CDI troubleshooting guidance notes

Client / Address -

Unit type(s)		Type of module affects, flowrate / quality / feedwater spec / current requirements		
Serial number(s)		All Ionpure modules are QC'd before leaving the factory. If module serial numbers are known, the observed running parameters can be compared to the original QC data.		
Date installed		Historical data is important to track trends. The minimum required is the commissioning data. A well maintained system should be fully monitored at least once / week. Some feedwater specs are ideally monitored daily, or continually 'on-line'		
Date data taken				
Feedwater analysis – (A **FULL** feedwater analysis is required to allow diagnosis of any possible oxidation, fouling or scaling issues). The parameters below do not represent our full feedwater specifications, but those listed below are easily monitored with site test kits.				
Temperature (°C)	5 to 45			
Total chlorine (ppm as Cl2)	<0.02	Excess chlorine can oxidise resin, giving reduced performance and high dilute pressure drop.		
Conductivity (µS/cm)	40uS/cm FCE	True 'challenge' to a module is the feedwater conductivity equivalent (FCE), essentially conductivity + CO2 +SiO2		
Hardness (ppm CaCO3)	<1	Maximum tolerance depends on module type. Excessive hardness can cause scaling. This is general indicated as an increase in module resistance. When the power supply 'peaks' out, the performance will then be affected. Hardness levels also limits the overall system recovery		
Alk (ppm CaCO3)		Alkalinity limits recovery, and along with pH can be used to calculate CO2, although RO permeate alkalinity levels are generally low and this method of estimating CO2 can lead to errors. Ideally CO2 should be measured with a test kit.		
Silica (ppm)	<1	Excessive silica will cause scaling and increased module resistance. Silica also contributes to FCE and affects system recovery.		
CO2 (ppm CO2)		A VERY important parameter. Used to calculate the ionic challenge to the module and thus the current required.		
Flowrates				
Product flowrate (m3/hr)	Max / min flowrate is dependent on module type. Flowrate affects the challenge to the module and thus the current required. Flowrates are also used to calculate recovery. Flowrate is proportional to pressure drop.			
Conc flowrate (m3/hr)				
Pressures				
Dilute pressure in/out (bar)	Systems should have pressure gauges on the inlet and outlet of the dilute and concentrate pipework. These are used to set up the module for optimum performance and to prevent cross leak contamination. Dilute outlet pressure should be set 2-5psi higher than concentrate outlet. High dilute pressure is indicative of resin damage, particulate contamination and biological fouling. Normal expected pressure drop can be projected with the IP-Pro software available as a download from www.ionpure.com			
Dilute ΔP (bar)				
Conc pressure in/out (bar)				
Conc ΔP (bar)				

Operational				
DC Voltage (volts)	The voltage is used to control current. The current is the 'driving force' for deionization. Current required can be calculated with the start up current calculator, providing other data is available – flowrate, FCE, module type, application.			
DC Current (amps)				
Module resistance (Ohms)	R = V / A. High resistance is usually indicative of scaling, but sometimes a small increase is observed with organic fouling and resin oxidation.			
Product Quality (μS/cm)	All of the above parameters will determine this value. Expected quality can be projected with the IP-Pro software available as a download from www.ionpure.com			
Additional data/Comments				
Concentrate Conductivity (μS/cm)	A useful parameter. This can be used to calculate the regenerative 'state' of the resin, (exhausted, fully regenerated, or rinsing). In steady state the concentrate conductivity can be calculated with a simple mass balance calculation.			

Additional Helpful information

P&ID's and a control philosophy can be very useful for troubleshooting. If P&IDs are not available, details on system design must be available. For instance;

1.) Is the system stop / start, or in recirculation when the process water tank is full.

2.) Does the system have an RO permeate dump on start up ?

3.) What type of power supply is fitted ? Sometimes we are asked to troubleshoot a power component failure which actually does not originate from Ionpure.

4.) For HI modules - Details on HWS cycles – Number, and temp / pressure / time profile.