURE 5.5 & FIGURE 5.6 & FIGURE 5.7).

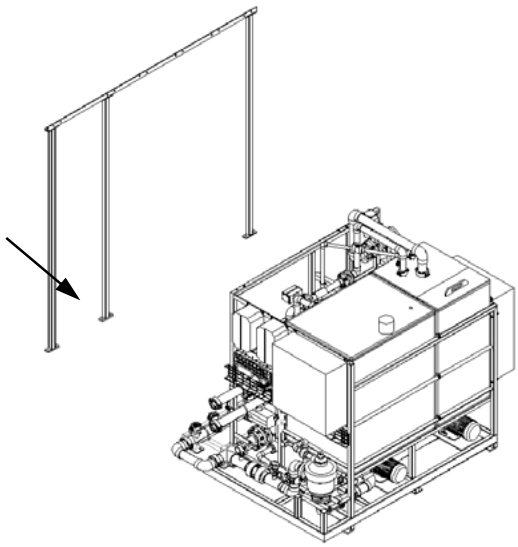


FIGURE 5.5– UPPER MODULE FRAME AND MONIFOLDS SUPPORT FRAME INSTALLATION-1

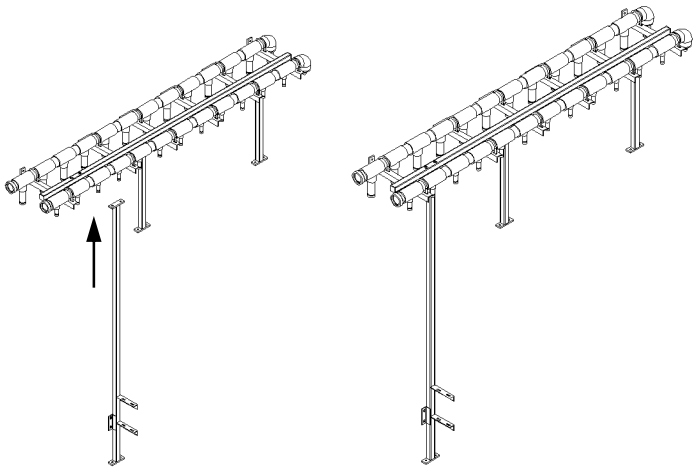


FIGURE 5.6– UPPER MODULE FRAME AND MONIFOLDS SUPPORT FRAME INSTALLATION-2

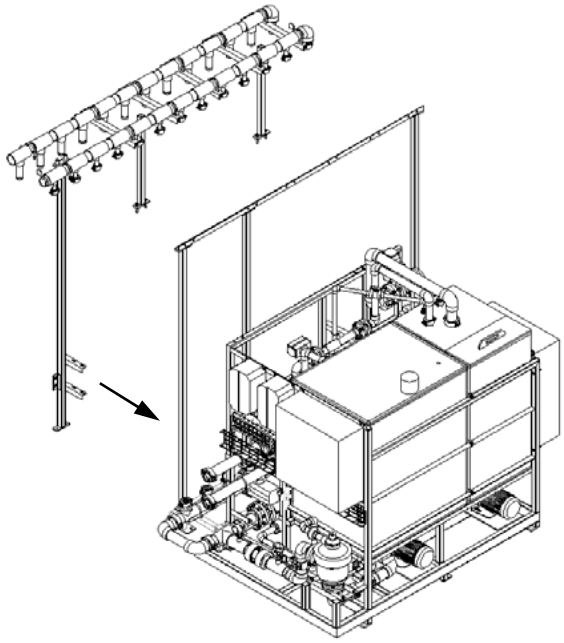


FIGURE 5.7– UPPER MODULE FRAME AND MONIFOLDS SUPPORT FRAME INSTALLATION-3

10. Install the permeate, AS, and XR intraconn,piping to upper manifolds and valve rack piping (Refer to Figure 5.8).

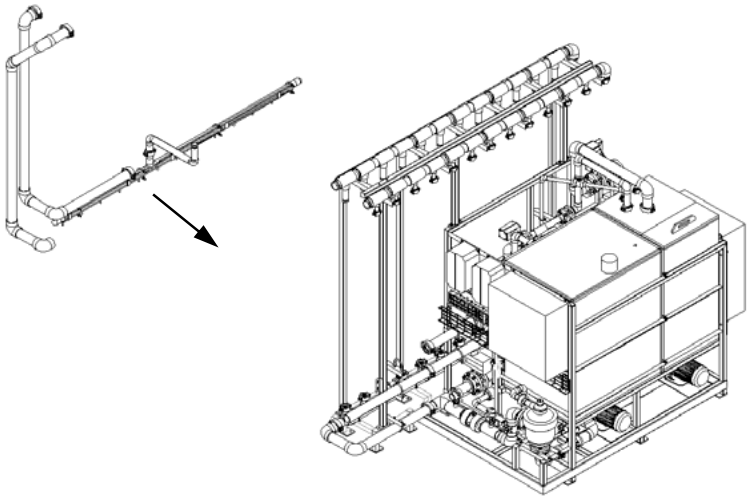


FIGURE 5.8–PERMEATE&XR,AS INTRACONN PIPE MANIFOLDS INSTALLATION

11. Install the intraconn piping support frame (Refer to Figure 5.9). This

frame needs to be anchored to the foundation.

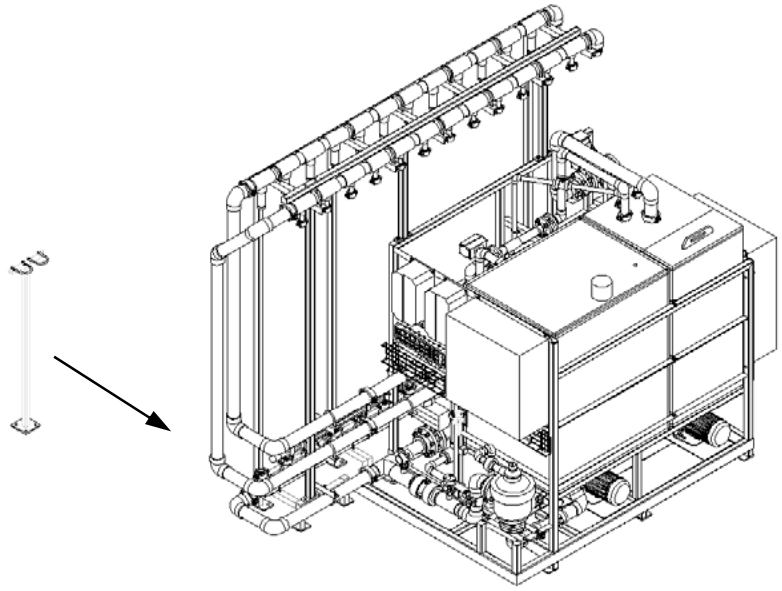


FIGURE 5.9 INTRACONN PIPING SUPPORT FRAME INSTALLATION

12. Install the AS hose on the module rack (Refer to Figure 5.10).

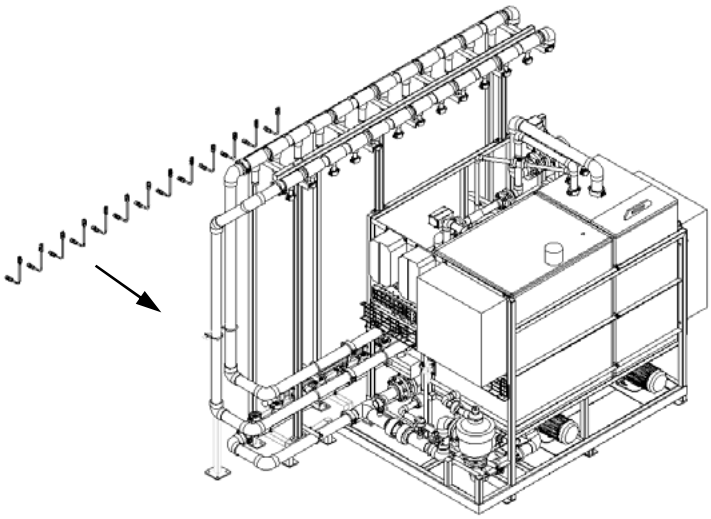


FIGURE 5.10–INSTALL AS HOSE

13. Till now, the AP-3 MF system has been installed (Refer to Figure 5.11, 5.12, 5.13).

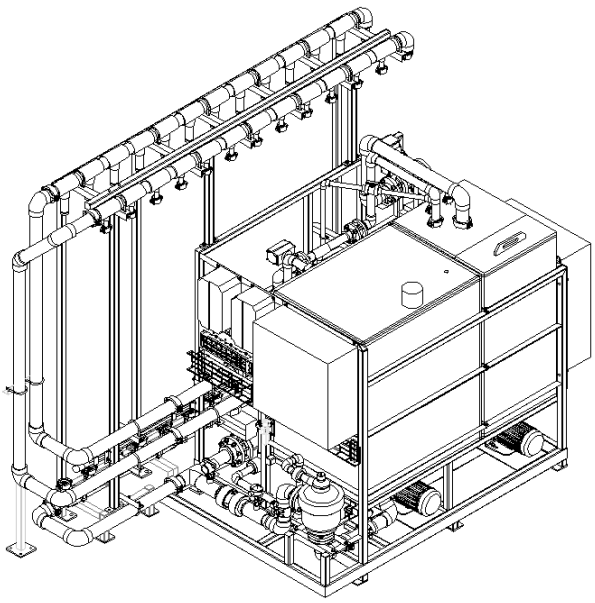


FIGURE 5.11–INSTALL FINISHED-1

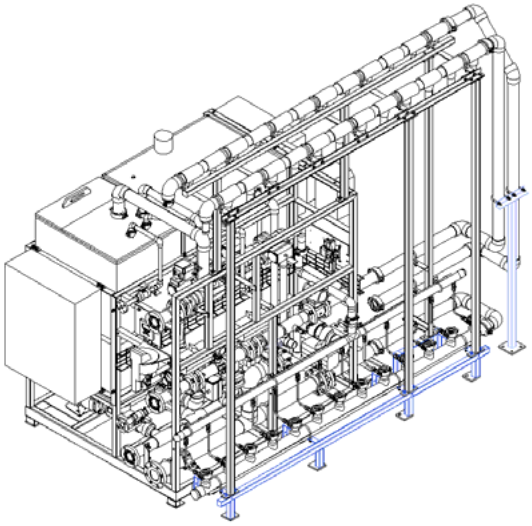


FIGURE 5.12–INSTALL FINISHED-2

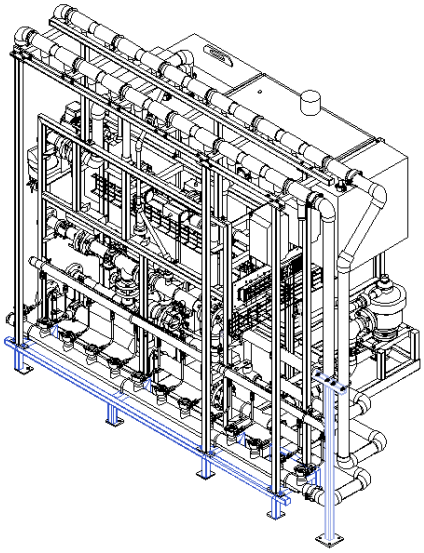


FIGURE 5.13–INSTALL FINISHED-3

CAUTION

The install sequence is not absolutely exclusive, it is used for instructing the installation. User can determine by their convenience on site.

5.6 DUMMY MODULE INSTALLATION ON THE MODULE RACK HDPE FEED AND FILTRATE MANIFOLDS

CAUTION

Do not install the Microza® modules in the rack or attempt to start a filtration cycle until the Pall Aria™ Water Treatment System has been properly and completely flushed with fluid and air (see Section 5.11 "Initial System Manual Flush Procedure" on page 58).

Dummy modules are provided to perform the initial system flush.

An initial system flush is necessary to remove debris and loose particles that may have accumulated inside the system piping during fabrication and installation. Pall Corporation recommends that a PASS Australia engineer be present at initial system startup to assist the operator in performing the system flush.

Using the Pall Aria™ system before flushing may cause damage to the modules and other system components. If a PASS Australia representative is not on site for system commissioning, contact PASS Australia immediately.

The compressed air line must be blown out and completely free of any construction debris. Failure to do this could result in premature module or instrument failures.

Pall Corporation is not responsible for any damage to the Pall Aria™ Water Treatment System caused by failure to provide sufficient protection of the system air components or caused by failure to sufficiently flush the system before installing the Microza® modules.

To maximise flow through the rack manifolds during flushing, the dummy modules are located in the first position and the last two positions on the manifolds. For dummy module component item numbers and locations, see Figure 5.14, next page.

Pall Corporation requires at least two people install the dummy modules.

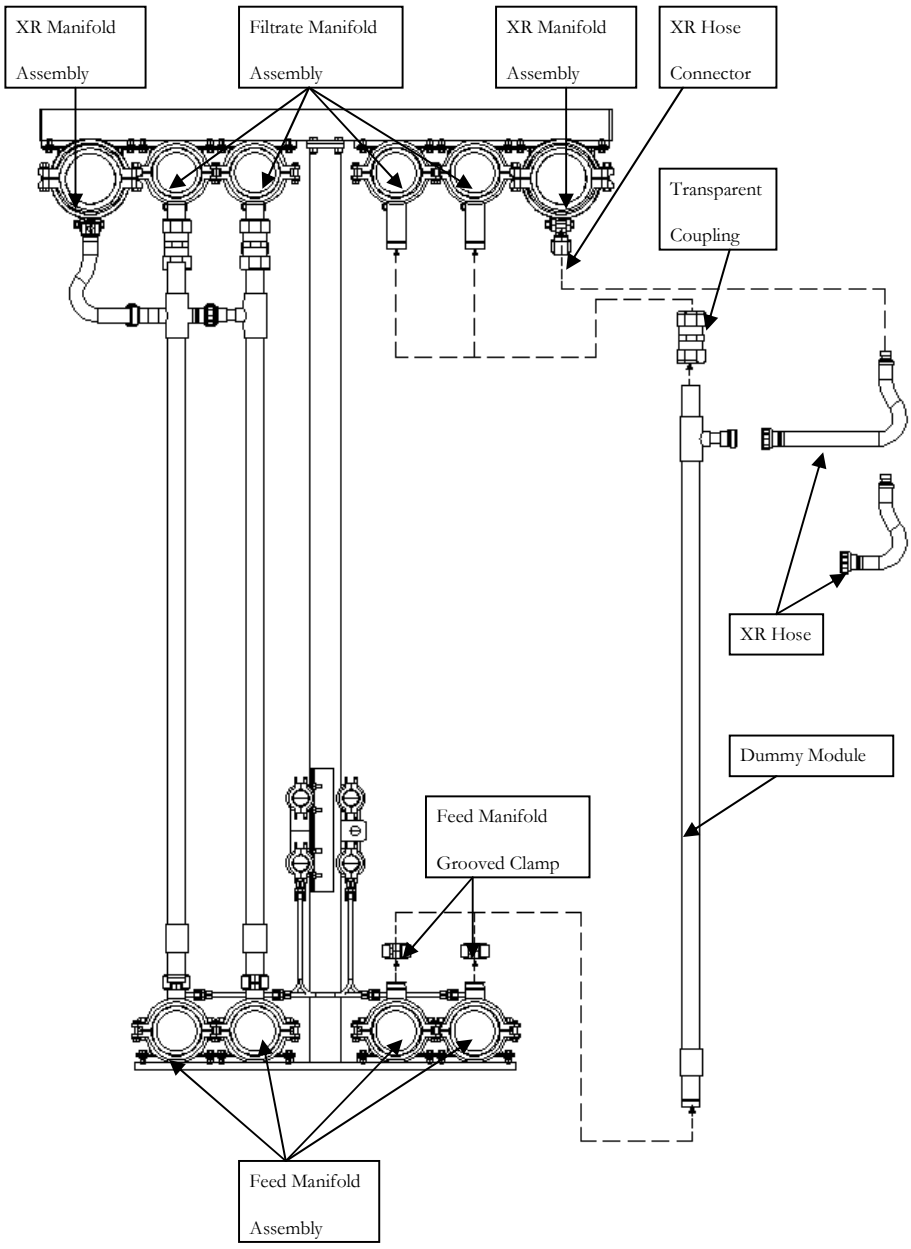


FIGURE 5.14 – DUMMY MODULE INSTALLATION AND PART IDENTIFICATIONS

Make sure the following components are available for each dummy module installation:

- ✓ PVC Transparent Couplings
- ✓ XR Flexible Hose Connectors
- ✓ Feed Manifold Grooved Pipe Clamp
- ✓ Dummy Modules

All unused module spaces on all manifolds must be capped and clamped fully to prevent leakage.

Refer to Figure 5.14 and depend on the module rack configuration during this procedure:

1. Apply a thin film of food-grade lubricant (NSF approved for potable water) on the gaskets of the transparent coupling. Slide the fitting over the filtrate connecting pipe on the rack in position #1. Push the coupling as far up as possible on the connecting pipe and tighten the upper gland nut enough to prevent the coupling from slipping.

   Remember to apply lubricant to the gaskets of the clamps on the feed and XR manifolds.

2. Loosen the grooved pipe clamp on the feed manifold position #1 and slide the clamp and its gasket over the feed manifold connection. Push the gasket down far enough to expose the end of the manifold nipple.

3. With the XR connection at the top, lift the dummy module and place it on top of the feed (lower) manifold nipple.

4. Locate the module so that the XR connection is located facing away from the rack tree.

5. On the filtrate manifold, slide the clear coupling down over the module and loosely tighten both coupling nuts.

6. On the feed manifold, slide the grooved pipe clamp up over the joint between the manifold and the dummy module. Make sure the clamp and gasket is correctly placed and tighten loosely.

7. Attach the XR hose to the nipple on the XR manifold using the provided clamp. Loosely tighten the clamp.

8. Attach the other end of the XR hose to the module and loosely tighten.

9. Check the plumb of the dummy module using a level on the side. Shift the module until the correct plumb position is attained.

10. Tighten all clamps and couplings according to the manufacturer's recommendations.

11. Repeat steps 1 – 10 to install the other dummy modules.

12. After installing all dummy modules, make sure all blank positions on all manifolds are capped off and that their respective clamps are tight.

5.7 CUSTOMER CONNECTIONS TO THE PALL ARIA™ AP-3 SKID

Required connections of off-skid equipment to the Pall Aria™ AP system can be located on the supplied Pall P&ID [00] drawing and on the electrical drawings [03].

CAUTION

It is the customer's responsibility to supply piping supports for piping runs installed by others to connect to the Pall Aria™ AP-3 system. Do not use the AP-3 connections alone to support piping runs. If unsure of necessary supports, contact PASS Australia for clarification before installation.

5.7.1 CONNECTING UTILITIES

CAUTION

To make certain of the safe and efficient operation of the equipment and the following of existing laws and regulations, only qualified personnel should make utility connections.

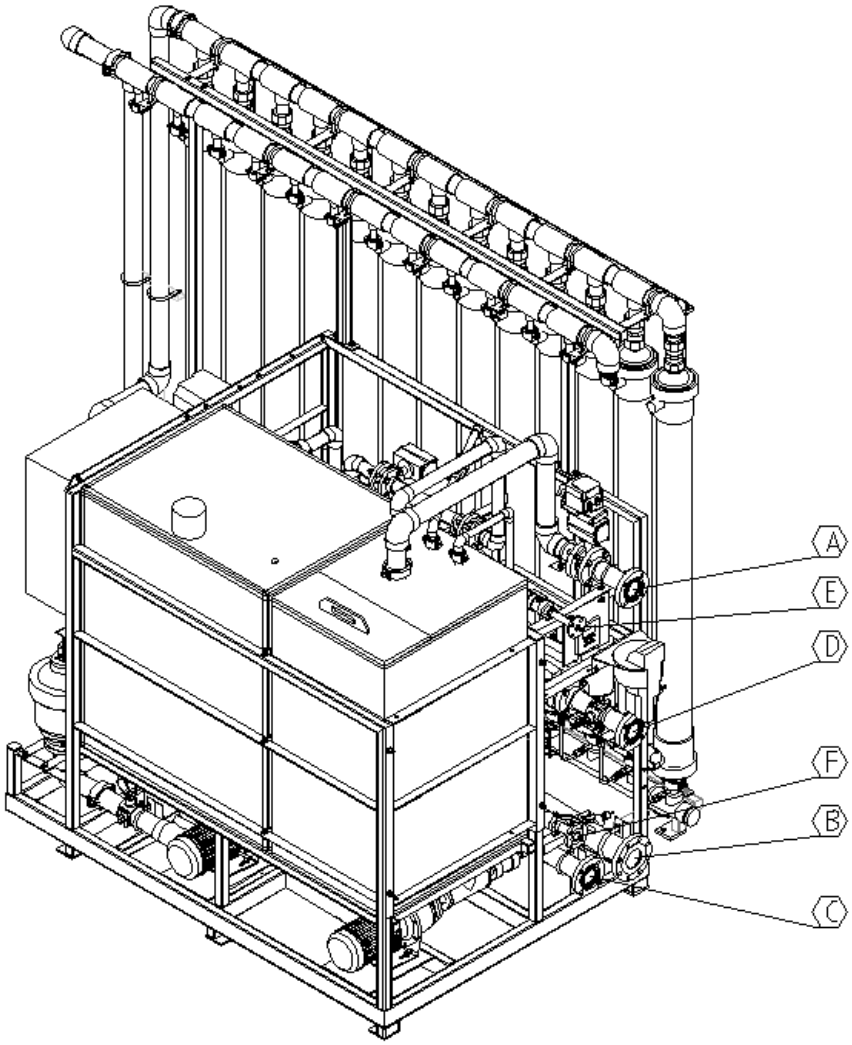
If required, Ethernet cable run to and between Pall equipment must be Category 5 unshielded twisted pair data cable (Belden catalog # 1583B or equal). It must be protected by installation in a PVC conduit or a suitable cable tray. Do Not use a metal conduit. This installation, including material, is by others.

Telephone lines connecting to Pall Aria™ AP equipment must be surge protected.

If questions or problems arise during installation and a Pall representative is not on-site, contact PASS Australia.

Required connections of off-skid equipment to the **Pall Aria™** AP system can be located on the P&ID drawing [00] and on the electrical drawings [03], and other relevant off-skid optional component drawings.

Contractors must supply gaskets, mating flanges and hardware as required for each connection. Refer to Figure 5.15 for **Pall Aria™** AP skid customer connection locations.



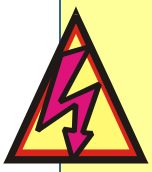
BATTERY LIMIT TABLE		
ITEM	DESCRIPTION	TYPE
A	FEED	3"FLG ANSI #150 UPVC
B	RF/AS DRAIN	4"FLG ANSI #150 UPVC
C	MISC.DRAIN	3"FLG ANSI #150 UPVC
D	FILTRATE FORWARD	3"FLG ANSI #150 UPVC
E	POTABLE WATER	1"FLG ANSI #150 UPVC
F	AIR SCRUB SUPPLY	1.5"FLG ANSI #150 304

FIGURE 5.15 – PALL ARIA™ AP-3 SKID CUSTOMER CONNECTIONS

5.7.1.1 ELECTRICAL CONNECTIONS TO SKID

CAUTION

Pall Corporation REQUIRES that certified electricians complete all wiring connections. Always use the specification information contained in the Pall Aria™ AP-3 drawings for installations.



DANGER – Using a power source other than that specified in this manual or the system drawings can cause BODILY HARM and/or product damage. Make sure the power supply meets the requirements as specified.

Under no circumstances shall the Pall Corporation supplied electrical enclosure(s) be penetrated on the top of the enclosure. All penetrations of control cabinets must be on either the side or bottom of the enclosure.

If the main control panel is UPS protected, turning the disconnect switch to the off position does not fully de-energise the panel. Refer to the panel electrical drawings and schematics for means to disconnect the UPS output power.

Electricians must check the specific site requirements and the Pall Corporation electrical drawings supplied with the system. **Pall Aria™** AP skid level electrical drawings numbers have key number [03]. The AP skid requires a single electrical connection for power. If there is more than one skid, the installation of an Ethernet cable is required between the skids and other electrical panels.

5.7.2 FEED PIPING

Pall recommends that feed piping be installed such that a minimum of 5 psi (0.35 bar) pressure is available at the flange inlet to the skid, and limit the inlet pressure to this same connection to 35 psig (2.4 barg). Feed piping must be compatible and approved for its intended service use.

CAUTION

Installers must flush the feed piping prior to making the final connections to the Pall Aria™ AP system. Debris from pipe fitting operations can destroy valve seats, plug strainers, and damage the microfiltration modules.

5.7.3 FILTRATE FORWARD PIPING

Pall recommends that the filtrate forward piping installation be such that it does not exceed a maximum pressure of 5 psi (0.35 bar). The minimum back pressure required at the filtrate forward connection is 2 psi (0.14 bar). Filtrate piping must be compatible and approved for its intended service use.

Installers must take care in designing filtrate piping to prevent siphoning of water from the **Pall Aria™** system.

5.7.4 DRAIN PIPING EXTERNAL TO THE PALL ARIA™ AP SKID

CAUTION

There are two drains on a Pall Aria™ system. Both these drains must discharge below the skidded system. This means that drain piping must be free draining. Miscellaneous drain piping must be free draining and freely vented. The process high flow drain piping must be free draining and is vented on the MF system by the systems valves when necessary. The drain lines are not designed to be tied together once they leave the MF system. Do not tie these drain lines together. Also, these drain lines must not be run up overhead. All drain processes utilise gravity to drain the skid.

Any solution drained from the system into a common drain must meet the requirements/standards set by the governing authority for waste disposal in the affected community/area.

5.7.4.1 CIP, RF, AS DRAIN (PROCESS (HIGH FLOW - GRAVITY) DRAIN) PIPING

Pall recommends that this piping remain at a minimum 168 mm in size for single skid applications and increase accordingly when the combined flows of more then one AP skid is introduced in to the drain piping system. Flow rates in this line can reach upwards of 1752lpm for 2 minutes. This line must have a dedicated drain to prevent flooding of gravity drains in the area.

Drain piping must be compatible and approved for its intended service use.

5.7.4.2 MISCELLANEOUS DRAIN

Pall recommends that this piping remain at a minimum 2 inches (50.8 mm) in size for single skid applications and increase accordingly when the combined flows of more then one AP skid is introduced into the drain piping system. Flow rates in this line are typically 3.79 lpm. This line must never be combined with the CIP, Reverse Filtration, Air Scrub Drain (Process (High Flow - Gravity) Drain) piping.

Drain piping must be compatible and approved for its intended service use.

5.7.5 CIP MAKE-UP WATER

Pall recommends that the installation of the piping be such that a minimum of 2 psi pressure is available at the flange inlet to the skid. CIP Make-up water piping must be compatible and approved for its intended service use.

5.7.6 AIR SUPPLY FOR AUTOMATED VALVES AND AIR SCRUB

CAUTION

All piping must be cleaned and deburred prior to installation. After installation and before connection to the Pall Aria™ skid, purge all piping with air to remove any debris. Failure to remove metal

shavings or other debris from the air piping can result in module failure, damage to the solenoid bank, and other components. This type of damage is NOT covered under warranty. Take appropriated safety precautions during purging operations.

Pall requires that the compressed air line be completely purged of all construction debris. Failure to do this could result in premature module or instrument failures.

Air is to be supplied at 1827.4 kPa MINIMUM DELIVERY PRESSURE, 3 scfm per module for Air Scrub + 0.5 scfm continuously for automated valves. The air must be instrument grade, clean, dry, and oil-free.

The air piping should be sized such that the maximum pressure drop would be no grater then 1.5 psid. Stainless steel or copper tubing (Type K or L) copper tubing from the receiver to the skid. Never use black iron or galvanised pipe for air supply.

5.8 MICROBIAL INDUCED CORROSION (MIC)

CAUTION

Microbial Induced Corrosion (MIC) can occur in water left standing in steel piping for more than 48 hours. To prevent MIC after piping installation is complete and a piping flush or hydro test has occurred, Pall Corporation REQUIRES that the contractor/installer completely and thoroughly drain all piping (regardless of the material of construction) if the system is not going to be started within 48 hours.
(Continued On Next Page)

If complete drainage is not possible, Pall Corporation REQUIRES that the piping remain full and have a free chlorine residual level of 1 - 2 mg/l.

Be aware that system draining does not guarantee prevention of MIC because water may be trapped in the piping. Consequently, if start-up of the system is to be delayed for an extended period of time, 72 hours or more, Pall Corporation REQUIRES circulation of water through the rack(s) weekly. This weekly circulation must be followed by a free chlorine residual check to verify the 1 - 2 mg/l

residual level. If necessary to maintain residual, chlorine levels can be increase to 5 mg/l.

Failure to observe this warning and follow the outlined procedures may result in damage to the Pall Aria™ Water Treatment System and its components and voids all warranties.

Contact PASS Australia with any questions on procedures on preventing and requests for information on Microbial Induced Corrosion.

5.9 SYSTEM INSTALLATION AND STARTUP CHECKLIST

The checklist document is generally submitted for use at the time of the Pall Aria™ AP system shipment.

All actions on the checklist must be completed and the checklist returned to the assigned Pall Water Processing Project Manager before a PASS Australia engineer arrives on site to perform initial system power-up and flush. The customer must make sure that water and power are available to operate the unit. If possible, these items should be checked-off during the system installation phase with a PASS Australia engineer or installation technician in attendance.

Timely completion of the checklist items helps PASS Australia engineers make efficient use of their time while on-site. If the items on the checklist are not completed when the PASS Australia' engineer arrives on-site, the customer may be charged with all or part of the travel expenses and labor time for that PASS Australia' engineer.

If the Installation and Startup Checklist is not supplied, contact the Pall Corporation project manager or contact administrator for the specific project.

5.10 ACTIVITIES LIST FOR INITIAL PALL ARIA™ AP-3 SKID STARTUP

After receiving the completed install checklist (see Section 5.12), a PASS Australia engineer, or designee, performs the following actions:

- Make sure the air lines from the compressors to the skid are flushed prior to connection to the AP skid.

- System installation is complete.
- All connections are made.
- Check main control panel for proper wiring.
- Turn on main power and check initial boot up. Clear any errors.
- Make sure all instruments are powered up.
- Perform the "Initial System Manual Flush Procedure" (see Section 5.11).

5.11 INITIAL SYSTEM MANUAL FLUSH PROCEDURE

The Initial System Manual Flush of the Pall Aria™ AP system is generally, and preferably, performed by a PASS Australia engineer at system startup and commissioning. The following description is provided for reference. Contact PASS Australia for more information.

- Blowout/flush the compressed air line prior to connection to the Pall Aria™ AP skid.
- Install the dummy module(s) included in the system startup kit in the rack and cap off all other module positions. Installation of the dummy module(s) must be in the location that allows flow through the entire length of the manifold.

Never use actual Microza® modules for initial system flushing.

- Fill the feed tank T-1 with filtrate quality water using an appropriate source.
- Verify T-1 level control is working.
- Pump P-1 and verify its rotation.
- The PASS Australia engineer manually initiates the flushing cycle by selecting **Manual** Mode on the **Skid Control Menu** screen and setting the valves as indicated in the Pall Aria™ Valve Truth Table. All Pall Aria™ AP components must be flushed, this includes: the main skid(s), and any purchased optional skids, e.g. Hot Water, CIP, and Neutralisation transfer systems.
- Using feed water, fill and drain T-1 twice to flush the raw water lines. The PASS Australia' engineer determines the settings for the

feed tank level percentage that controls the level control valve LCV-1. Turn P-1 off, V-5 closed.

- After final T-1 drain, fill the AP system. When the RF tank T-2 shows level, bump P-2 to confirm proper rotation.
- Close the upper drain and open the lower drain. Perform the **Air Scrub (AS)/RF** Process until the RF tank is empty.
- During **AS/RF** process, set the stop on valve V-4 to split the flow of **RF**.
- Fill T-2 and repeat the **AS/RF** process to the lower drain three times.
- Set the valves for **Forward Flow**. The operator then starts P-1 and performs a manual system fill by selecting a speed that produces the correct filtrate flow, as determined by the PASS Australia' engineer, through the flow indicating transmitter FIT-1. With the dummy modules installed, the flow rate must be monitored closely. Filtrate must be diverted to drain, not the normal final filtrate destination.
- While flushing the system, check all instruments for accuracy.
- Manually flush the system for a minimum of fifteen (15) minutes. When the system has undergone the startup flushing cycle, the operator must drain the system and clean the feed tank strainer.
- The previous fill and drain steps may need to be repeated.
- When the PASS Australia engineer has successfully completed the system startup flush and drain cycles, the system is ready to go into service. The operator can now remove the dummy module and install the Microza® MF modules (see Section 5.16) with the guidance of a PASS Australia' engineer or authorised representative.
- After installation of the Microza® modules is complete, another flush of the system is necessary to dispose of any residual storage solution in the modules (little storage solution will remain as most is drained during module installation).

After the checklist is complete, shutdown the system, drain, remove dummy modules, and install Microza® microfiltration modules (see next section "Microza® Module Installation"). In some cases the modules may need a rewetting procedure (if a Pall Corporation representative is not onsite for module installation and the installer is not sure whether the rewetting procedure is necessary, contact PASS Australia).

After module installation, rewetting (if required), and a successful **IT**, the Pall Aria™ AP system is ready to begin regular operation.

CAUTION

Any solution drained from the system into a common drain must meet the requirements/standards set by the governing authority for waste disposal in the affected community/area.

Make sure all drain connections are appropriate for the disposal of the chemical agents required for use during Pall Aria™ system CIP procedures. Also, note that the RF/AS Drain connection is under pressure.

The drain piping into which the RF/AS Drain connection ties MUST be sized properly in order to take large quantity short duration flows. An air gap should be provided on the Miscellaneous Drain to ensure that the pressurised drains do not back up into the miscellaneous drains.

Refer to the supplied Pall drawings for piping connections, line sizes, and other specifications.

There are two drains on Pall Aria™ AP3 MF systems. Both these drains must discharge below the skidded MF system. *(Continued On Next Page)*

This means that drain piping must be free draining. Miscellaneous drain piping must be free draining and freely vented. The process

high flow drain piping must be free draining and is vented on the MF

system by the systems valves when necessary. The drain lines are not designed to be tied together once they leave the MF system. Do not tie these drain lines together. Also, these drain lines must not be run up overhead. All drain processes utilise gravity to drain the skid.

Any solution drained from the system into a common drain must meet the requirements/standards set by the governing authority for waste disposal in the affected community/area.

5.12 MICROZA® MODULE INSTALLATION

CAUTION

DO NOT proceed with module installation if a PASS Australia representative is not on-site or without the consent of PASS Australia. Pall Corporation is not responsible for any damage caused by the customer not adhering to this CAUTION and such action may void all warranties.

DO NOT install the modules on the rack until the PASS Australia engineer has completed the checklist in the preceding section, "System Initial Power-up and Flush". Installing the modules before an initial flushing of the system has taken place and the entire system has been thoroughly checked may cause damage to the modules and the Pall Aria™ AP-3 system and void all warranties.

Handle the modules with extreme care. DO NOT drop or expose the modules to shock or impact. There may be damage to the membrane even if no visible damage to the module case is evident. DO NOT leave the modules without their preservative solution or un-wetted for a long time.

(Continued On Next Page)

Installing the Microza® modules must be a continuous systematic process and requires at least two (2) people. Personnel must wear eye and hand protection during module installation as the module contains a shipping/storage solution to preserve the membranes. This solution is non-toxic, but is sticky and not easy to clean.

Contact of the solution with the eyes may cause inflammation.

Install the modules vertically on the rack with the module head marked "FEED INLET" at the bottom and the other head, marked "CONCENTRATE OUTLET," at the top. The bottom end cap has a 2 inch pipe groove to attach the pipe coupling.

The skid piping and the module are connected in three places:

1. **To the process flow connection on the bottom of the module**
2. **To the process flow connection on the top of the module**
3. **To the Excess Recirculation outlet at the top/side of the module**

WARNING!

TO AVOID PERSONAL INJURY, DAMAGE TO EQUIPMENT, AND/OR THE MODULE MEMBRANE, IT IS ESSENTIAL AT ALL TIMES TO MAINTAIN ADEQUATE SUPPORT OF THE MODULE DURING INSTALLATION.

PALL CORPORATION REQUIRES THAT AT LEAST TWO PEOPLE INSTALL OR UNINSTALL THE MODULES ON THE RACK.

THIS PROCEDURE MAY INVOLVE WET AND SLIPPERY WORKING CONDITIONS. USE APPROPRIATE SAFETY PRECAUTIONS.

Equipment Required:

- Clean cloths
- Torque wrench or strap wrench
- 3 foot level
- Microza® Module wrench (supplied by Pall Corporation)

For each module, the following is required (see Figures 5.16 and 5.17):

- 1) Microza® microfiltration module
- 2) Module O-rings
- 2) Large module nuts
- 1) Black module end cap with groove (feed side)
- 1) Black module end cap without groove (filtrate side)
- 1) 2" grooved pipe coupling
- 1) 2" transparent plastic (TP) joint fitting and a 1" PVC coupling for XR hose assembly
- 1) XR hose assembly
- An NSF approved for potable water lubricant.

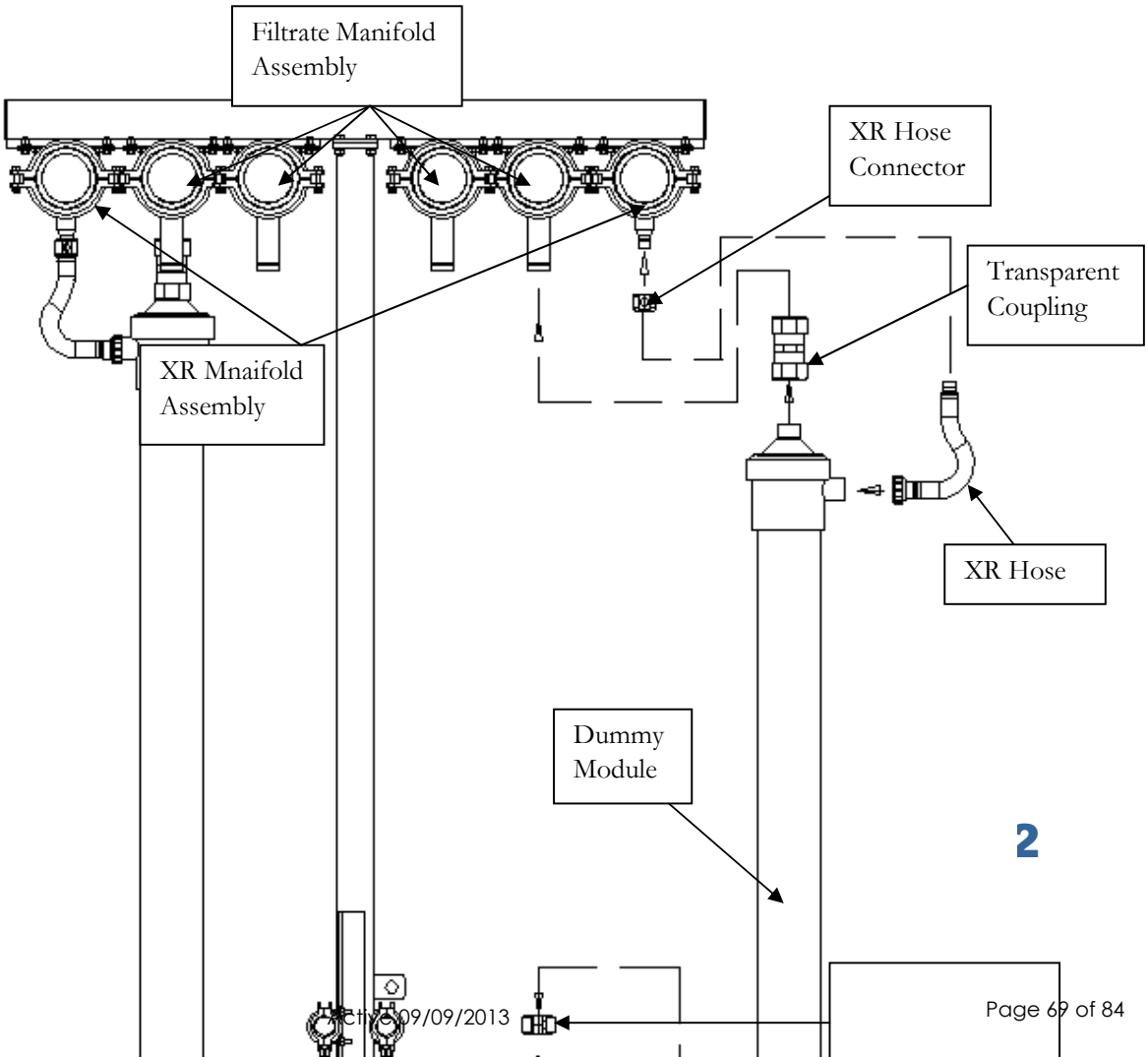

Filtrate Manifold Assembly
XR Hose Connector
Transparent Coupling
XR Mnaifold Assembly
XR Hose
Dummy Module

FIGURE 5.16 – MICROZA® MODULE INSTALLATION AND PARTS IDENTIFICATIONS

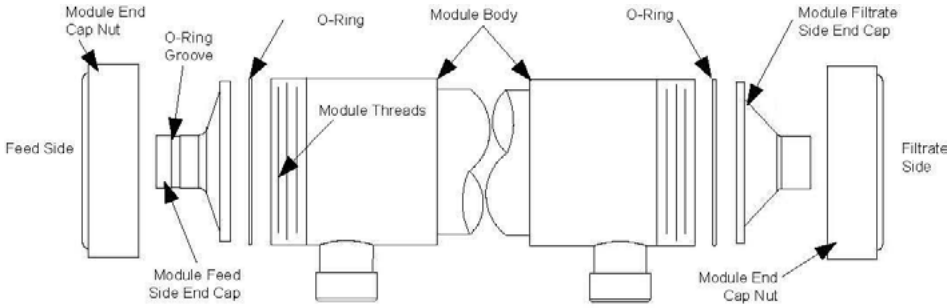


FIGURE 5.17 – MICROZA® MODULE PART IDENTIFICATIONS

CAUTION

When working with the Microza® modules, be aware that the modules contain a preservative solution. This solution is non-toxic,

but sticky, slippery, and not easy to clean. If there is spillage, clean up as quickly as possible as THE SOLUTION MAY CAUSE A SLIPPING HAZARD, TAKE APPROPRIATE SAFETY PRECAUTIONS. Contact of the solution with the eyes may cause inflammation.

Remember, DO NOT leave the modules without their preservative solution or un-wetted for a long time.

The following is the approved method of module installation (refer to the Pall Aria™ AP system drawings and Figures 5.16 and 5.17 during this procedure). See the supplied Pall Aria™ AP system drawings for item numbers.

The figures displayed in the following description are for reference only. Some components may appear differently (e.g. stainless steel manifolds instead of HDPE) on the purchased system; however the installation procedure is the same.

1. Remove a module from the shipping container and determine which end is the top (filtrate end with the smaller holes in the epoxy potting). The feed end (with the larger holes in the epoxy potting) orients to the bottom. Also, the module label is legible when the module is in the correct orientation.
2. Place the module on a flat surface. Raise the filtrate end approximately 2½ feet (76.2 cm) above the feed end (Figure 5.18).

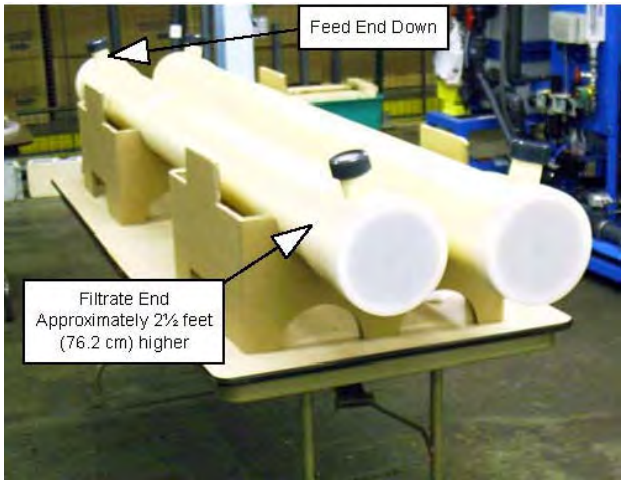


FIGURE 5.18

3. With a container placed to catch any solution that may drain out, carefully remove the tape and protective end cover from the filtrate end of the module (Figure 5.19 with collection container not shown).

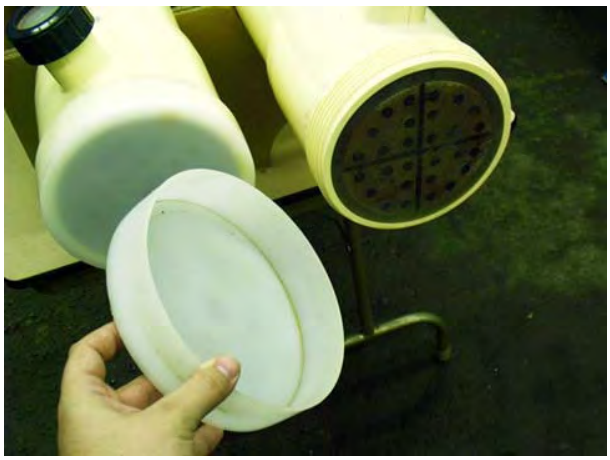


FIGURE 5.19

4. Carefully lift the feed end of the module allowing the storage solution to drain out of the filtrate end into the container.

5. After draining the module, remove the tape and protective end cover from the feed end of the module. Be aware that there may be a small amount of storage solution left in the module that drains out when the cover is removed.

6. Install the feed side end cap (the feed side end cap has the groove for the pipe clamp) onto the module:

   a. Lubricate an o-ring with NSF approved water-based lubricant and set in the groove inside the end cap (Figure 5.20).

FIGURE 5.20

   b. Lubricate the module threads with the water-based lubricant

(Figure 5.21).

FIGURE 5.21

c. Lubricate the flat area located on the top outside edge of the end cap with water-based lubricant (Figure 5.22).

FIGURE 5.22

d. With the end cap nut placed over the arm, position the end cap onto the module and hold in place (Figure 5.23).

FIGURE 5.23

e. Carefully slide the module nut over the feed side end cap and thread hand-tight onto the module (Figure 5.24).

FIGURE 5.24

7. Repeat Step 6 for the filtrate side end cap.

8. With one person holding a strap wrench around the module body, torque both end caps to 66 ft/lbs [9.13 kg/m] utilising the supplied module wrench with a torque wrench attached in the place provided (Figure 5.25).

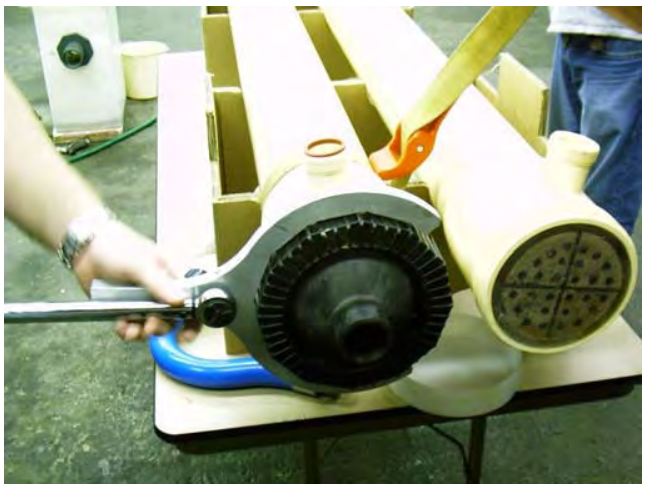


FIGURE 5.25

9. Remove the clamps and pipe caps from the rack module positions on the feed and filtrate manifolds.

10. Connect the XR flexible hose to the XR manifold and hand-tighten fasteners (Figure 5.26).

FIGURE 5.26

11. Apply a thin film of lubricant to the threads and gaskets of the 50 mm TP fitting. Insert the gaskets into fittings nuts and loosely thread the nuts onto the body of the fitting (Figure 5.27).

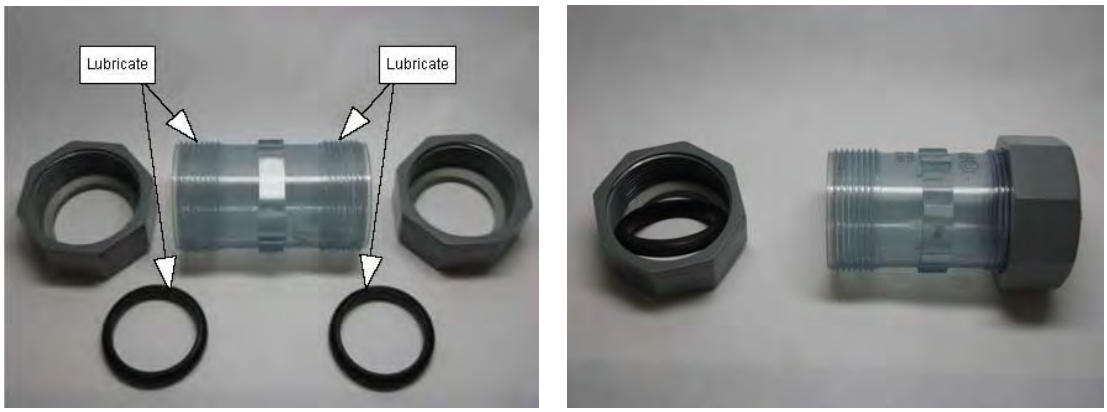


FIGURE 5.27

12. Slide the fitting over the connecting nipple on the filtrate manifold. Push the TP fitting as far up as possible and tighten the upper gland nut enough to prevent the fitting from slipping (Figure 5.28).

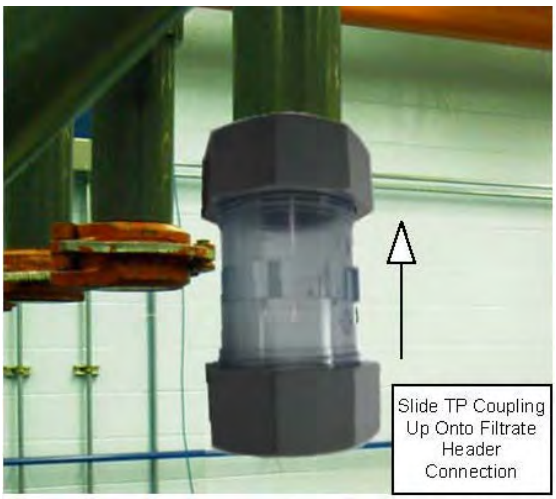


FIGURE 5.28

13. Slide a grooved clamp gasket over the exposed feed connection on the feed manifold. Push the gasket down to expose the end of the manifold nipple (Figure 5.29).

FIGURE 5.29

14. Carefully lift the module (filtrate end up) and place it on top of the lower (feed) manifold nipple. The nipple and end cap have mating chamfered surfaces to assist in locating the module correctly.

15. While one person holds the module in place on the manifold, another person slides the grooved clamp gasket up until it is centered between the grooves (Figure 5.30).

FIGURE 5.30

16. Put the grooved clamp in place and start the bolts. Loosely hand-tighten (Figure 5.31).

FIGURE 5.31

17. On the filtrate manifold, slide the TP coupling down over the filtrate end cap until it bottoms out on the end cap. Hand-tighten the TP coupling nuts (Figure 5.32).

FIGURE 5.32

18. Make sure an o-ring is in place where the XR hose connects to the module, then carefully thread the XR hose fitting onto the module and hand-tighten (Figure 5.33).

FIGURE 5.33

19. Tighten all fittings. Use a strap wrench to tighten the TP fitting (Figure 5.34). Be careful not to over tighten.

FIGURE 5.34

20. After adding all of the modules, pressurise the system to 45 psig (3 barg) in several steps, starting at 15 psig (1 barg). Check all joints for leaks at each pressure, and adjust where necessary. Usually, a leak in a module joint indicates a misaligned O-ring or gasket, or a nut that has not been torqued sufficiently. Cycling pressure may reveal leaks in joints that were tight on the previous cycle, but once the joints hold at 45 psig (3 barg) over two or three cycles, they remain tight.

The module joints, particularly on the feed side, must be absolutely leak-tight to properly perform Integrity Tests.

After all modules are installed, fill the system with feed water, circulate for 15 minutes, and send the filtrate to drain (not the finished water destination). Recheck the system for any leakage. If additional assistance is required, contact PASS Australia.

CAUTION

Before bringing the system online, an Integrity Test must be performed (refer to Section 5.13, page 74).

Refer to the Maintenance Section of the main Operational and Maintenance manual for information on repairing and replacing the Microza® modules.

5.13 THE INTEGRITY TEST (IT)

Before the Pall Aria™ Water Treatment System can be brought on-line, an Integrity Test of the modules must be performed every two hours as described below. While the test is underway, closely observe the transparent (TP) coupling (see Figure 5.35) at the top of each module. If the integrity of a module has been lost, small bubbles appear in the clear coupling.

If no bubbles appear in the TP coupling for the entire IT, or after 18 hours, the system can be stopped and then drained in preparation for system start-up. If, after this time, the operator fails to achieve a passing IT, contact PASS Australia.

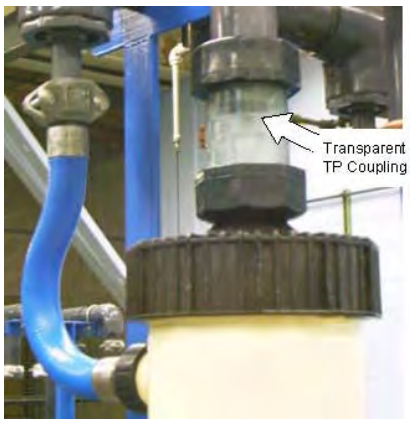


FIGURE 5.35 – THE TRANSPARENT (TP) COUPLING ON THE MODULE

IMPORTANT

The setpoints contained in the following process description are standard Pall Aria™ setpoint names (bold **CAPS** text). The Integrity Test procedure described is the standard IT. The Integrity Test setpoint names and the Integrity Test procedure itself may differ based on options specified by the customer for the purchased system. Refer to the main operation and maintenance manual provided with the purchased Pall Aria™ AP system for setpoint names.

The operator can initiate an Integrity Test at any time as long as the system is in Auto Mode and the skid is not busy doing anything else except for Forward Flow. To initiate an IT, access the Skid Control Screen and then press the Integrity Test button.

When the **Integrity Test** is complete, the skid performs the **Fill** Process.

After completing the **Fill** Process, if the **IT DECAY HIHI ALARM** was received and the skid is selected to **SHUTDOWN** on **IT** failure, the skid shuts down. If the skid is not selected to **SHUTDOWN** on **IT** failure, the skid moves to the **Forward Flow** Process.

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