



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 1 of 22

**INSTALLATION QUALIFICATION
(IQ)
FOR
BUILDING MANAGEMENT SYSTEM**

[AHU No.:.....]

Submitted To:

Submitted By:



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 2 of 22

Table of Contents

S.No.	Contents	Page No.
1.	INSTALLATION QUALIFICATION PROTOCOL PRE APPROVAL	3
2.	VERSION RECORDS	4
3.	IDENTIFICATION OF EXECUTORS	4
4.	INTRODUCTION	5
5.	OBJECTIVE	5
6.	PURPOSE & SCOPE	6
7.	RESPONSIBILITIES	6
8.	OVERVIEW OF THE SYSTEM	7
9.	INSTALLATION QUALIFICATION PROCEDURE	8
10.	EQUIPMENT MASTER FILE	9
11.	IDENTIFICATION OF EQUIPMENTS	10
12.	VERIFICATION OF TEST CERTIFICATES	11
13.	SUPPORTING UTILITIES	12
14.	COMMUNICATION CABLE	12
15.	ROUTER AND SCADA VERIFICATION	12
16.	INPUT/OUTPUT VERIFICATION FOR AHU	13
17.	COMPONENT VERIFICATION TEST OF AHU	33
18.	DDC PANEL DETAIL	43
19.	DDC PANEL TO FIELD WIRING CHECK LIST	46
20.	INSTALLATION QUALIFICATION DEVIATION REPORT	83
21.	LIST OF ANNEXURES	84
22.	ABBREVIATION	85
23.	SUMMARY	86
24.	CONCLUSION	86
25.	CERTIFICATION FOR INSTALLATION QUALIFICATION	87



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 3 of 22

1. INSTALLATION QUALIFICATION PROTOCOL PRE APPROVAL

Function	Name	Designation	Signature	Date
Prepared By				

Function	Name	Designation	Signature	Date
Checked By				
Checked By				
Checked By				

Function	Name	Designation	Signature	Date
Approved By				



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 4 of 22

2. VERSION RECORDS:

Title: Building Management System (BMS)				
Version	Changed Date	Section Changed	Revision Date	Remarks

3. IDENTIFICATION OF EXECUTORS:

S.No.	Name of the participant	Designation/Department	Sign and Date



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 5 of 22

4. INTRODUCTION

The BMS is a distributed control system through computerized, intelligent network of electronic devices to monitor and control the mechanical/electrical field devices to maintain a controlled environment. DDC is a central control system and run independent of BMS Process Data Manager. BMS Process Data Manager Failure will not affect the functioning of configured HVAC system. BMS shall have independent control on HVAC operation and data collection as a part of engineering operations and maintenance. Hence this system shall be considered as back end system for the control and operation. This system shall be designed in view to provide more technical data required for operation, maintenance and troubleshooting by engineering department.

The four basic functions of a BMS are:

Controlling, Monitoring, Optimizing and Reporting.

5. OBJECTIVE

The objective of this Installation Qualification document is to ensure the proper Installation of the Building Management System.

This study verifies:

- 5.1. The System, as received at site, is as per the purchase specifications laid down.
- 5.2. Each installed sub-component complies with the design specifications and technical data sheets.
- 5.3. Qualification of the unit installation and examination of all background information is performed to assure conformance of project requirements of the client and manufacturer's specifications.
- 5.4. All supporting utilities are properly connected.
- 5.5. All testing reports are available and maintained on file.
- 5.6. Unauthorized and unrecorded modification cannot take place.



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 6 of 22

6. PURPOSE & SCOPE

- Verify the installation of various components related to Building Management System as specified in design specification.
- Verify all the field devices, DDC panels are terminated properly.

7. RESPONSIBILITIES:

In order to achieve the objectives for the complete BMS system, following shall be the responsibility of

7.1 The complete system is designed as per the relevant standards, agreed technical specification.

7.2 Technical specification of all the components is as per the tender document.

7.3 Control philosophy shall be prepared for the complete system.

7.4 Carryout Validation activities after the system is commissioned for indented operations.

7.5 Control philosophy shall be prepared for the complete system.

7.6 Support for Performance Qualification Documents shall be provided after completion of Operational Qualification.

7.7 To check and verify all the documents submitted as per above are in line with agreed Specification and scope and shall approve all the documents to signify that the vendor has Compiled with his commitment.

7.8 To provide the necessary site clearance and complete the site activities covered.

7.9 To participate in the execution of the validation.



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 7 of 22

8. OVERVIEW OF THE SYSTEM:

The Building management system consists of the following:

- 8.1. Net workable/Standalone DDC (Direct Digital Control) Controllers.
- 8.2. System Operator Workstation with BMS software.
- 8.3. Field Sensors (analogue/Digital).
- 8.4. Field Output devices/actuators.

The system is modular in nature and permits expansion of both capacity and functionality through the addition of sensors, actuators, and DDC Controller and operator devices. System architectural design eliminates dependence on the network for controlling and storing events. The DDC Controllers are microprocessor based controllers and operates independently by performing its own specified input and output control and historical data collection. These Controllers are capable of functioning on a stand-alone mode i.e. even in case of loss of communication with the central control station, the DDC will function independently. The DDC controllers have fast peer to peer communication of data via the network communication system hence the DDC Controllers are able to access any data or send control commands and alarm reports directly to any other DDC Controllers or combination of controllers on the network without dependence upon a central processing device. The failure of network connection will not interrupt the execution of control strategies at other operation devices.

In case of failure of network or PDM, DDCs will have archiving capacity up to at least 5,000 events. This would enable the BMS Control System to retrieve data from the controller. The field instruments like temperature sensor, differential pressure switch for filter status, differential pressure transducer are connected to the DDC, which gives the signal to the controller. Based on the input signals and the set parameters, the DDC controls the output field devices like chilled water valve, hot water valve, SA Fan etc. to maintain the conditioned area.

The DDC controllers shall interface with sensors, actuators and carry out following functions:

- 8.5. Individual input/output point scanning, processing and control.
- 8.6. Direct Digital Controls with proportional, integral, derivative PID and adaptive gain and with any combination is possible.
- 8.7. Alarm Detection, time, event history, scheduling and communication interface control.



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 8 of 22

9. INSTALLATION QUALIFICATION PROCEDURE:

The following procedure shall be used for the Installation Qualification of the Building Management System.

- 9.1 The location and the placement of panel at site shall be verified.
- 9.2 The availability of engineering drawings / schematics shall be checked. A list of available engineering drawings / schematics shall be prepared and recorded.
- 9.3 All the equipments / components of the system shall be identified and verified against the approved drawings. All these equipments shall be verified for their location Serial no and manufacturer's name. The observations are recorded.
- 9.4 Installation checks shall be performed to verify building management system has been installed with proper electrical connections and utilities. The observations shall be recorded as per the installation report of the service engineer.
- 9.5 A list of software / firmware installed along with the building management system shall be prepared and verified. The observations are recorded.
- 9.6 Any deviation observed during installation qualification shall be recorded in the observed deviation corrective action and justification report section.
- 9.7 Observed deviations are reported to the department head and quality head.
- 9.8 If the observed deviation does not have any major impact on the qualification the final conclusion shall be provided. If the observed deviation has major impact on the qualification deviation shall be reported to the manufacturer for the corrective action and qualification activity shall be redone.



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 10 of 22

11. IDENTIFICATION OF EQUIPMENTS

11.1 BMS PC Details:

S.No.	Component/ Equipment	Specification	Observation	Remarks	Signature / Date
1	CPU	Dell – Optiplex 3050			
2	Monitor	Dell – E2216H			
3	Printer	HP LaserJet P1108			
4	RAM	Dell - 8 GB			
5	ROM	Dell - 1 TB			
6	System Details	Intel ® Core™ i5-6500 CPU @ 3.20 GHz			

11.2 Printer Details:

S.No.	Component/ Equipment	Specification	Observation	Remarks	Signature / Date
1	Make	HP			
2	Model	LaserJet P1108			
3	Quantity	01			

11.3 BMS Software:

S.No	Name of the Parameter	Specified	Observed		Done by/ Date
			Yes	No	
1.	Make	SIEMENS			
2.	Version	V3.0			

Remarks (if any):

Checked By:
(Sign and Date)

Reviewed By:
(Sign and Date)



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 12 of 22

13 SUPPORTING UTILITIES:

S.No.	Utility Specification	Observation	Checked by	Date
1.	Electric supply 230 v +/- 10 %, 50 HZ (UPS)			

14 COMMUNICATION CABLE:

All the DDC's bus terminals have been looped with the CAT 5 screened cable and it has been terminated to the Router PXG3.L.

Communication Cable (DDC To ROUTER)			
Cable	Specified	Actual	Signature /Date
Type	CAT 6		
Make	D-Link		

15 ROUTER VERIFICATION :

Router			
Description	Specified	Actual	Signature /Date
Model	PXG3.L		
Make	SIEMENS		
Quantity	02		

Remarks (if any):

Checked By:
(Sign and Date)

Reviewed By:
(Sign and Date)



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 13 of 22

16 INPUT/OUTPUT VERIFICATION FOR AHU.

16.1 Input/output Verification for AHU-GF 01 to AHU-GF 03/AHU-FF-01 to AHU-FF 09 & AHU-FF 12 to AHU FF 15/ AHU-SF 01 to AHU SF 23.

S.No.	Description	AI	AO	DI	DO	Field Devices
1.	Supply Blower Motor Start / Stop Command				1	Potential Free contact
2.	Supply Blower Motor running status			1		Pot free Contact in Electrical Panel
3.	Supply Blower Motor Auto/Manual Status			1		
4.	Return air Temperature + RH Sensor	2				RHP 3D22
5.	CHW Modulating Valve Control & Feedback	1	1			Danfoss
6.	HW Modulating Valve Control & feedback	1	1			Danfoss
7.	Velocity Sensor	1				MS311
8.	VFD Speed Control Supply		1			Control Voltage to VFD
	Used Point	5	3	2	1	11
	Spare available	2	2	2	5	11
	Total IOs available	7	5	4	6	22



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 14 of 22

16.2 Input/output Verification for AHU-FF 10 to AHU-FF 11

S.No.	Description	AI	AO	DI	DO	Field Devices
1.	Supply Blower Motor Start / Stop Command				1	Potential Free contact
2.	Supply Blower Motor running status			1		Pot free Contact in Electrical Panel
3.	Supply Blower Motor Auto/Manual Status			1		
4.	Return air Temperature + RH Sensor	2				RHP 3D22
5.	CHW Modulating Valve Control & Feedback	1	1			Danfoss
6.	HW Modulating Valve Control & feedback	1	1			Danfoss
7.	Velocity Sensor	1				MS311
8.	VFD Speed Control Supply(DPT)		1			Control Voltage to VFD
9.	Dehumidifier Start/Stop Command				1	Potential Free contact
10.	Dehumidifier Start/Stop Feedback			1		
	Used Point	5	3	3	2	13
	Spare available	2	1	2	4	9
	Total IOs available	7	4	5	6	22

Remarks (if any):

Checked By:
(Sign and Date)

Reviewed By:
(Sign and Date)



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 15 of 22

17 COMPONENT VERIFICATION TEST OF AHU:

This test is performed to verify that all the components are installed and terminated properly.

17.1 Component Verification Test: AHU- 01

S.No.	Component	Location	Make	Model No	Verified		Done by/
					Yes	No	Date
1.	DDC Controller	DDC Panel	Siemens	PXC22			
2.	Temp and RH sensor	RA Duct	Dwyer	RHP-3D22			
3.	CHW actuator	CHW Outlet	Danfoss	AME 435			
4.	HW actuator	HW Outlet	Danfoss	AME 435			
5.	Differential pressure transmitter	Across Blower	Dwyer	MS-341			
6.	VFD	Electrical Panel	Danfoss	FC 102			



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 16 of 22

18 DDC Panel Detail:

18.1 Router Panel

S.No.	Component Description/Specification	Verified		Done by/ Date
		Yes	No	
1.	MCB for 230V AC MCB: 1 Nos.			
2.	100VA Transformer- 1 Nos. Input Voltage: 230 V AC (50 Hz), Output Voltage: 24 V AC			
3.	SIEMENS PXC 22 – 01 Nos.			

18.2 DDC Panel-1 for AHU-01

S.No.	Component Description/Specification	Verified		Done by/ Date
		Yes	No	
1.	MCB for 230V AC MCB: 1 Nos.			
2.	100VA Transformer- 1 Nos. Input Voltage: 230 V AC (50 Hz), Output Voltage: 24 V AC			
3.	SIEMENS PXC 22 – 01 Nos.			

Remarks (if any):

Checked By:
(Sign and Date)

Reviewed By:
(Sign and Date)



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 17 of 22

19 DDC PANEL TO FIELD DEVICE WIRING CHECK LIST:

The Electrical wiring between DDC panel and the Field Devices are cross checked with the following checklist.

DDC PANEL-1 of AHU- 01				
I/O number	Functional Description	Verified		Done By/ Date
		Yes	No	
SE6166 Controller (Universal Inputs)				
IN-1	AHU RUN status			
IN-2	SA Fan VFD Auto/Manual Status			
IN-3	RA temperature & RH sensor			
IN-4	AHU SA Fan diff. pressure transmitter			
IN-5	3 Way CHW valve position feedback			
IN-6	3 Way HW valve position feedback			
IN-7	Spare			
IN-8	Spare			
IN-9	Spare			
IN-10	Spare			
DDC PANEL-1 of AHU-01				
I/O number	Functional Description	Verified		Done By/ Date
		Yes	No	
SE6166 Controller (Digital Outputs)				
DO-1	AHU On/Off command			
DO-2	Spare			
DO-3	Spare			
SE6166 Controller (Analog Outputs)				
AO-1	SA Fan VFD speed control			
AO-2	CHW Modulating Valve Control & Feedback			
AO-3	HW Modulating Valve Control & feedback			
AO-4	Spare			
AO-5	Spare			



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 18 of 22

20 INSTALLATION QUALIFICATION DEVIATION REPORT:

Document any discrepancies or variations noted during the Installation Qualification execution.

Record the corrective actions and the retest document.

Discrepancies:

Corrective Actions:

Satisfactorily completed: Yes / No

Signature:

Date:



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 20 of 22

22 ABBREVIATIONS:

IQ	Installation Qualification
DDC	Direct Digital Control
DDS	Detailed Design Specification
AHU	Air Handling Unit
BMS	Building Management System
GA	General Arrangement
RA	Return Air
SA	Supply Air
A/L	Airlock
CHW	Chilled Water
HW	Hot Water
IO	Input/Output
T&RH	Temperature & Relative Humidity
Pa	Pascal
A/M	Auto/ Manual
HVAC	Heating Ventilating Air Conditioning
AHU	Air Handling Unit
TFA	Treated Fresh Air
DI	Digital Input
DO	Digital Output
AI	Analog Input
AO	Analog Output
UI	Universal Input
DX	Direct Expansion



**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 21 of 22

23 SUMMARY:

24 CONCLUSION:

(Sign/Date): - _____



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

**INSTALLATION QUALIFICATION PROTOCOL CUM REPORT
FOR
BUILDING MANAGEMENT SYSTEM**

PROTOCOL No.:

EFFECTIVE DATE:

PAGE No.: 22 of 22

25 CERTIFICATION FOR INSTALLATION QUALIFICATION:

This Installation qualification document is studied and approved by the Undersigned Authorized Personnel.

Function	Name	Designation	Signature	Date
Executed By				

Function	Name	Designation	Signature	Date
Checked By				
Checked By				
Checked By				

Function	Name	Designation	Signature	Date
Approved By				