

108050000-TD0002-R01

Spallation Neutron Source

Conventional Facilities Controls
Power Monitoring System
Functional System Design

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SNS Project Engineer



A U . S . D e p a r t m e n t o f E n e r g y M u l t i l a b o r a t o r y p r o j e c t
A g o n n e N a t i o n a l L a b o r a t o r y • B r o o k h e v e n N a t i o n a l L a b o r a t o r y • L a w r e n c e B e r k e l e y N a t i o n a l L a b o r a t o r y • L o s A l a m o s N a t i o n a l L a b o r a t o r y • O a k R i d g e N a t i o n a l L a b o r a t o r y

S P A L L A T I O N N E U T R O N S O U R C E

1.0 SCOPE

This document identifies the functional requirements of the Conventional Facilities Controls (WBS 1.8.5) Power Monitoring System for the Spallation Neutron Source. Power monitoring for the Klystron power supplies will be provided by the Accelerator Systems Division (WBS 1.4).

2.0 INTRODUCTION

The power monitoring system consists of software networked with meters, relays and trip units to provide real-time data and alarms as well as historical profiles to isolate the source, magnitude, time and direction of power quality problems, including voltage disturbances, harmonics and power factor.

3.0 POWER MONITORING SYSTEM OPERATION

The CF power distribution network consists of a 161kV main substation and numerous 13.8kV unit substations distributed throughout the SNS site as shown in Figure 1. Power system data for the CF power distribution network will be collected by a Cutler-Hammer PowerNet power monitoring system. PowerNet is a system of integrated metering, protection and control devices.

The two main substation 13.8kV busses and each 13.8 kV unit substation in the CF power distribution system will be monitored by Cutler-Hammer IQA6610 or FP-5000 meters. The meters will be networked to a PC/OPC Server running PowerNet software. PowerNet software is a suite of software applications that monitors device data, controls field devices, collects and compiles information, and generates reports. The PC will collect power system data from field devices and the data will be made available to the CF Control System via the OPC Server as shown in Figure 2.

The PowerNet OPC Server acts as an interface between the OPC protocol and the PowerNet protocol, enabling OPC clients to receive data dynamically from field devices and issue commands over an Ethernet network. The CF Control System EPICS software will act as an OPC client sending and receiving data to and from the OPC Server using the OPC protocol.

Power system data will be displayed on EPICS workstation screens. Operators will select the desired power monitoring data display screen using a series of menu screens. Data from each unit substation power analyzer is unique and will be displayed on a separate screen. Example EPICS workstation menu screens and data screens are shown in Figures 3 thru 15.

4.0 POWER MONITORING SYSTEM SIGNAL LIST

A list of signals that will be displayed on EPICS workstation screens is shown in Table 1. There will be no setpoints, no logic functions, no automatic control functions and no remote control from the control room (CFCC or CCR) associated with these signals. The signals will be used for system information and operational status only. The system information provided may be used for troubleshooting CF power system operational problems and accelerator operational problems.

The EPICS signal names shown in Table 1 will be preceded by a building_device descriptor. See examples below.

- | | |
|---|-----------------------|
| 1. Phase A current on transformer KL-T-SS3 is shown as: | KL_SS3:IA |
| 2. System power factor for transformer RN-T-SS7 is shown as: | RN_SS7:PFS |
| 3. Average phase voltage on main transformer Bus B is shown as: | MAIN_BUSB:VAVG |

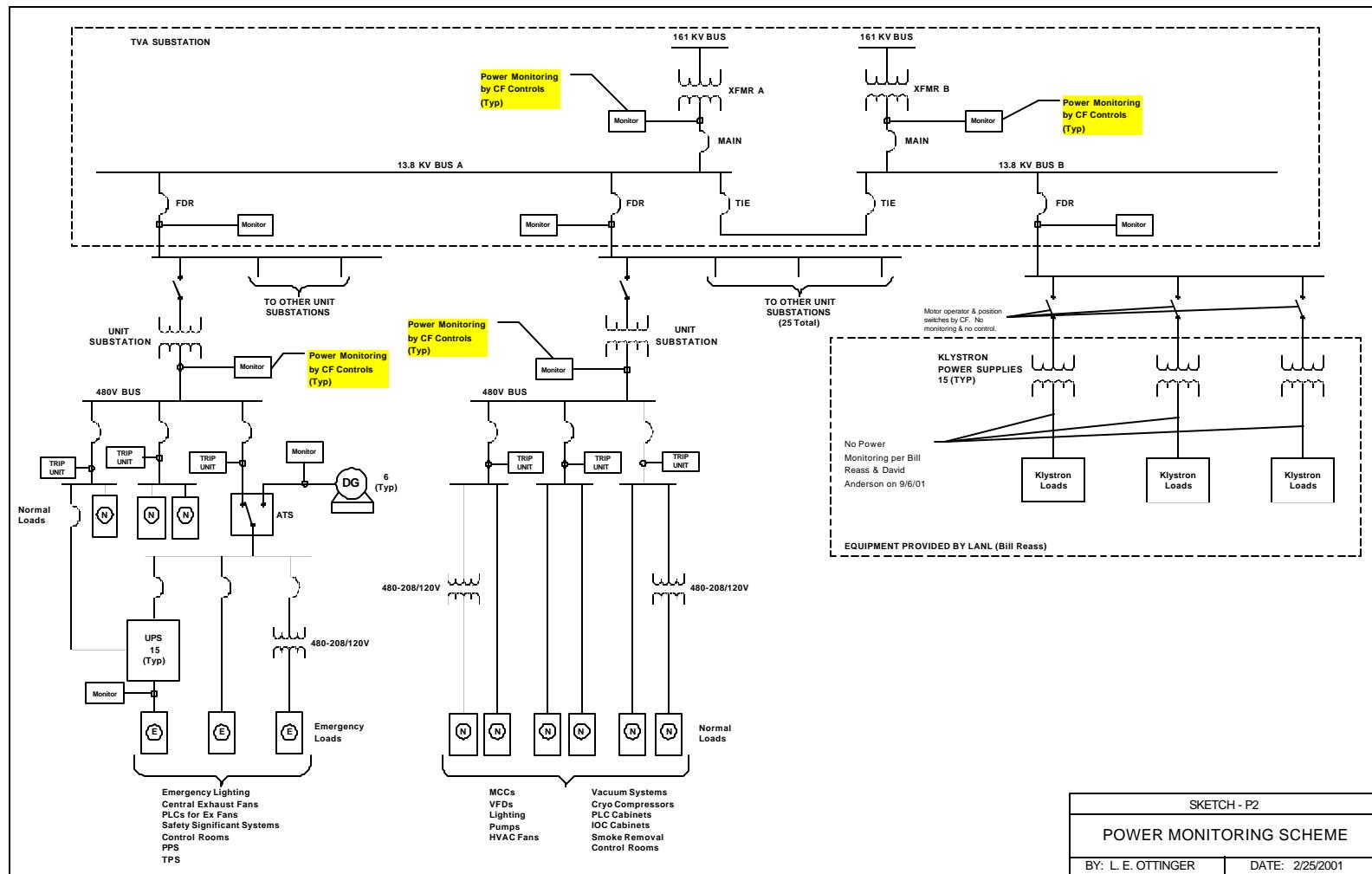


FIGURE 1 – CF Power Monitoring Scheme

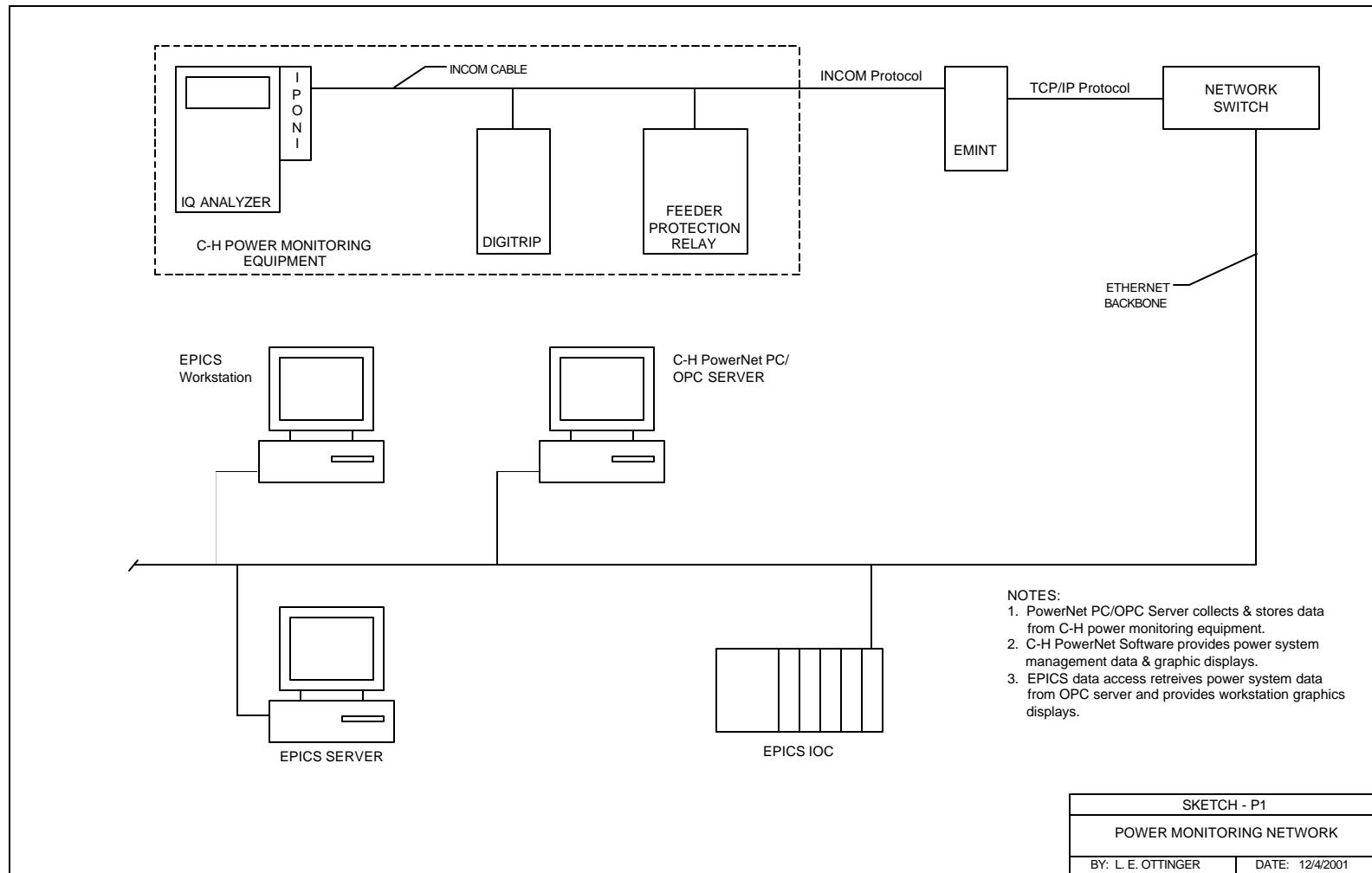


FIGURE 2 – Conventional Facilities Power Monitoring Network

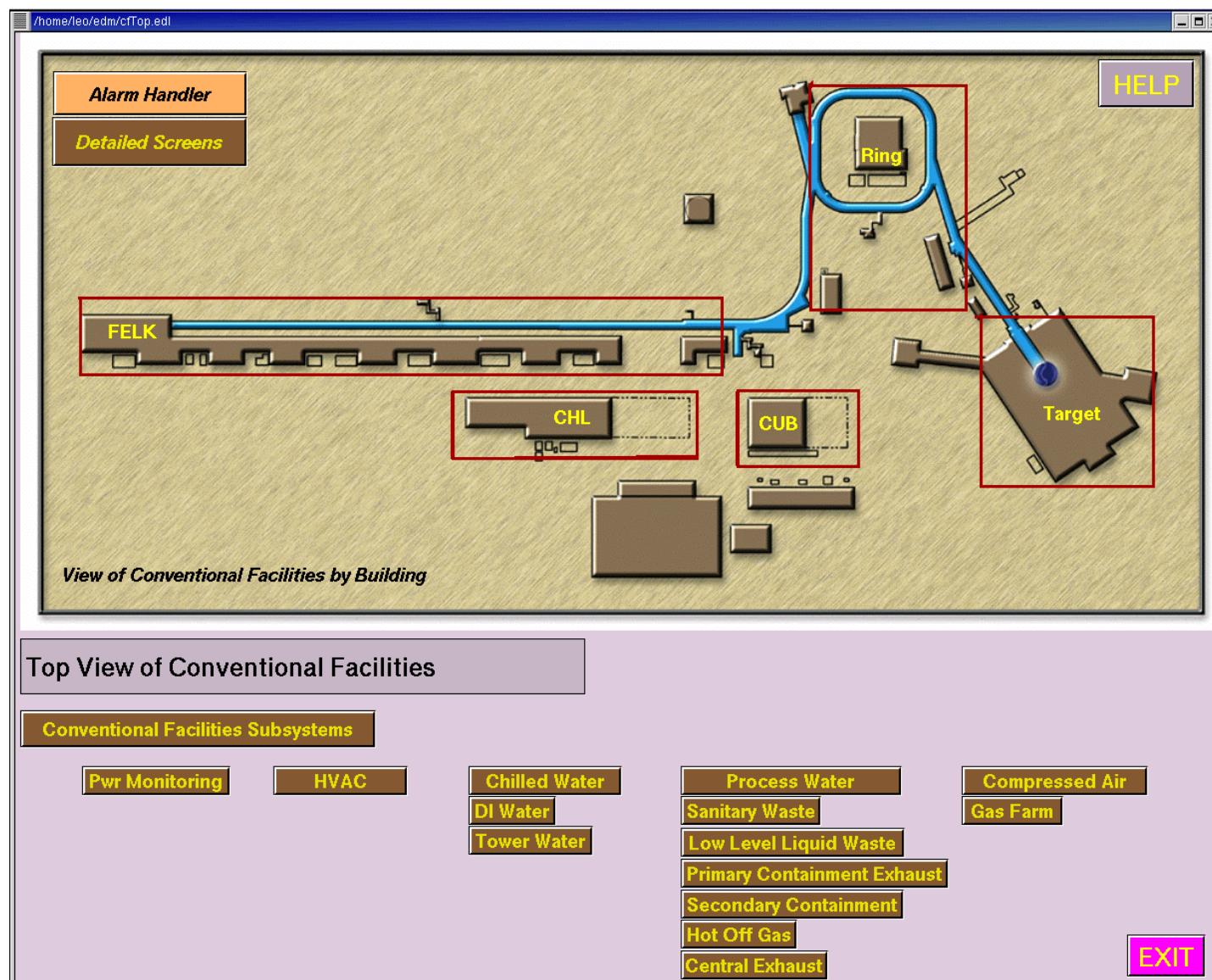


FIGURE 3 – Conventional Facilities Main Menu Screen

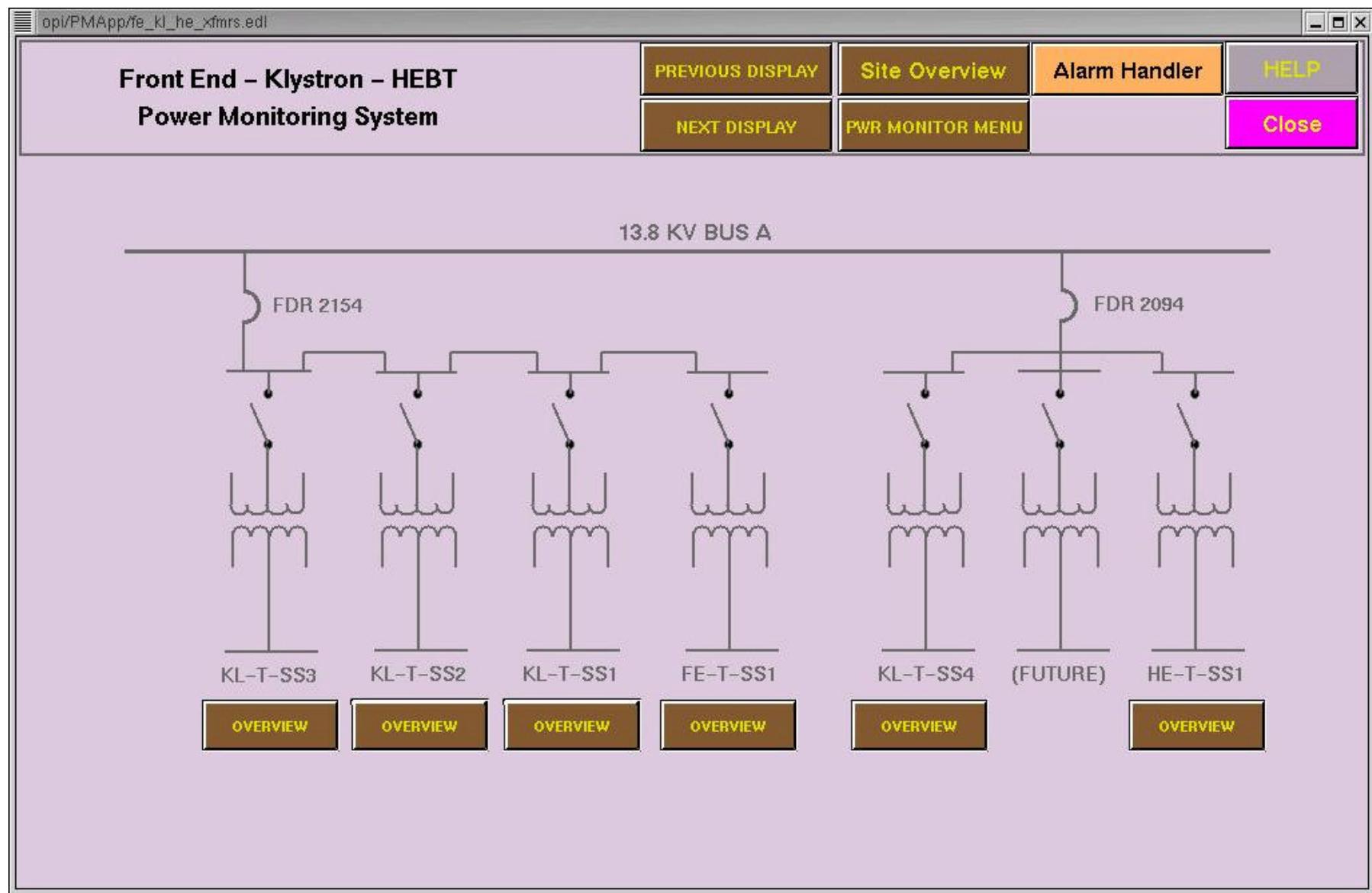


FIGURE 4 – Front End, Klystron & HEBT Power Monitor Menu Screen

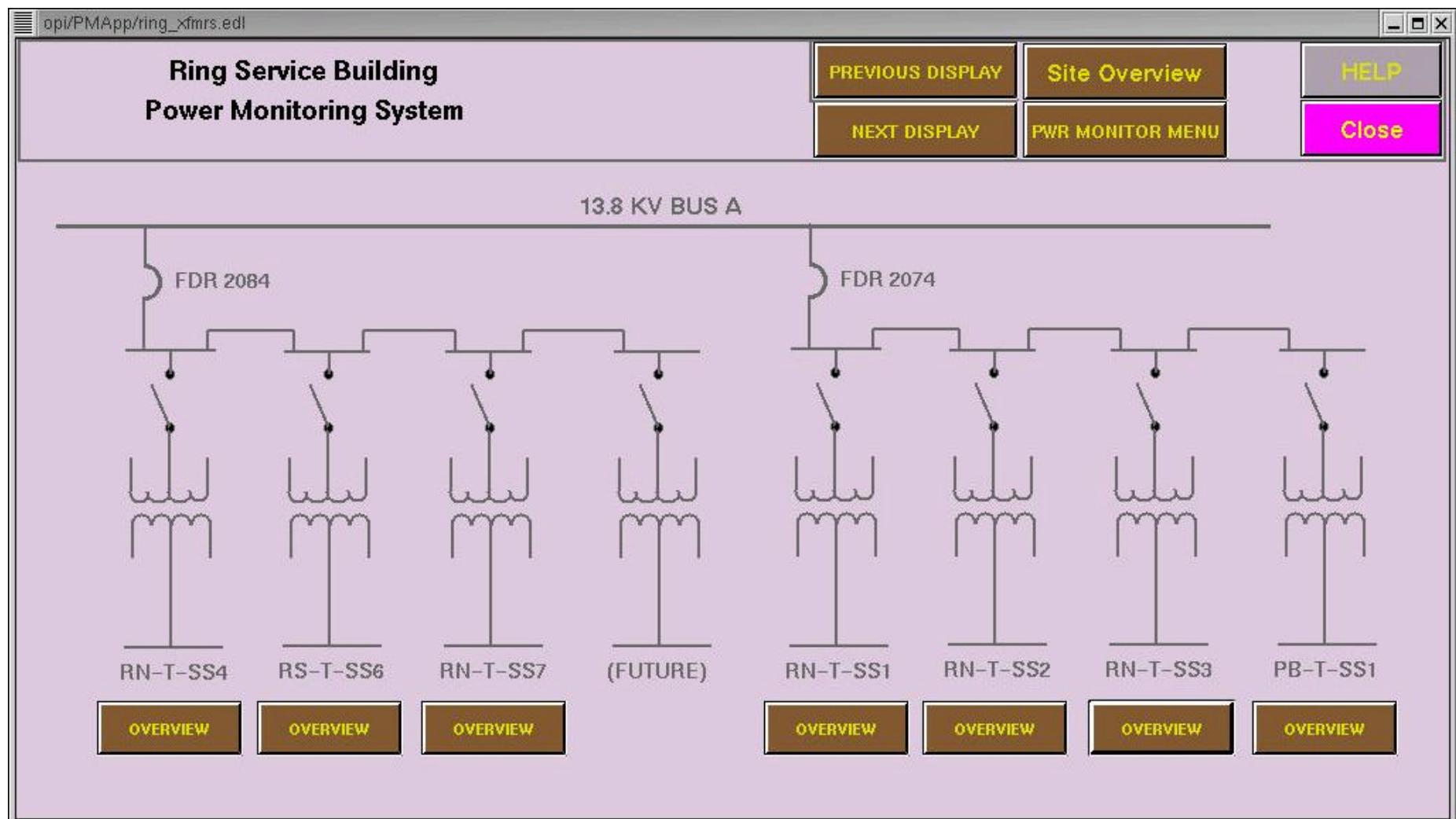


FIGURE 5 – Ring Service Building Power Monitor Menu Screen

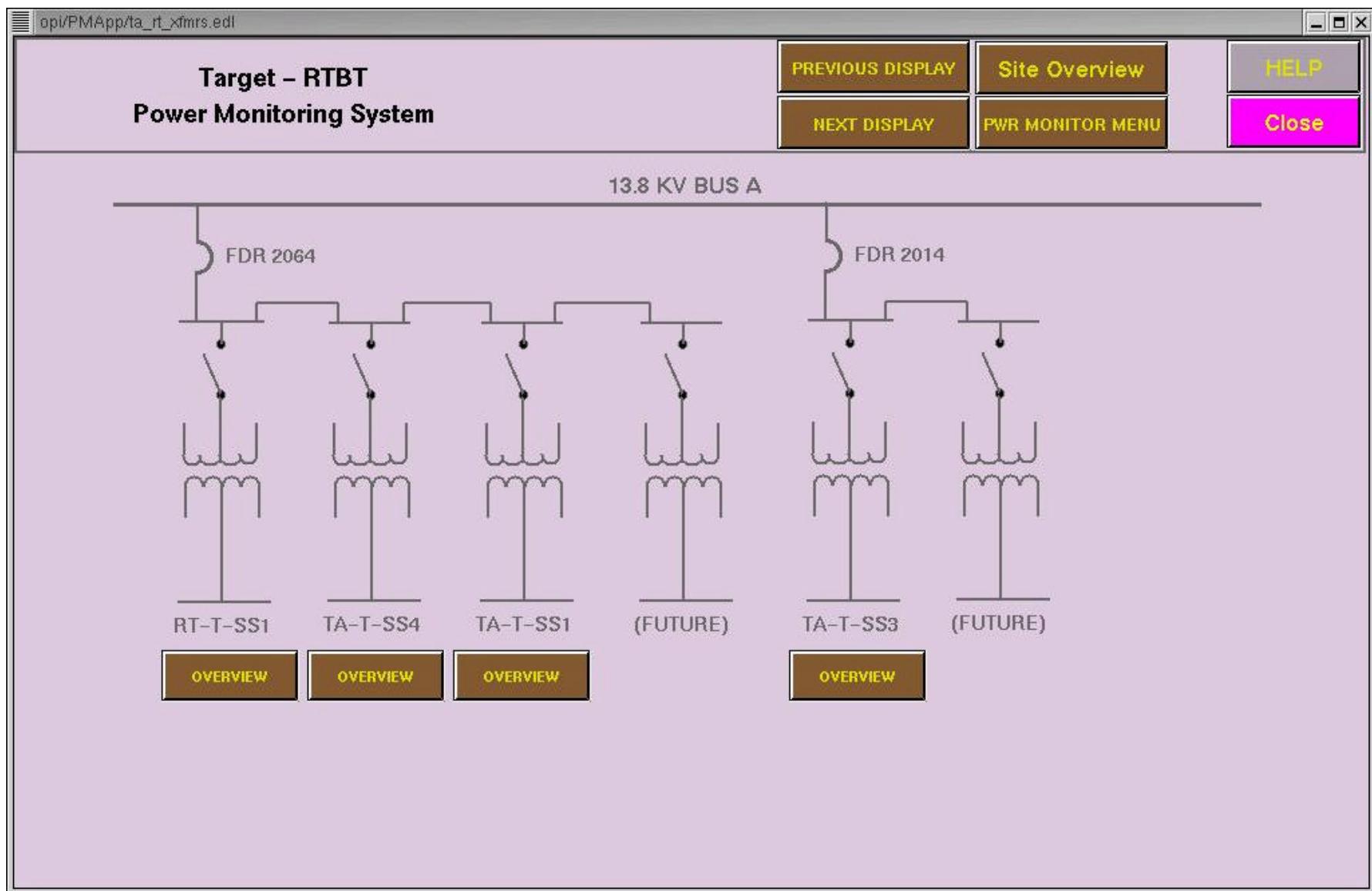


FIGURE 6 – Target & RTBT Power Monitor Menu Screen

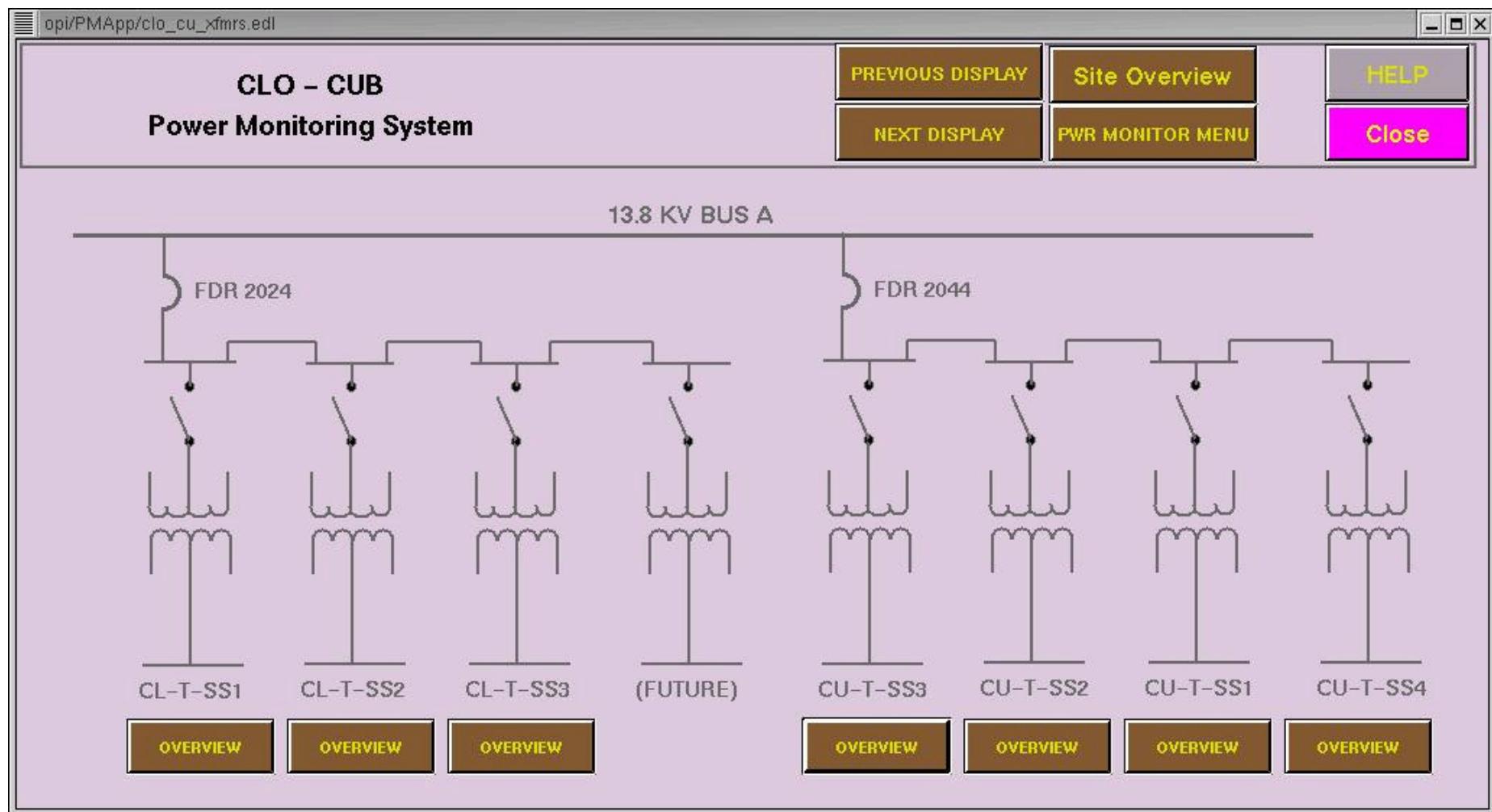


FIGURE 7 – CLO & CUB Power Monitor Menu Screen

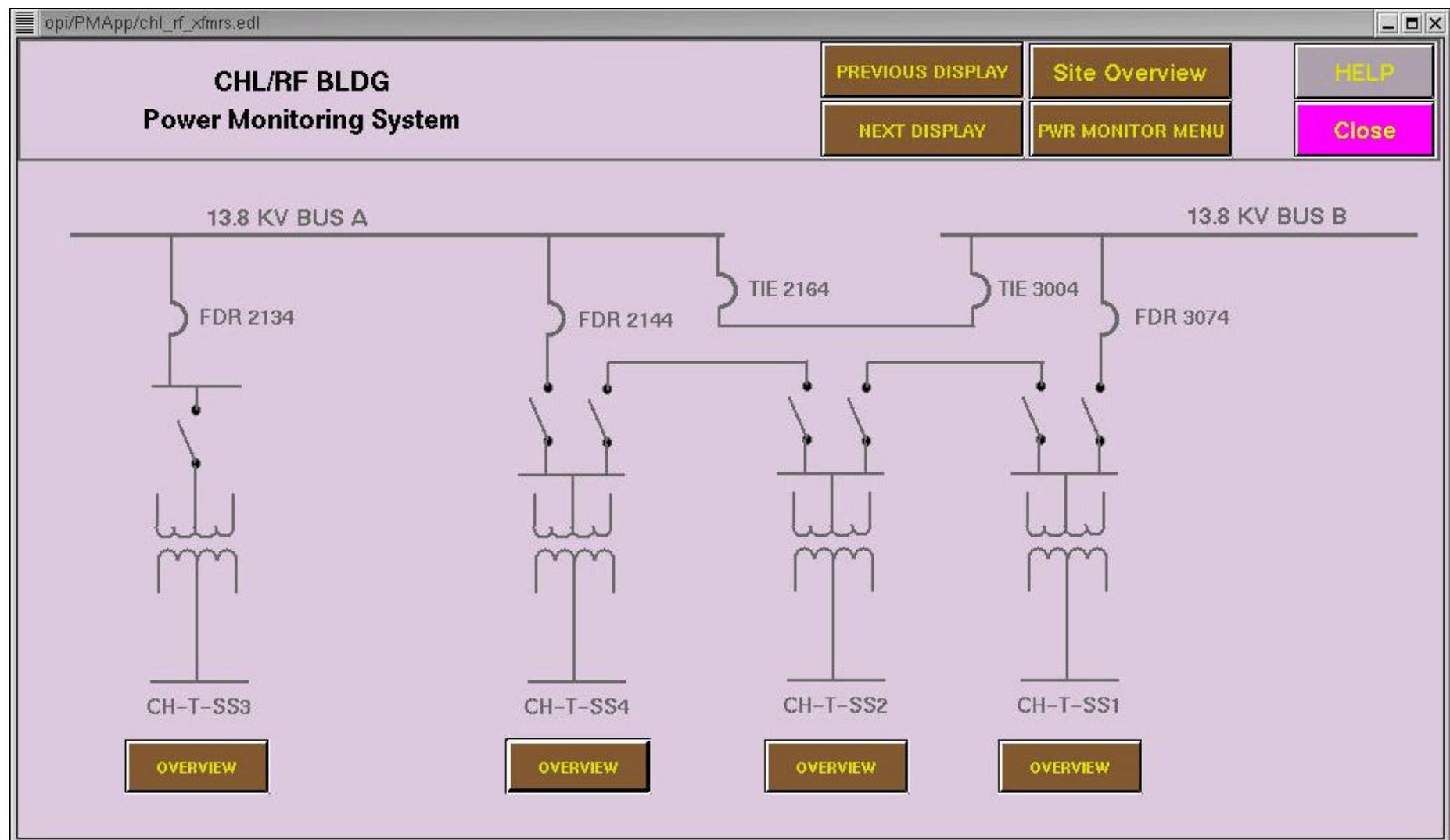


FIGURE 8 – CHL/RF Power Monitor Menu Screen

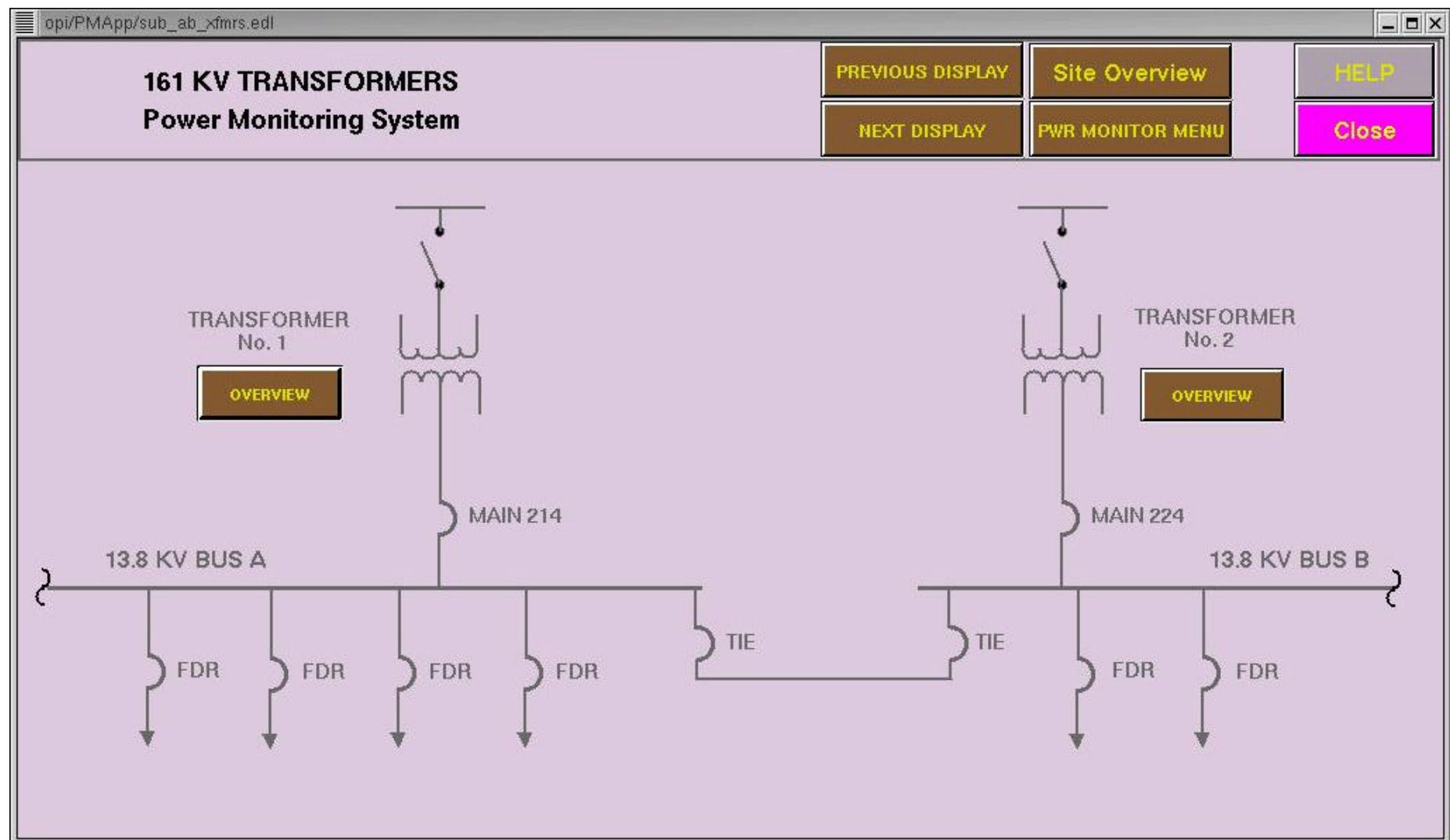


FIGURE 9 – TVA Substation Power Monitor Menu Screen

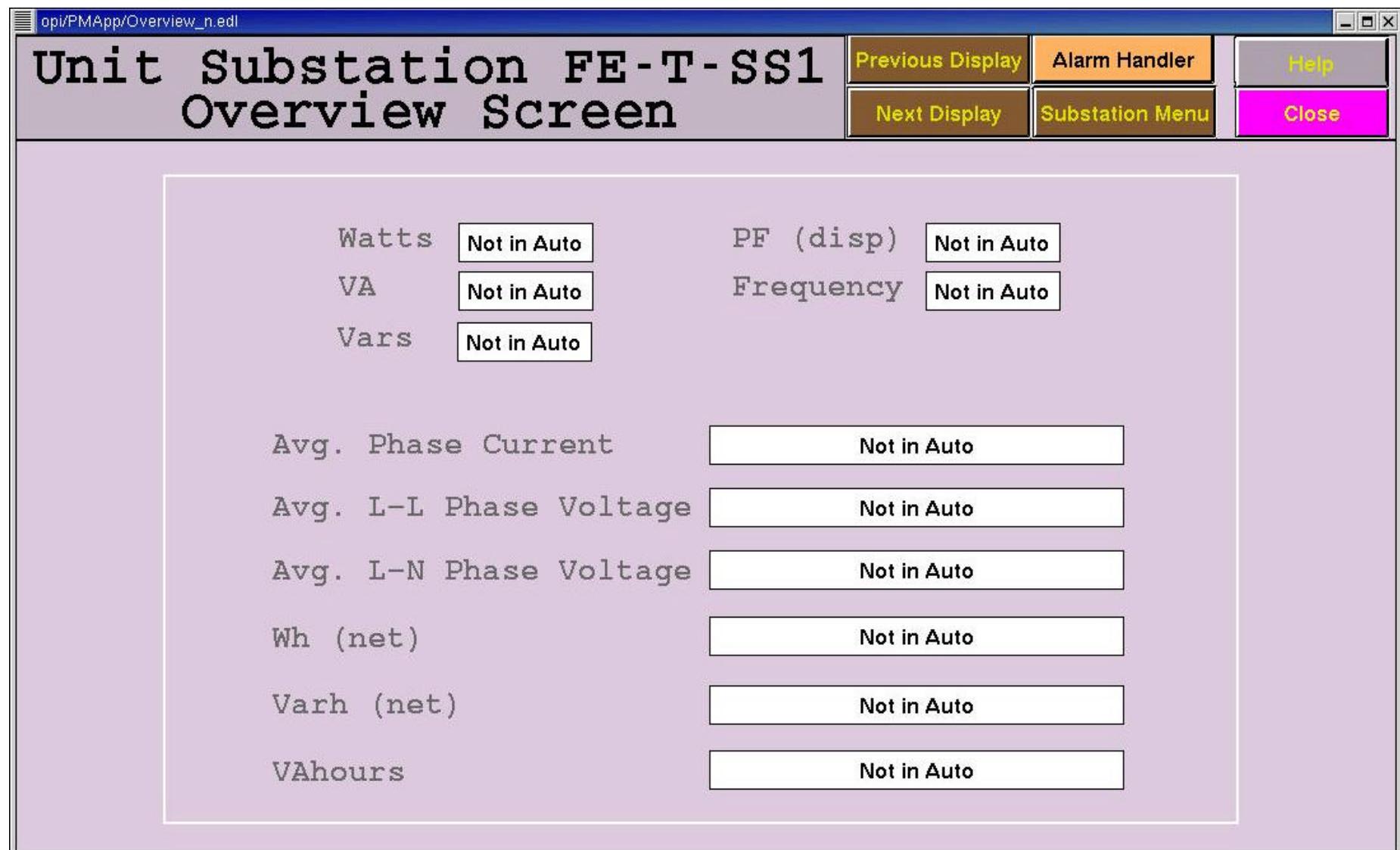


FIGURE 10 – Example Data Screen

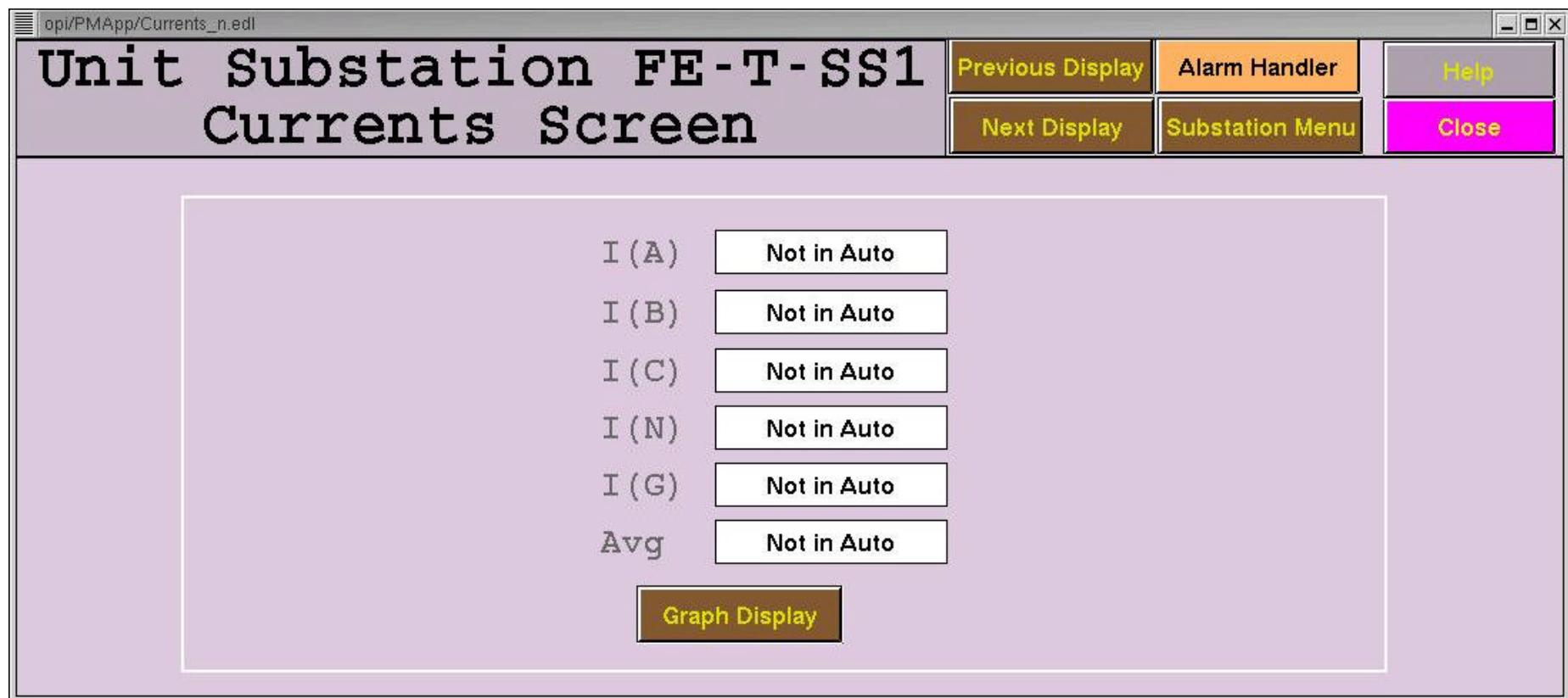


FIGURE 11 – Example Data Screen

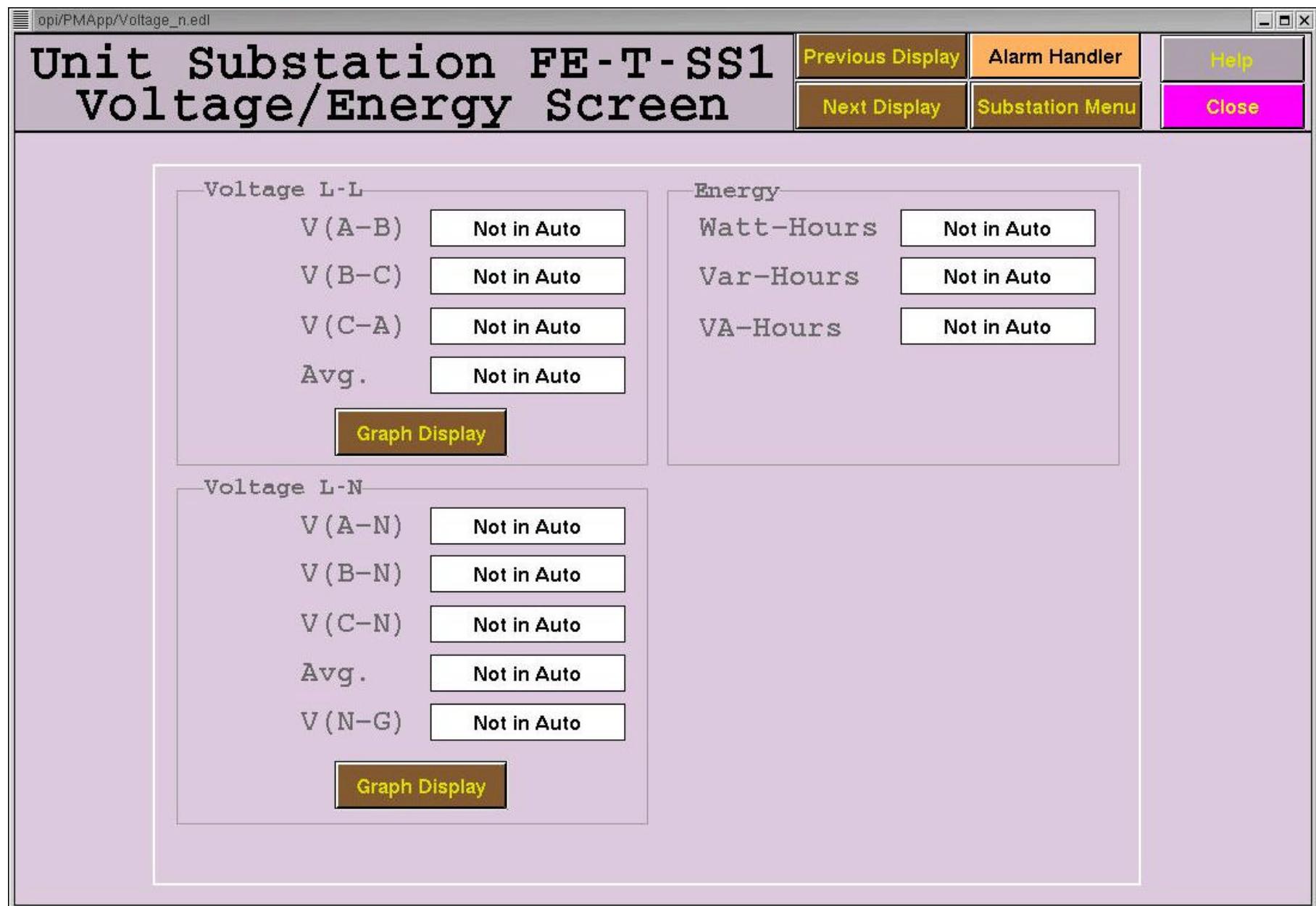


FIGURE 12 – Example Data Screen

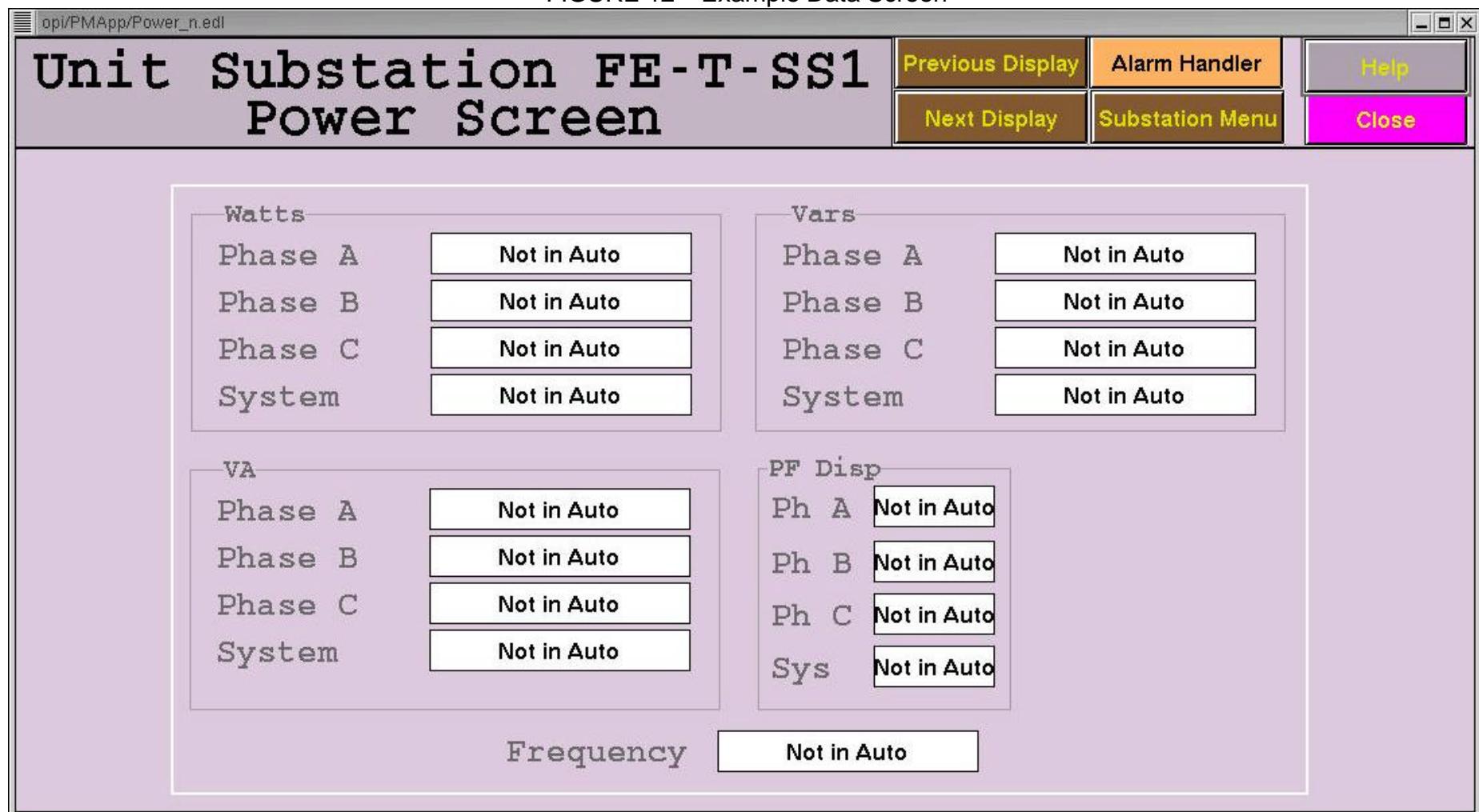


FIGURE 13 – Example Data Screen

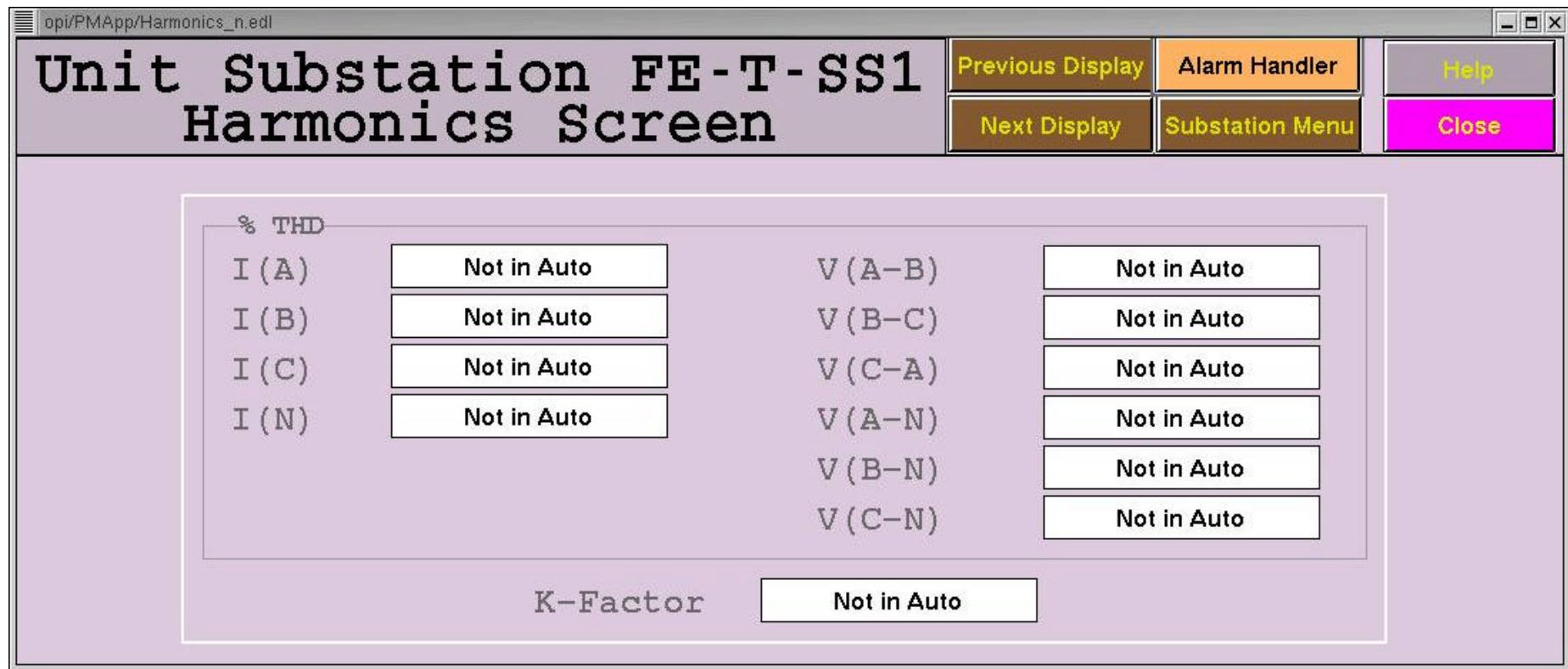


FIGURE 14 – Example Data Screen

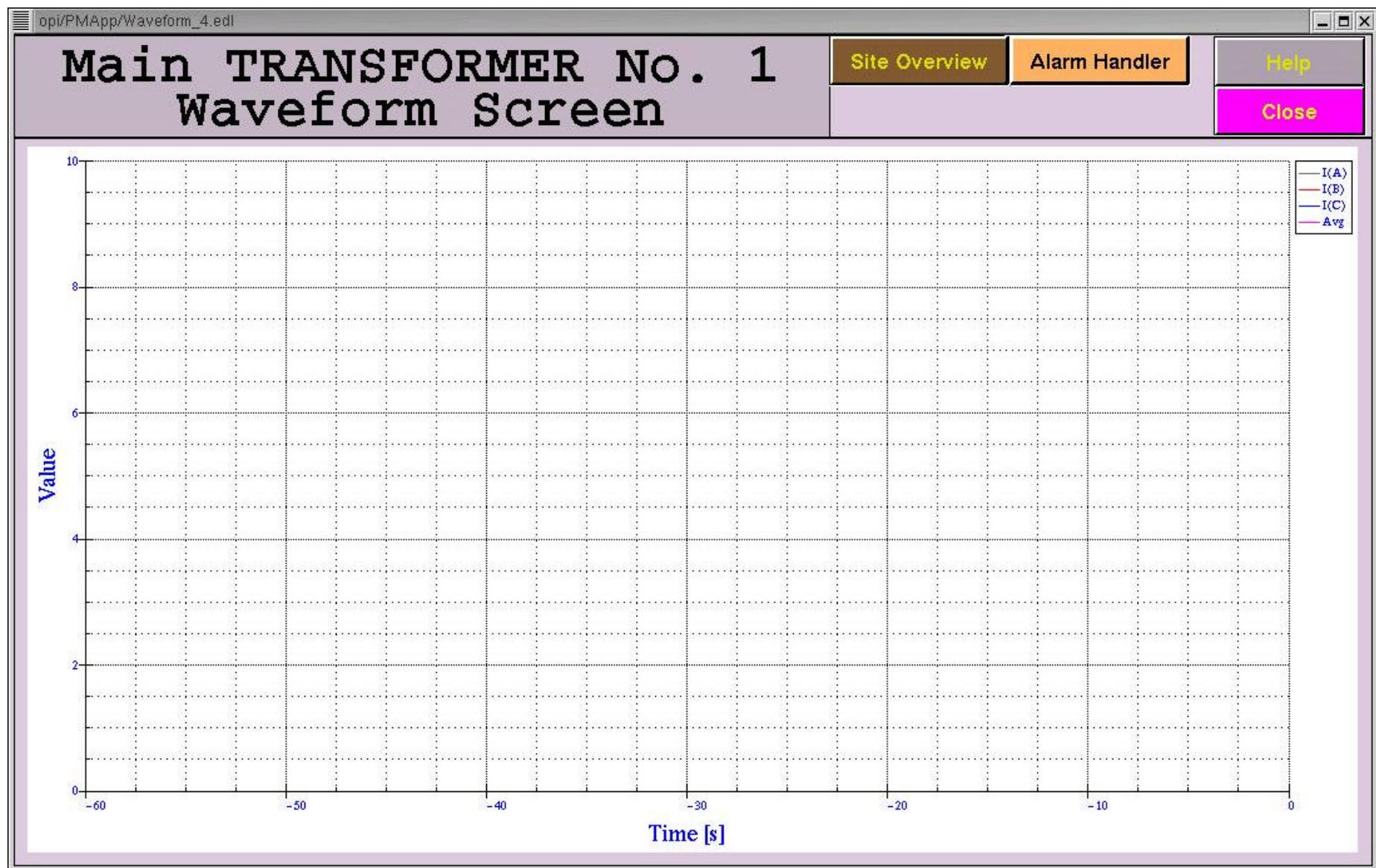


FIGURE 15 – Example Data Screen

TABLE 1 - POWER MONITORING SYSTEM SIGNAL LIST

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
Main Substation	13.8kV Bus A	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VLLAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VLNAVG		average phase – N voltage
		VNG		N – G voltage
		VARS		system reactive power
		VA		system apparent power
		POSENERGY	Wh	Real energy
		POSVARHRS	VARh	Reactive energy
		VAHRS	Vah	VA Hours
		FREQ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFDISP		System power factor
Main Substation	13.8kV Bus B	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		IAVG		average phase current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VLLAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VLNAVG		average phase – N voltage
		VNG		N – G voltage
		VARS		system reactive power
		VA		system apparent power
		POSENERGY	Wh	Real energy
		POSVARHRS	VARh	Reactive energy
		VAHRS	Vah	VA Hours
		FREQ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFDISP		System power factor
Front End	FE-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Klystron	KL-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Klystron	KL-T-SS2	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Klystron	KL-T-SS3	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Klystron	KL-T-SS4	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
HEBT	HE-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Ring	RN-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Ring	RN-T-SS2	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Ring	RN-T-SS3	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Ring	RN-T-SS4	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Ring	RN-T-SS6	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAV		average phase – N voltage
		VNG		N – G voltage

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Ring	RN-T-SS7	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Pump Station	PB-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAV		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		CFACTOR		Crest factor
Target	TA-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Target	TA-T-SS3	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
Target	TA-T-SS4	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
RTBT	RT-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAV		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
Lab/Office	CL-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Lab/Office	CL-T-SS2	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAV		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Lab/Office	CL-T-SS3	IA	Ampere	A phase current

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
Central Utility	CU-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Central Utility	CU-T-SS2	IA	Ampere	A phase current
		IB		B phase current

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Central Utility	CU-T-SS3	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
Central Utility	CU-T-SS4	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
CHL/RF	CH-T-SS1	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFACTOR		Crest factor
CHL/RF	CH-T-SS2	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
CHL/RF	CH-T-SS3	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor
CHL/RF	CH-T-SS4	IA	Ampere	A phase current
		IB		B phase current
		IC		C phase current
		IAVG		average phase current
		IN		Neutral current

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		IG		Ground current
		VAB	Volt	A – B phase voltage
		VBC		B – C phase voltage
		VCA		C – A phase voltage
		VAVG		average phase voltage
		VAN		A – N voltage
		VBN		B – N voltage
		VCN		C – N voltage
		VNAVG		average phase – N voltage
		VNG		N – G voltage
		KWA	kW	A phase real power
		KWB		B phase real power
		KWC		C phase real power
		KWS		system power
		KVARA	kVAR	A phase reactive power
		KVARB		B phase reactive power
		KVARC		C phase reactive power
		KVARS		system reactive power
		KVAA	kVA	A phase apparent power
		KVAB		B phase apparent power
		KVAC		C phase apparent power
		KVAS		system apparent power
		KWHA	kWh	A phase real energy
		KWHB		B phase real energy
		KWHC		C phase real energy
		KVARHA	kVARh	A phase reactive energy
		KVARHB		B phase reactive energy
		KVARHC		C phase reactive energy
		KVAHA	kVAh	A phase apparent energy
		KVAHB		B phase apparent energy
		KVAHC		C phase apparent energy
		HZ	Hertz	Frequency
		THDIA	%	A phase current percent THD
		THDIB		B phase current percent THD
		THDIC		C phase current percent THD
		THDIN		Neutral current percent THD
		THDVAB		A phase voltage percent THD

BUILDING	DEVICE	SIGNAL	UNITS	DESCRIPTION
		THDVBC		B phase voltage percent THD
		THDVCA		C phase voltage percent THD
		THDVAN		A - N voltage percent THD
		THDVBN		B - N voltage percent THD
		THDVCN		C - N voltage percent THD
		PFA		A phase power factor
		PFB		B phase power factor
		PFC		C phase power factor
		PFS		system power factor
		KFACTOR		K-factor
		THDF		Harmonic Derating Factor
		CFATOR		Crest factor