ENDORSEMENT SHEET FOR QP
REFERENCE / ~~STANDARD / FIELD~~ QUALITY PLAN (RQP / ~~SQP / RFQP / SFQP~~)

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		To be filled in by NTPC

PROJECT NAME	**NTPC PATRATU 3X800 MW**	***REVIEW & ENDORSEMENT BY NTPC***
CONTRACT NO.:	CS-9585-001	**PROJECT SPECIFIC QP NUMBER ALLOTTED**
MAIN SUPPLIER	**M/S BHARAT HEAVY ELECTRICALS LIMITED.,TRICHY**	**QP NO.: 9585-001-102-QVI-Q-021**
MANUFACTURER WORKS & ADDRESS	**M/S BHARAT HEAVY ELECTRICALS LIMITED.,TRICHY**	**REV. NO.:** 02 **DATE:06/06/2019**
ITEM /EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS i.e. MODEL TYPE/SIZE/RATING etc.	**GRAVIMETERIC FEEDER CONTROLS SYSTEM(MICROPROCESSOR BASED) BHELFEED SYSTEM**	** The RQP / SQP / RFQP/SFQP once endorsed for a particular contract shall remain valid even though the original QP may have expired or revised, unless / otherwise mutually agreed with the supplier
APPROVED QP NO.: RQP/~~SQP/RFQP/SFQP~~	**0000-999-QVI-P-030 REV.0 DATE: 30/01/2011 (VALID UP TO 29/01/2014)**	

Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)	*(TICK APPLICABLE)*
I. That the item/ component is identical to that considered for QP approval. √	**The QP is endorsed for this project without any change** √
II. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same do not affect the contents of QP. **OR**	
III. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same affect the QP slightly, as indicated below in attached sheet.	**The QP is endorsed for this project with changes as indicated.**
IV. Mandatory spares shall be treated as Cat 'III' items.	***DISTRIBUTION OF ENDORSEMENT OF***
V. RQP attached.	**A) RQP/SQP:**
VI. Even though the validity of the RQP is expired, for this project, this RQP is used since there is no change in the design and QP.	***1. MAIN SUPPLIER (WITH A COPY OF QP)***
VII. Sources of VFD mentioned in Annexure A of this RQP shall be M/s Fuji Electric, Japan , M/s Mitsubishi, Japan. Acceptable as BHEL approved source	***2. MANUFACTURER***
	3. RIO
	4. CQA-SPL
	Signature Not Verified Digitally signed by R K JHA Date: 2019.06.19 17:49:34 IST Reason: CAT I Location: NTPCEOC
06/06/19 V. AVINASH Senior Engineer Controls & Instrumentation / FB BHEL, TRICHY - 620 014	
SIGN.: (Main Supplier) DATE	
06/06/19 V. AVINASH Senior Engineer Controls & Instrumentation BHEL, TRICHY - 626 0	
SIGN.: (Manufacturer) DATE:	**NTPC (Reviewed /Approved by/ Date & Seal)**

बी एच ई एल BHEL	Manufacturer's Name & Address BHEL / TIRUCHY	REFERENCE QUALITY PLAN			एनटीपीसी NTPC	TO BE FILLED IN BY NTPC	
		ITEM : GRAVEMETRIC FEEDR CONTROL SYSTEM (MICROPROCESSOR BASED)	RQP No. CI:QA;GFC REV. No.: 0 DATE: 14/12/10	SIGN. OF MANUF. Name - N. SRIDHAR Manager Controls & Instrumentation / FB BHEL, Tiruchirappalli - 620 014	QP NO: 0000-999-QVI-P-030 REV. NO: 0 Date: 30.01.11 VALID UPTO : 29.01.14 Page 1 of 3	REVIEWED BY :	APPROVED BY :
		SUB SYSTEM :					

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
A) Bought out items														
1	Wired Control Panel (Remote & Local)	Dimensions, paint shade and thickness	Major	Meas & Visual	100%	—	BHEL Appproved Drawing, Vendor QP	BHEL Appproved Drawing, Vendor QP	IR		P	W#	-	# Witness at Sub supplier works by BHEL
2	CPU	Functional reliability	Major	Visual	100%	—	PO / Specs.	PO / Specs.	TC		P	W#	-	# Witness at BHEL/Tiruchy
3	IO Modules	Functional reliability	Major	Visual & Elec.	100%	—	Manufacturer Standard	Manufacturer Standard	IR		P	W#	-	# Witness at Sub supplier works by BHEL
4	Electronic Modules	Functional reliability	Major	Visual & Elec	100%	—	BHEL Approved Mfr.Drawing & FAT	BHEL Approved Mfr.Drawing & FAT	IR		P	W#	-	# Witness at Sub supplier works by BHEL
5	Key Board & Display	Functional reliability	Major	Visual & Elec	100%	—	BHEL Approved Mfr.Drawing & FAT	BHEL Approved Mfr.Drawing & FAT	IR		P	W#	-	# Witness at Sub supplier works by BHEL
6	Power Supply Unit	Functional reliability	Major	Visual & Elec	100%	—	Manufacturer Standard	Manufacturer Standard	IR		P	W#	-	# Witness at Sub supplier works by BHEL
7	Variable Frequency Drive (Wherever Applicable)	Functional reliability	Major	Visual & Elec	100%	—	Manufacturer Standard	Manufacturer Standard	IR		P	W#	-	# Witness at Sub supplier works by BHEL
B. Final Assembly Inspection (Complete System)														
1	Routine Test	a) General Arrangement and overall diemensions	Major	Meas	100%	C=100% N=10%	BHEL Drawings	BHEL Drawings	Int. R		P	W	W	
		b) Verification of Makes/models of Major BOI	Major	Phys	100%	Random	Annexure-A to QP	Annexure-A to QP	LGB		P	W	W	
		c) Provision, Rating & Location of components	Major	Visu	100%	C=100% N=10%	BHEL Approved Vendor Drawing	BHEL Approved Vendor Drawing	Int. R		P	W	W	
		d) Wiring Check	Major	Visu	100%	C=100% N=10%	BHEL Approved Vendor Drawing	BHEL Approved Vendor Drawing	Int. R		P	W	V	
		e) Shrouding of power terminals	Major	Visu	100%	C=100% N=10%	BHEL Approved Vendor Drawing	BHEL Approved Vendor Drawing	Int. R		P	W	W	

LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,'W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"

Note : NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

Format No.: QS-01-QAI-P-10/F1-R0

Engg. Div/QA & I

बी एच ई एल BHEL	Manufacturer's Name & Address BHEL / TIRUCHY	REFERENCE QUALITY PLAN			एनटीपीसी NTPC	TO BE FILLED IN BY NTPC	
		ITEM : GRAVEMETRIC FEEDR CONTROL SYSTEM (MICROPROCESSOR BASED)	RQP No. Cl:QA;GFC REV. No.: 0 DATE: 14/12/10	SIGN. OF MANUF. Name - N. SRIDHAR Manager Controls & Instrumentation F FB BHEL, Tiruchirappalli - 620 014	QP NO: 0000-999-QVI-P-030 REV. NO: 0 Date: 30.01.11 VALID UPTO : 29.01.14 Page 2 of 3	REVIEWED BY :	APPROVED BY
		SUB SYSTEM :					

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
		f) Fuctional /Simulation Check before & after Soak Test	Critical	Elec	100%	C=100% N=1 No./Boiler	As per IFAT Procedure	As per IFAT Procedure	Int. R		P	W	W	NTPC Witnesss only for Functional test after soak test
		g) Soak test and voltage variation test for Remote Control Panel.	Major	Envi	1 No./Boiler	1No./ Boiler	As per Note .7	As per Note.7	LGB		P	W	V	
		h) Insulation resistance test with 500 V megger (before / after HV test)	Major	Elec	100%	C=100% N=10%	—	> 1 Mega Ohm	Int. R		P	W	W	
		i) HV Test (without electronics)	Major	Elec	100%	C=100% N=10%	Signal Ckt=500V/1 Min Control Ckt=1.5KV/1 Min Power Ckt=2KV/1 Min	No Failure	Int. R		P	W	W	
		j) Calibration test with test weight with gravemetric feeders	Critical	Mech/ Elec	1 No./Boiler	1 No./Boiler	BHEL Standard Procedure	BHEL Standard Procedure	TR		P	W	W	At Shop/Out sourcing vendor works with typical standard panel
3	Type Test	Type Test requirement shall be as per Agreement with NTPC / Engg : - CHP												

D.Notes

1. Legends:

ENVI : Environment
PHYS : Physical
VISU : Visual
T.C : Test Certificate
I.R : Inspection Report
IFAT : Integrated Factory Acceptance Test
MEAS : Measurement
ELEC : Electrical
LGB : Log Book
TR : Test Report
Int.R : Internal Report

2. Manufacturer shall arrange all the testing facilites at their works. Tests for which facilites are not available at Vendor's works, are to be carried out at recognized National Test House like ETDC / CIL / NPL / ERTL etc., at vendor's cost

3. Through Log Book / any other documents / System available at the vendor's works, it shall be possible to correlate the finished products with raw material & in process stage checks / Inspection carried out

4. All Measuring & Testing Instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification

5. Test certificates for routine & Type tests are to be furnished by the vendor.

6. Packing shall be as per the BHEL standard Packing Procedure.

7. SOAK TEST :

This test is carried out to verify the heat load of the Remote Control Panel. The fully equipped panel is kept energized for 24 hrs. continuously. Out of the 24 hrs, for first 10 hrs., the cabinet / equipment is kept in temp. Controlled oven at 50 deg. C +/- 2 deg. C. This 10 hrs. Period is divided into 5 cycles of 2 hrs. Duration each. In each cycle the voltage varied between 100 % for 1hr, 110% for ½ hr, and 90% for ½ hr. For the balance 14 hours , the cabinet/equipment will be kept at ambient temperature prevalent at that time with nominal voltage. Functional test will be performed after this test. During the test, temp. Rise inside cubicle/equipment should not exceed 10 deg. C over ambient. For soak test BHEL internal inspection report shall be verified by NTPC/RIO(Tiruchy).

LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,'W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"

Note : NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

BHEL (बी एच ई एल)	Manufacturer's Name & Address BHEL / TIRUCHY	REFERENCE QUALITY PLAN		NTPC (एनटीपीसी)	TO BE FILLED IN BY NTPC	
		ITEM : **GRAVEMETRIC FEEDR CONTROL SYSTEM (MICROPROCESSOR BASED)** SUB SYSTEM :	RQP No. CI:QA;GFC REV. No.: 0 DATE: 14/12/10	SIGN. OF MANUF. **Name -** N. SRIDHAR Manager Controls & Instrumentation / FB BHEL, Tiruchirappalli - 620 014	QP NO: **0000-999-QVI-P-030** REV. NO: **0** Date: **30.01.11** **VALID UPTO : 29.01.14** Page 3 of 3	REVIEWED BY :	APPROVED BY Quality Assurance अनुमोदित Approved Dt....... N.T.P.C., Noida

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11

ANNEXURE - A

BOM for BHEL make Microprocessor based Gravemetric feeder control system (BHELFEED System)

Sl N	Item	Sources
1	Wired Control Panel (Remote & Local)	Rittal/ BCH/Pyrotech/Enclotech
2	CPU	MPL-Switzerland
3	I/O Modules (AIM, AOM, DIM, DOM, PIM, BTM)	EDN-Bangalore
4	Electronic Modules (SCM, SIM, MCM)	EM Electroniks,Bangalore/ Verotronics,Hyderabad
5	Key Board & Display	Control Touch India & Futaba/Japan
6	Power Supply Unit	Traco/Switzerland & XP Power /Switzer land
7	Variable Frequency Drive (Wherever Applicable)	Amtech
8	Relays	OEM, Elesta
9	Interconnection cables for I/O Rack and CPU	Lapp, Germany and Helkable, Germany

Legend:

AIM : Analog input module
AOM : Analog output module
DIM : Digital output module
DOM : Digital output module
PIM : Pulse input module
BTM : Bus terminator module
CPU : Central processing unit
RCP : Remote control panel
LCP : Local control panel
SIM : Signal intrface module
SCM : Signal conditioning module
MCM : Motor control module

Other Electrical assessories as per NTPC approved list

ENDORSEMENT SHEET FOR QP
REFERENCE / ~~*STANDARD* / FIELD~~ QUALITY PLAN (~~RQP~~ / ~~SQP/*RFQP/SFQP*~~)

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		To be filled in by NTPC
PROJECT NAME	**UPRVUNL PANKI 1 X 660MW**	***2REVIEW & ENDORSEMENT BY NTPC***
CONTRACT NO.:	14A14-SPC-G-0001	**PROJECT SPECIFIC QP NUMBER ALLOTTED**
MAIN SUPPLIER	**M/S BHARAT HEAVY ELECTRICALS LTD., TRICHY**	
MANUFACTURER WORKS & ADDRESS	**M/S BHARAT HEAVY ELECTRICALS LTD., TRICHY**	**QP NO.: 9962-001-TR-102-QVI-Q-002**
ITEM /EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS i.e. MODEL TYPE/SIZE/RATING etc.	**GRAVIMETRIC FEEDER CONTROLS SYSTEM (MICROPROCESSOR BASED) BHELFEED SYSTEM**	**REV. NO.: 00**
APPROVED QP NO.: ~~RQP/SQP/RFQP/SFQP~~	**0000-999-QVI-P-030 REV.0 DATE:30/01/2011 (VALID UP TO 29/01/2014)**	

Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)	*(TICK APPLICABLE)*
I. That the item/ component is identical to that considered for QP approval.	**The QP is endorsed for this project without any change**
II. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same do not affect the contents of QP. **OR** √	
III. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same affect the QP slightly, as indicated below in attached sheet.	**The QP is endorsed for this project with changes as indicated.**
Notes: ***i) Mandatory spares shall be treated as Cat 'III' items.*** ***ii) Even though the validity of the RQP is expired, for this project, the RQP is used since there is no change in the design and QP.*** ***iii) Sources of VFD is mentioned in the Annexure A of this RQP. Additional sources shall be M/s. Fuji Electric, Japan, M/s. Mitsubishi, Japan as agreed in PVUNL Patratu project (Ref MDL no.9585-001-102-QVI-Q-021 Rev.02 Dtd. 06/06/2019)*** ***iv) Sources of 'Wired Control Panel(Remote & Local)' is mentioned in Annexure A. Additional source of 'Wired Control Panel (Remote & Local)' shall be M/s. Sajas Electricals.***	***DISTRIBUTION OF ENDORSEMENT OF*** **A) RQP/SQP:** ***1. MAIN SUPPLIER (WITH A COPY OF QP)*** ***2. MANUFACTURER*** ***3. RIO*** ***4. CQA-SPL*** ***5. CQA-O/C*** **B) RFQP/SFQP:** ***1. MAIN SUPPLIER (with a copy of QP)*** ***2. MANUFACTURER*** ***3. NTPC FQA (with a copy of QP)*** ***4. NTPC Erection (with a copy of QP)*** ***5. CQA-SPL*** ***6. CQA-O/C***

SIGN.: (Main Supplier) *DATE* **12.09.2020**	*SIGN.: (Manufacturer)* *DATE:* **12.09.2020**	**NTPC (Reviewed /Approved by/ Date & Seal)**

B. ARUN KUMAR
Sr. Engineer
Controls & Instrumentation / FB
BHEL, TRICHY - 620 014

B. ARUN KUMAR
Sr. Engineer
Controls & Instrumentation / FB
BHEL, TRICHY - 620 014

बी एच ई एल BHEL	Manufacturer's Name & Address BHEL / TIRUCHY	REFERENCE QUALITY PLAN			एनटीपीसी NTPC	TO BE FILLED IN BY NTPC	
		ITEM : GRAVEMETRIC FEEDR CONTROL SYSTEM (MICROPROCESSOR BASED)	RQP No. CI:QA;GFC REV. No.: 0 DATE: 14/12/10	SIGN. OF MANUF. Name - N. SRIDHAR Manager Controls & Instrumentation / FB BHEL, Tiruchirappalli - 620 014	QP NO: 0000-999-QVI-P-030 REV. NO: 0 Date: 30.01.11 VALID UPTO : 29.01.14 Page 1 of 3	REVIEWED BY :	APPROVED BY :
		SUB SYSTEM :					

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
A) Bought out items														
1	Wired Control Panel (Remote & Local)	Dimensions, paint shade and thickness	Major	Meas & Visual	100%	—	BHEL Appproved Drawing, Vendor QP	BHEL Appproved Drawing, Vendor QP	IR		P	W#	-	# Witness at Sub supplier works by BHEL
2	CPU	Functional reliability	Major	Visual	100%	—	PO / Specs.	PO / Specs.	TC		P	W#	-	# Witness at BHEL/Tiruchy
3	IO Modules	Functional reliability	Major	Visual & Elec.	100%	—	Manufacturer Standard	Manufacturer Standard	IR		P	W#	-	# Witness at Sub supplier works by BHEL
4	Electronic Modules	Functional reliability	Major	Visual & Elec	100%	—	BHEL Approved Mfr.Drawing & FAT	BHEL Approved Mfr.Drawing & FAT	IR		P	W#	-	# Witness at Sub supplier works by BHEL
5	Key Board & Display	Functional reliability	Major	Visual & Elec	100%	—	BHEL Approved Mfr.Drawing & FAT	BHEL Approved Mfr.Drawing & FAT	IR		P	W#	-	# Witness at Sub supplier works by BHEL
6	Power Supply Unit	Functional reliability	Major	Visual & Elec	100%	—	Manufacturer Standard	Manufacturer Standard	IR		P	W#	-	# Witness at Sub supplier works by BHEL
7	Variable Frequency Drive (Wherever Applicable)	Functional reliability	Major	Visual & Elec	100%	—	Manufacturer Standard	Manufacturer Standard	IR		P	W#	-	# Witness at Sub supplier works by BHEL
B. Final Assembly Inspection (Complete System)														
1	Routine Test	a) General Arrangement and overall diemensions	Major	Meas	100%	C=100% N=10%	BHEL Drawings	BHEL Drawings	Int. R		P	W	W	
		b) Verification of Makes/models of Major BOI	Major	Phys	100%	Random	Annexure-A to QP	Annexure-A to QP	LGB		P	W	W	
		c) Provision, Rating & Location of components	Major	Visu	100%	C=100% N=10%	BHEL Approved Vendor Drawing	BHEL Approved Vendor Drawing	Int. R		P	W	W	
		d) Wiring Check	Major	Visu	100%	C=100% N=10%	BHEL Approved Vendor Drawing	BHEL Approved Vendor Drawing	Int. R		P	W	V	
		e) Shrouding of power terminals	Major	Visu	100%	C=100% N=10%	BHEL Approved Vendor Drawing	BHEL Approved Vendor Drawing	Int. R		P	W	W	

LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,'W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"

Note : NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

बीएचईएल BHEL	Manufacturer's Name & Address BHEL / TIRUCHY	REFERENCE QUALITY PLAN					एनटीपीसी NTPC	TO BE FILLED IN BY NTPC								
		ITEM : GRAVEMETRIC FEEDR CONTROL SYSTEM (MICROPROCESSOR BASED)			RQP No. Cl:QA;GFC REV. No.: 0 DATE: 14/12/10	SIGN. OF MANUF. Name -	QP NO: 0000-999-QVI-P-030 REV. NO: 0 Date: 30.01.11 VALID UPTO : 29.01.14 Page 2 of 3	REVIEWED BY :					APPROVED BY		
		SUB SYSTEM :														
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record		Agency M	Agency C	Agency N	Remarks		
1	2	3	4	5	6		7	8	9	D*	10			11		
		f) Fuctional /Simulation Check before & after Soak Test	Critical	Elec	100%	C=100% N=1 No./Boiler	As per IFAT Procedure	As per IFAT Procedure	Int. R		P	W	W	NTPC Witnesss only for Functional test after soak test		
		g) Soak test and voltage variation test for Remote Control Panel.	Major	Envi	1 No./Boiler	1No./ Boiler	As per Note .7	As per Note.7	LGB		P	W	V			
		h) Insulation resistance test with 500 V megger (before / after HV test)	Major	Elec	100%	C=100% N=10%	—	> 1 Mega Ohm	Int. R		P	W	W			
		i) HV Test (without electronics)	Major	Elec	100%	C=100% N=10%	Signal Ckt=500V/1 Min Control Ckt=1.5KV/1 Min Power Ckt=2KV/1 Min	No Failure	Int. R		P	W	W			
		j) Calibration test with test weight with gravemetric feeders	Critical	Mech/ Elec	1 No./Boiler	1 No./Boiler	BHEL Standard Procedure	BHEL Standard Procedure	TR		P	W	W	At Shop/Out sourcing vendor works with typical standard panel		
3	Type Test	Type Test requirement shall be as per Agreement with NTPC / Engg : - CHP														

D.Notes

1. Legends:

ENVI : Environment
PHYS : Physical
VISU : Visual
T.C : Test Certificate
I.R : Inspection Report
IFAT : Integrated Factory Acceptance Test

MEAS : Measurement
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Int.R : Internal Report

2. Manufacturer shall arrange all the testing facilites at their works. Tests for which facilites are not available at Vendor's works, are to be carried out at recognized National Test House like ETDC / CIL / NPL / ERTL etc., at vendor's cost

3. Through Log Book / any other documents / System available at the vendor's works, it shall be possible to correlate the finished products with raw material & in process stage checks / Inspection carried out

4. All Measuring & Testing Instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification

5. Test certificates for routine & Type tests are to be furnished by the vendor.

6. Packing shall be as per the BHEL standard Packing Procedure.

7. SOAK TEST :

This test is carried out to verify the heat load of the Remote Control Panel. The fully equipped panel is kept energized for 24 hrs. continuously. Out of the 24 hrs, for first 10 hrs., the cabinet / equipment is kept in temp. Controlled oven at 50 deg. C +/- 2 deg. C. This 10 hrs. Period is divided into 5 cycles of 2 hrs. Duration each. In each cycle the voltage varied between 100 % for 1hr, 110% for ½ hr, and 90% for ½ hr. For the balance 14 hours , the cabinet/equipment will be kept at ambient temperature prevalent at that time with nominal voltage. Functional test will be performed after this test. During the test, temp. Rise inside cubicle/equipment should not exceed 10 deg. C over ambient. For soak test BHEL internal inspection report shall be verified by NTPC/RIO(Tiruchy).

LEGEND : * RECORDS, IDENTIFIED WITH " TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION M:MANUFACTURER/ SUB SUPPLIER C:MAIN SUPPLIER,N:NTPC, P:PERFORM ,'W: WITNESS and V: VERIFICATION AS APPROPRIATE, "CHP" NTPC SHALL INDICATED IN COLOUM "N" AS "W"

Note : NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

बी एच ई एल BHEL	Manufacturer's Name & Address BHEL / TIRUCHY	REFERENCE QUALITY PLAN		NTPC एनटीपीसी		TO BE FILLED IN BY NTPC	
		ITEM : **GRAVEMETRIC FEEDR CONTROL SYSTEM (MICROPROCESSOR BASED)**	RQP No. CI:QA;GFC REV. No.: 0 DATE: 14/12/10	SIGN. OF MANUF. **Name -** N. SRIDHAR Manager Controls & Instrumentation / FB BHEL, Tiruchirappalli - 620 014	QP NO: **0000-999-QVI-P-030** REV. NO: **0** Date: **30.01.11** **VALID UPTO : 29.01.14** Page 3 of 3	REVIEWED BY :	APPROVED BY:
		SUB SYSTEM :					

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C,N	Reference Document	Acceptance Norms	Format of record	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	D*	10			11

ANNEXURE - A

BOM for BHEL make Microprocessor based Gravemetric feeder control system (BHELFEED System)

Sl N	Item	Sources
1	Wired Control Panel (Remote & Local)	Rittal/ BCH/Pyrotech/Enclotech
2	CPU	MPL-Switzerland
3	I/O Modules (AIM, AOM, DIM, DOM, PIM, BTM)	EDN-Bangalore
4	Electronic Modules (SCM, SIM, MCM)	EM Electroniks,Bangalore/ Verotronics,Hyderabad
5	Key Board & Display	Control Touch India & Futaba/Japan
6	Power Supply Unit	Traco/Switzerland & XP Power /Switzer land
7	Variable Frequency Drive (Wherever Applicable)	Amtech
8	Relays	OEM, Elesta
9	Interconnection cables for I/O Rack and CPU	Lapp, Germany and Helkable, Germany

Legend:

AIM : Analog input module
AOM : Analog output module
DIM : Digital output module
DOM : Digital output module
PIM : Pulse input module
BTM : Bus terminator module
CPU : Central processing unit
RCP : Remote control panel
LCP : Local control panel
SIM : Signal intrface module
SCM : Signal conditioning module
MCM : Motor control module

Other Electrical assessories as per NTPC approved list

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT , TIRUCHIRAPPALLI 620 014.

CONTROLS AND INSTRUMENTATION

TECHNICAL SPECIFICATION

FOR

MEMBRANE KEY PANEL, DISPLAY MODULE AND ACCESSORIES FOR MICRO PROCESSOR BASED GRAVIMETRIC FEEDER CONTROL

SPECIFICATION NO.: TDC: TCI:307/REV 06

06	28.09.2020	Keyboard type changed to Non-Tactile	**[SKS]**	**[KV]**	**[AKP]**
05	09.03.2019	BOM Updated & Keyboard type changed to tactile	**-/sd**	**-/sd**	**-/sd**
04	05.06.2009	BOM for Key panel communication module revised.	**-/sd**	**-/sd**	**-/sd**
03	30.06.2008	Feedback on components incorporated.	**-/sd**	**-/sd**	**-/sd**
02	27.03.2008	Component changes incorporated	**-/sd**	**-/sd**	**-/sd**
01	30.11.2007	Component changes incorporated	**-/sd**	**-/sd**	**-/sd**
00	22.06.2007	Initial release	**-/sd**	**-/sd**	**-/sd**
REV	**DATE**	**DESCRIPTION**	**PREPARED**	**CHECKED**	**APPROVED**

1.0 (A) SCOPE:

The following items and activities shall constitute the scope of supply:

1.1 40x2 Vacuum Fluorescent display module *

1.2 12V Power Supply Module *

1.3 24V Power Supply Module *

1.4 Custom built membrane key panel *

1.5 Key panel communication Module *

1.6 Testing of assembled modules

The following shall be applicable for items (1.4) & (1.5)

PCB artwork design

Solder mask with component legend printing

PCB marking and population with the components

Protective conformal coating

Any other items and activities those are necessary to manufacture and supply the modules meeting all functional requirements and the system complete.

(B) Exclusion:

Application program for communication between the keyboard and CPU.

* Quantity as per enquiry

2.0 GENERAL REQUIREMENTS:

2.1 The make and model of various components are indicated in the bill of materials. Any change suggested by the vendor has to be indicated in the offer itself. Deviation, if any will not be accepted after the placement of purchase order (PO).

2.2 All components shall be of **industrial grade**. Components shall be test screened before populating.

2.3 Power supply de-coupling capacitors shall be provided to IC's as per standard practice.

2.4 Standard industrial PCB manufacturing and populating guidelines are to be followed.

2.5 PCB shall have BHEL emblem and name of module along with vendor code. This will be specified after placement of PO.

2.6 Films for PCBs. Component side, solder side negatives shall be furnished after placement of PO.

3.0 DESCRIPTION OF MODULES:

3.1 VACUUM FLUORESCENT DISPLAY (VFD) MODULE

- 40-character x 2 line VFD Module
- Make: Futaba, Part No. M402SD07GR/M402SD64AA

3.2 12 V POWER SUPPLY MODULE SMPS-1

The 12 V power supply module shall be used to power the CPU (supplied by others) in the GFC panel. The detailed specification is given in Annexure-2.

3.3 24 V POWER SUPPLY MODULE SMPS-2

The 24V power supply module shall be used to power the I/O rack module (supplied by others) in the GFC panel. The detailed specification is given in Annexure-2.

3.4 CUSTOM BUILT MEMBRANE KEY PANEL

The Custom Built membrane key panel is the user interface device and is used to feed setup data and program parameters to the system. The detailed specification is given is Annexure-3

3.5 KEY PANEL COMMUNICATION MODULE

The Key panel communication module is the communication bridge between the CPU and the key-panel, display module. The required communication is established by means of RS232 serial link. The module is to be designed for 24V DC input power supply.

The following documents are attached for further understanding of the above modules.

- Bill of materials for Key panel communication module - Annexure-1
- Specification details of power supply modules, (3.2) & (3.3) - Annexure-2
- Specification details of custom built membrane key panel with display window for VFD - Annexure-3

4.0 QUALITY REQUIREMENTS:

4.1 The vendor shall get the vendor-quality plan, inline with BHEL quality plan format, approved by BHEL.

4.2 One complete set of all items shall be manufactured, populated, tested and shall be informed to BHEL for prototype inspection. After getting approval for prototype module, further manufacturing of balance quantity shall be done. This should be offered positively on or before 20 days from the date of the PO. The CPU required for conducting the testing of the module shall be provided by BHEL. This clause is applicable only to first supply pertaining to any vendor.

4.3 BHEL will carry out final inspection of this module.

5.0 DOCUMENTATION:

5.1 Along with offer.

- Compliance to each clause of this specification and quality requirements.
- Compliance to BOM clearly indicating make, tolerance and quantity for the offered modules.

5.2 In the event of PO

- PCB artwork drawing & component layout drawing.
- Schematic and component layout drawings.
- Bill of material indicating make and quantity.
- Quality plan for the scope of items as indicated in (1.0).

Vendor shall submit above documents in soft copy for BHEL's approval. Documents shall be furnished within one week from the date of PO.

6.0 IPR REQUIREMENTS:

The technology forms part of product/service patented by BHEL. The information contained in this enquiry specification is provided by BHEL to enable the vendors to work out their offers and submit them to BHEL. The vendors are advised not to use the information contained in this enquiry or provided by BHEL in any of the subsequent interactions for any other purpose whatsoever without the express written permission from BHEL. The vendors shall never use the information to infringe upon BHEL RIGHTS or detrimental to BHEL's interests. The vendors shall return all the documents along with their quotation / regret letters.

The vendors shall not divulge any information contained in the vendor documents or otherwise provided by BHEL to any third party without express written consent from BHEL.

"BHEL RIGHTS" shall mean the proprietary technology owned by BHEL pertaining to the product / process, including but not limited to patents, patent applications, confidential information, copyrighted information including trademarks and any trade secrets used in the manufacturing / executing and supply / rendering of the product / service.

7.0 GENERAL INSTRUCTIONS:

7.1 Vendor to check the receipt of complete documents referred as enclosures in the relevant clause of this specification. In the event of PO, the entire specification will form part of purchase order for compliant during execution.

7.2 Deviation if any, shall be clearly brought out in the “Deviation Schedule” (enclosed). Otherwise it will be construed that the vendor is fully complying with the specification.

7.3 The vendor is advised to promptly clarify with BHEL any issue of technical ambiguity or non-clarity.

8.0 SPECIAL INSTRUCTIONS TO VENDOR:

8.1 Vendor shall follow BHEL specification BOM and drawings for inspection. Deviation, if any will not be accepted after placement of PO.

8.2 Nothing in this specification shall be construed to relieve the vendor from his responsibility. The specification covers briefly the requirements of the module. It is the responsibility of vendor to take care of other basic and essential requirements to manufacture a quality product.

Annexure-1

BOM FOR KEY PANEL COMMUNICATION MODULE

RESISTORS:

S. N	LEGEND	QTY	DETAIL	DESCRIPTION	Make
01	R1, R11, R12, R13, R14, R15,R16, R17, R18	9nos.	10 K	0.25 watt, MFR 1% 50ppm	Philips/Keltron/AEC /Walsin/Vishay/Thermax/MFR/Yageo
02	R2, R3, R4, R5, R6, R7, R9,R10	8 nos.	1.0 K		
03	R8	1 no.	560 Ohms		

SMD CAPACITORS:

04	C1, C2, C3, C4, C5, C8	6 nos..	1µF/ 35V	Tantalum , +/- 10% tolerance	(Philips / Samsung / AEC / Advance Electronics / Deawoo / AVX/Vishay/Kemet/Multicomp/Walsin)
05	C6, C7	2 nos.	150 pF/ 63V	Ceramic, +/- 20% tolerance	
06	C9, C12, DC2-DC8, DC10, DC11	11 nos.	0.1µF/ 63V	Ceramic, +/- 20% tolerance	
07	C10, C11	2 nos.	10µF/ 35V	Tantalum, +/- 10% tolerance	

INDUSTRIAL GRADE IC's:

08	U1	1 no.	MAX 232	16 pin DIP	(National / Texas / Motorola / Harris / Philips / Linear Technology / SGS Thomson / RCA / NEC / Fairchild / OKI/ Sprauge/Cipress semi/Pericom/CDT/ Maxim/ATMEL/Microchip technology)
09	U2	1 no.	89C668HBA/ AT89C51RD2-SLSUM	44 PIN PLCC	
10	U3, U4, U5	3 nos.	74FCT373	20 PIN SOIC	
11	U6	1 no.	74FCT245	20 PIN SOIC	
12	U7	1 no.	74AC138	16 PIN SOIC narrow	
13	U10, U11	2 nos.	74LS00	14 PIN SOIC narrow	
14	U8	1 no.	SMD Oscillator 20Mhz	F3340R/ SG710PHK	FOX /SEIKO EPSON

DIODE:

15	D1	1 No.	1N5059	Controlled Avalanche Sinterglass Diode Package : SOD57	Philips/ Vishay/Multicomp

MISCELLANEOUS:

16	U9/U12	1 No.	DC-to-DC Converter 24VDC to 5VDC	AIMTEC make, Part No. AM5T-2405SZ; Traco Make, Part No. TEN5-2411	
17	Jumper JP1, JP2, CON4 – 2X1 Header	3 nos.			Berg Stick – Protectron/champion/ FCI/Samtec
18	J1 - 20x2 Header 90 degree	1 no.			Berg Stick – Protectron/champion/ FCI/Samtec
19	CON3 – 10X2 Female Header	1 no.		P9403-20-21	Berg - Protectron/champion/ FCI/Samtec
20	CON5 – 9 Pin 90 deg.Female D-Connector	1 no.			OEN(FCI)/ESSEN/
21	CN1 – 2 Pos. TB	1 no.	740-102		Wago (Cage Clamp)
22	PCB	1no.	FR4 / 1.6mm Thick 35 micron Cu	Size: 57mm(H) x 250mm(W)	Capronics, Anand Electronics/ Cosmic /Meena Ckts/ Prototech / Suitable source of Industrial Grade
23	44 Pin IC Base	1 no.		PLCC 44	Protectron/Champion
24	Aluminium sheet	1 no	S1 grade		Control touch
25	M3x25mm screw CSK Material: MS	As Req d.			
26	Hex. Spacer (without spindle) inner thread size 3mm, height 11mm Material: Brass	4 Nos.			
27	M3x35mm screw CSK Material: MS	As reqd			
28	M3 Nut, Material:MS	As reqd			
29	SMPS-1	1 No.	Traco make	TIS 75-112	
			XP make	DNR60US12	
			Mean Well make	NDR-75-12	
30	SMPS-2	1 No.	Traco make	TIS 150-124	
			XP make	DNR 120LS24 / DNR 120AS24	

			Mean Well make	NDR-120-24	
31	Custom built membrane key panel assembled in aluminium back plate	1 No.	Control Touch		
32	Acrylic coating	As req.			
33	Silica jel	As req.			
34	Thermocol box for keypanel				
35	Packing boxes for PS & Key board.				

Note: All BOM items shall be of Industrial grade.

Annexure-2

(A) 12 VDC Power Supply Module SMPS –1

Preferred make	Traco/Switzerland (part no. TIS 75-112)	XP/ Switzerland (part no. DNR60US12)	Mean Well/Taiwan make NDR-75-12
Input Voltage range **	93 - 132 VAC / 187-264VAC	85 - 264 VAC	90 ~ 264VAC
Input frequency	47- 63 Hz	47- 63 Hz	47 ~ 63Hz
Output	12V DC, 6 A	12V DC, 5 A	12V DC, 6.3A
Input line regulation	± 1 %	± 1 %	±0.5%
Load regulation	± 2 %	± 2 %	±1.0%
Ripple and Noise	< 150 mV P – P	< 150 mV P – P	80mVp-p
Over Voltage protection	Required	Required	Required
Over load protection	Required	Required	Required
Efficiency	≥70 %	≥70 %	≥70 %
Operating temp. range	- 25 º C to + 70 º C	- 25 º C to + 70 º C	- 20 º C to + 70 º C
EMI suppression	EN 55022 – B	EN 55022 – B	EN55032 (CISPR32),
Safety standards and approvals	UL 508	UL 508	UL508,
Mounting	DIN – Rail 35 mm	DIN – Rail 35 mm	DIN – Rail 35 mm
Connections	Screw terminals	Screw terminals	Screw terminals
Packaging	Fully enclosed in box	Fully enclosed in box	Fully enclosed in box

(B) 24 VDC Power Supply Module SMPS-2

Preferred make	Traco/Switzerland (part no. TIS 150-124)	XP/ Switzerland (part no. DNR120LS24)	Mean Well/Taiwan make NDR-120-24
Input Voltage range **	93 - 132 VAC / 187-264VAC	93 - 132 VAC / 186-264VAC	90 ~ 264VAC
Input frequency	47- 63 Hz	47- 63 Hz	47 ~ 63Hz
Output	24V DC, 6 A	24V DC, 5 A	24V DC, 5A
Input line regulation	± 1 %	± 1 %	±0.5%
Load regulation	± 2 %	± 2 %	±1.0%
Ripple and Noise	< 150 mV P – P	< 150 mV P – P	120mVp-p
Over Voltage protection	Required	Required	Required
Over load protection	Required	Required	Required
Efficiency	≥70 %	≥70 %	≥70 %
Operating temp. range	- 25 º C to + 70 º C	- 25 º C to + 70 º C	- 20 º C to + 70 º C
EMI suppression	EN 55022 – B	EN 55022 – B	EN55032 (CISPR32),
Safety standards and approvals	UL 508	UL 508	UL508,
Mounting	DIN – Rail 35 mm	DIN – Rail 35 mm	DIN – Rail 35 mm
Connections	Screw terminals	Screw terminals	Screw terminals
Packaging	Fully enclosed in box	Fully enclosed in box	Fully enclosed in box

Annexure – 3

Specification for custom built membrane key panel with display window for VFD

Module and LEDs.	All the connections shall be terminated on flex tail.
Size of key panel	300mm(W) x 260mm(H)
Number of keys	32 nos. (8x4 matrix)
Type of key	Non-Tactile type
LEDs	9 nos , 3mm size
Flex tail Length	180 mm
Termination	2 nos. Single row 0.1” pitch female
Connectors. (Berg)	12+1(polarity) position for 8x4 matrix for 32 keys and one 18+1(polarity) pin for 9 LEDs . As per the enclosed Drawing No. 1
Colour Scheme & Key Sizes:	As per the enclosed Drawing No. 2
Display Window	Should have suitable filter for green color VFD Dimensions as per the enclosed Drawing No. 2
Mounting	Sticking with self-adhesive on a suitable Aluminium plate of 1.5mm thickness. As per Drawing No.3
Electrical	
Switch resistance	Less than 100 ohms
Operating voltage	24 V DC maximum
Operating current	30 mA maximum
Contact bounce	Less than 10ms
Operating force	2 ounces
Life	2 million operations,
Certificate to be enclosed Along with quotation.	
Switch and matrix connection	As per the enclosed Table 1 & Table 1A
Switch matrix and LED connections	As per the enclosed Drawing No.1
Operating temperature	-40 deg C to +70 deg C
Dielectric withstand capacity	250 V AC @ 50Hz
Preferred make	Control Touch / Pune

Table No.1: Switch Connections

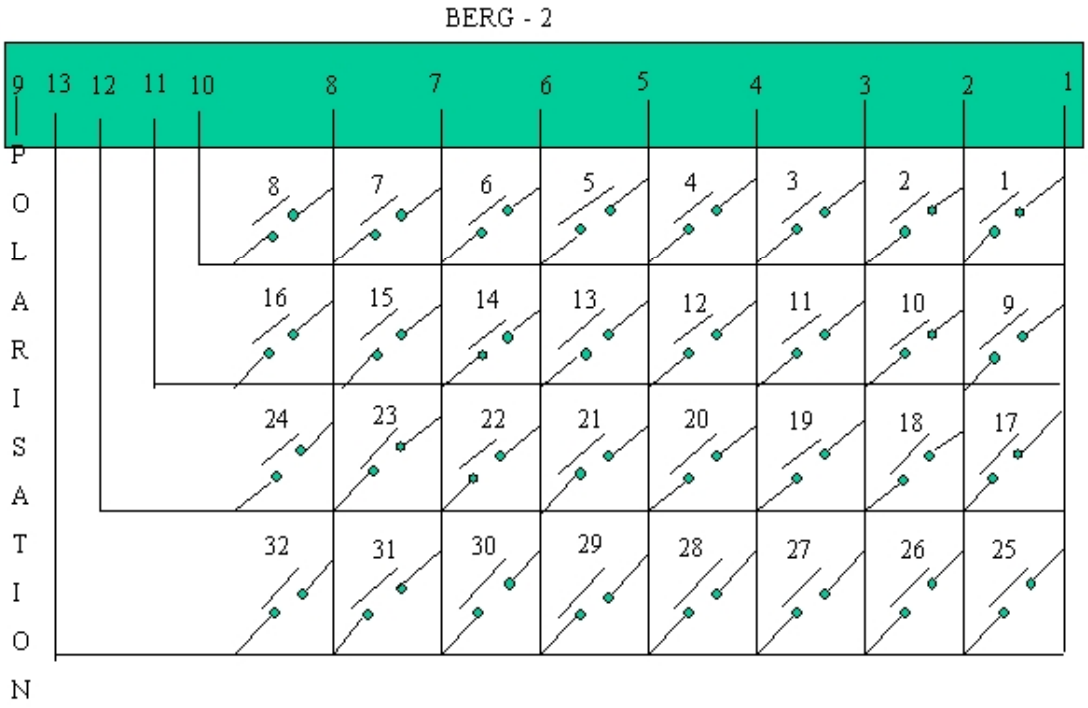
Key Details

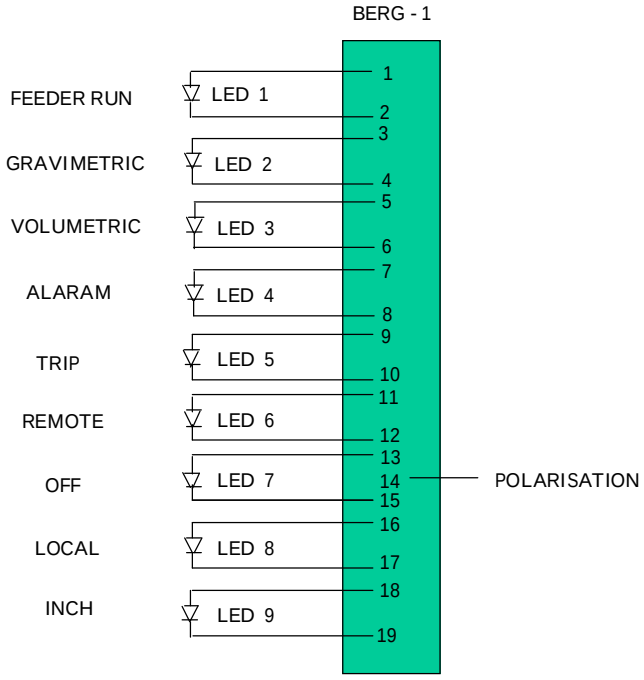
S.No.	Key number	Key description
01	1	Numeric 1
02	2	Numeric 2
03	3	Numeric 3
04	4	Numeric 4
05	5	Numeric 5
06	6	Numeric 6
07	7	Numeric 7
08	8	Numeric 8
09	9	Numeric 9
10	10	Numeric 0
11	11	Decimal point
12	12	00
13	13	NEXT
14	14	PREV
15	15	PROG
16	16	ENTER
17	17	CLS
18	18	ESC
19	19	TARE CAL
20	20	SPAN CAL
21	21	TOTAL DISPLAY
22	22	TOTAL RESET
23	23	SELECT DATA
24	24	SELF CHECK
25	25	ERROR LIST
26	26	SPL FUN
27	27	CLOCK SET
28	28	BELT REV
29	29	INCH
30	30	REMOTE
31	31	OFF
32	32	LOCAL

Table No.1A: Matrix Connection

S.No.	Key number	Matrix connection (Rx ROW NUMBER Cx COLUMN NUMBER)	Key description
01	1	R1,C1 (DI0,DO0)	Numeric 1
02	2	R2,C1 (DI1,DO0)	Numeric 2
03	3	R3,C1 (DI2,DO0)	Numeric 3
04	4	R4,C1 (DI3,DO0)	Numeric 4
05	5	R5,C1 (DI4,DO0)	Numeric 5
06	6	R6,C1 (DI5,DO0)	Numeric 6
07	7	R7,C1 (DI6,DO0)	Numeric 7
08	8	R8,C1 (DI7,DO0)	Numeric 8
09	9	R1,C2 (DI0,DO1)	Numeric 9
10	10	R2,C2 (DI1,DO1)	Numeric 0
11	11	R3,C2 (DI2,DO1)	Decimal point
12	12	R4,C2 (DI3,DO1)	00
13	13	R5,C2 (DI4,DO1)	NEXT
14	14	R6,C2 (DI5,DO1)	PREV
15	15	R7,C2 (DI6,DO1)	PROG
16	16	R8,C2 (DI7,DO1)	ENTER
17	17	R1,C3 (DI0,DO2)	CLS
18	18	R2,C3 (DI1,DO2)	ESC
19	19	R3,C3 (DI2,DO2)	TARE CAL
20	20	R4,C3 (DI3,DO2)	SPAN CAL
21	21	R5,C3 (DI4,DO2)	TOTAL DISPLAY
22	22	R6,C3 (DI5,DO2)	TOTAL RESET
23	23	R7,C3 (DI6,DO2)	SELECT DATA
24	24	R8,C3 (DI7,DO2)	SELF CHECK
25	25	R1,C4 (DI0,DO3)	ERROR LIST
26	26	R2,C4 (DI1,DO3)	SPL FUN
27	27	R3,C4 (DI2,DO3)	CLOCK SET
28	28	R4,C4 (DI3,DO3)	BELT REV
29	29	R5,C4 (DI4,DO3)	INCH
30	30	R6,C4 (DI5,DO3)	REMOTE
31	31	R7,C4 (DI6,DO3)	OFF
32	32	R8,C4 (DI7,DO3)	LOCAL

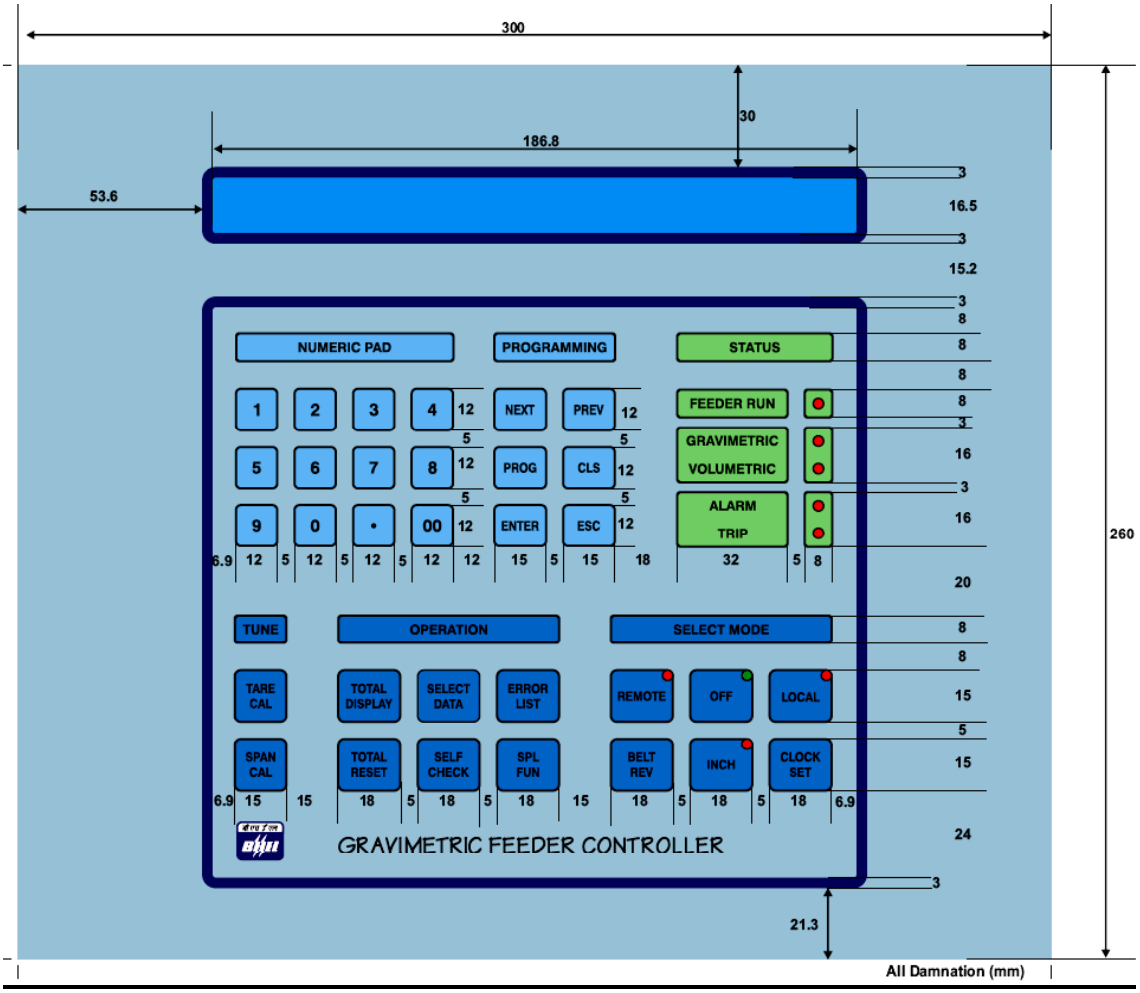
Drawing No.1: Switch Matrix Arrangement And LED Arrangement





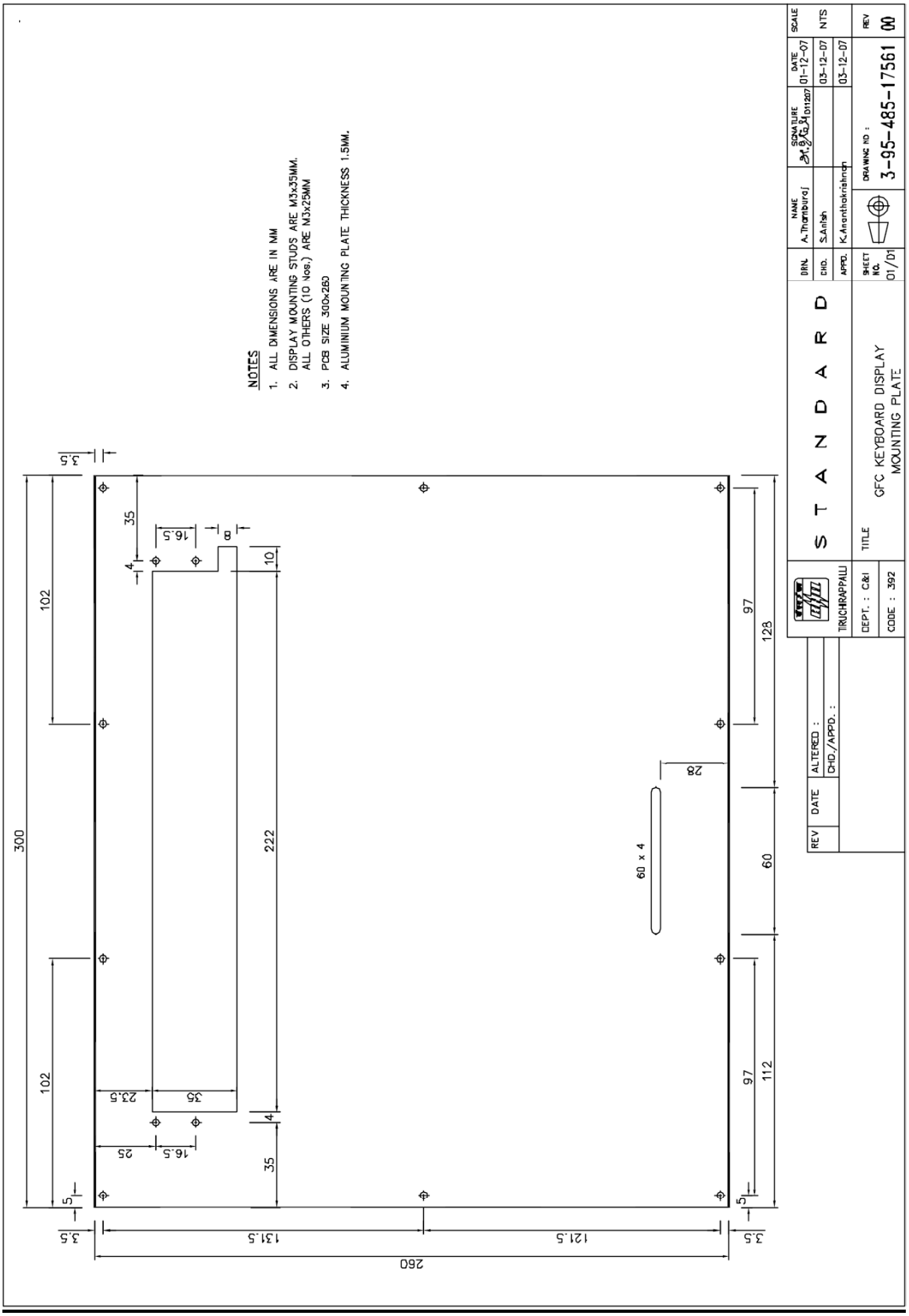
Rev 02

Drawing No. 2 – Key Panel Layout



Rev 01

Drawing No.4: Aluminium Plate for Key-panel mounting



BHARAT HEAVY ELECTRICALS LIMITED

TIRUCHIRAPPALLI

CONTROLS AND INSTRUMENTATION / FB

QUALITY ASSURANCE

STANDARD PACKING PROCEDURE

FOR

ELECTRONIC MODULES

Rev	Date	Prepared	Checked	Approved	Revision History
00	09/10/2014	V.AVINASH	RM.VAIRAVAN	S.DAKSHINAMOORTHY	Initial Release

1.0 SCOPE

1.1 This procedure gives minimum guidelines to be complied for packing of Electronic modules. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage for periods more than one year.

2.0 MATERIAL SPECIFICATION FOR PACKING

2.1 The material shall be packed in carton box and / or seasoned wood or plywood as per international standard.

3.0 PACKING

3.1 For Inland packing, suitable carton boxes shall be used. For export packing suitable box made of seasoned wood and / or plywood sheets of required thickness shall be used.

3.2 The individual electronic card shall be kept inside a bubble sheet cover and sealed appropriately

3.3 ESD sensitive components/assemblies shall be packed using ESD protective bags and sealed appropriately.

3.4 The electronic modules packed as above shall be kept inside a suitably sized carton box.

3.5 The gap between modules and the box shall be filled with suitable shock absorbing material like thermocol, etc.

3.6 Individual carton boxes with modules shall be stacked inside a carton box or wooden box according to inland or export packing.

3.7 Each case must have sufficient quantity of silica gel, packed in cotton cloth bags, and shall be kept at different places as required.

3.8 Wooden boxes shall be steel strapped and straps shall be secured with crimped steel seals.

3.9 Carton boxes shall be strapped with Non-metallic straps.

3.10 Carton boxes should be wrapped around with water proof tape to prevent water ingress.

3.11 Wooden boxes should be provided with foot in case of size of box side exceeds 600 mm

4.0 MARKING

4.1 After completing the packing, Stencil marking, as per dispatch instructions and symbol marking as per Annexure – I shall be made. Please ensure the box is stenciled with “FRAGILE ITEM”, “HANDLE WITH CARE”

5.0 PACKING SLIP

5.1 A copy of the packing slip, kept in a polythene cover shall be kept inside the box. Another copy of the packing slip, kept in a polythene cover shall be kept outside the box and covered with a metallic plate for wooden box and polythene cover for carton box.

6.0 CAUTION

6.1 Do not pack any other Mechanical items with this case.

7.0 GENERAL

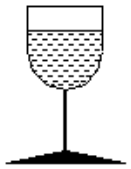
7.1 These packing procedures are the minimum requirements in addition to the standard instructions mentioned in the Purchase Order and Specification.

7.2 Deviation to meet the packing procedure requirements / non-clarity in packing approach in any quotation will be liable for rejection of offer.

ANNEXURE – 1

TO

PROCEDURE NO:CI:QAC:PR:02/00 ; PR:03/00 ; PR:04/00



FRAGILE, HANDLE WITH CARE

PROTECT FROM HEAT AND RADIOACTIVE SOURCES

USE NO HOOKS

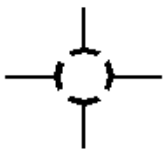
NOTE: The design of heavy goods packages cannot always resist top lifting by grabhooks.

KEEP DRY

NOTE: Not all cases have waterproof internal liners: plywood used in the construction may not have a waterproof glueline.

THIS WAY UP

NOTE: Certain designs of small cases make it difficult to distinguish top from bottom.

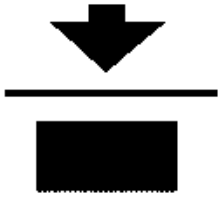


CENTRE OF GRAVITY

NOTE: This should be stencilled as a minimum on the two longest case sides (this information will normally be supplied by the manufacturer of the item(s) packed).

KEEP AWAY FROM HEAT

... kg max



STACKING LIMITATION

INTERNATIONAL "SLING HERE" SYMBOL

NOTE: The maximum load in kilograms should be marked above the arrow.

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT , TIRUCHIRAPPALLI 620 014.

CONTROLS AND INSTRUMENTATION

TECHNICAL SPECIFICATION

FOR

ELECTRONIC MODULES, BACK PLANE, EURO RACK, CABLES AND ACCESSORIES FOR MICRO PROCESSOR BASED GRAVIMETRIC FEEDER CONTROL

SPECIFICATION NO.:TDC:TCI:308/REV 06

REV	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
06	25.09.2019	SCSI cable type reverted to flat ribbon cable.			
05	09.03.2019	BOM updated, Pulse relay type changed, DOM & AIM prefab cable length increased, SCSI cable type changed.	**-/sd [SK]**	**-/sd [KV]**	**-/sd [TK]**
04	11.05.2018	Revised to update the BOM	**-/sd [SK]**	**-/sd [KV]**	**-/sd [TK]**
03	01.02.2016	Revised to incorporate FES feedback for ribbon cable	**-/sd [SK]**	**-/sd [KV]**	**-/sd [DS]**
02	22.02.2010	Revised to incorporate site / testing feedback	**-/sd**	**-/sd**	**-/sd**
01	01.10.2008	Revised to incorporate site / testing feedback	**-/sd**	**-/sd**	**-/sd**
00	25.06.2007	Initial release	**-/sd**	**-/sd**	**-/sd**

1.0 SCOPE:

The following items and activities shall constitute the scope of supply:

1.1 Relay Interface module *

1.2 Pulse Relay module *

1.3 Back plane with 8 slots *

1.4 CPU to I/O Rack interface module *

1.5 Prefabricated I/O Cable Set (overall shielded) *

- 1.5.1 8 Pair x 0.25 sq. mm (3 runs)
- 1.5.2 16 core x 0.25 sq. mm (2 runs)
- 1.5.3 RS232C cable

1.6 50 Pin SCSI FRC *

- 1.6.1 CPU to I/O interface module
- 1.6.2 Interface module to bus terminator module

1.7 Euro rack system *

1.8 Testing of assembled module

The following activities shall be applicable for items (1.1), (1.2), (1.3) & (1.4)

PCB artwork design

Solder mask with component legend printing

PCB marking and populating

Protective conformal coating

Any other items and activities those are necessary to manufacture and supply the modules meeting all functional requirements and the system complete.

Refer to drawing no.TDC:TCI:308 for details of interface.

* Quantity as per enquiry

2.0 GENERAL REQUIREMENTS:

2.1 The make and model of various components are indicated in the bill of materials. Any change suggested by the vendor has to be indicated in the offer itself. Deviation, if any will not be accepted after the placement of purchase order (PO).

2.2 All components shall be of **industrial grade**. Components shall be test screened before populating.

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2.4 Standard industrial PCB manufacturing and populating guidelines are to be followed.

2.5 PCB shall have BHEL emblem and name of module along with vendor code. This will be specified after placement of PO.

2.6 Films for PCBs. Component side, solder side negatives shall be furnished after placement of PO.

3.0 DOCUMENTS FURNISHED:

The following documents are attached for further understanding of the modules.

- BOM for Relay interface module - Annexure-1
- BOM for materials for Pulse Relay module - Annexure-2
- BOM for materials for Back Plane with 8 slots - Annexure-3
- BOM for materials for interface module between CPU and I/O Rack - Annexure-4
- Specification for prefabricated I/O cable set - Annexure-5
- BOM for RS232C cable - Annexure-6
- BOM for 50 pin SCSI cable - Annexure-7
- BOM for Euro rack - Annexure-8
- Scope diagram – Drawing no. TDC:TCI:308

4.0 QUALITY REQUIREMENTS:

4.1 The vendor shall get the vendor-quality plan, inline with BHEL quality plan format, approved by BHEL.

4.2 One complete set of all items shall be manufactured, populated, tested and shall be informed to BHEL for prototype inspection. After getting approval for prototype module, further manufacturing of balance quantity shall be done. This should be offered positively on or before 20 days from the date of the PO. This clause is applicable only to first supply pertaining to any vendor.

4.3 BHEL will carry out final inspection of this module.

5.0 DOCUMENTATION:

5.1 Along with offer.

- Compliance to each clause of this specification and quality requirements.
- Compliance to BOM clearly indicating make, tolerance and quantity for the offered modules.

5.2 In the event of PO

- PCB artwork drawing & component layout drawing.
- Schematic and component layout drawings.

- Bill of material indicating make and quantity.
- Quality plan for the scope of items as indicated in (1.0).

Vendor shall submit above documents in soft copy for BHEL's approval. Documents shall be furnished within one week from the date of PO.

6.0 IPR REQUIREMENTS:

The technology forms part of product/service patented by BHEL. The information contained in this enquiry specification is provided by BHEL to enable the vendors to work out their offers and submit them to BHEL. The vendors are advised not to use the information contained in this enquiry or provided by BHEL in any of the subsequent interactions for any other purpose whatsoever without the express written permission from BHEL. The vendors shall never use the information to infringe upon BHEL RIGHTS or detrimental to BHEL's interests. The vendors shall return all the documents along with their quotation / regret letters.

The vendors shall not divulge any information contained in the vendor documents or otherwise provided by BHEL to any third party without express written consent from BHEL.

"BHEL RIGHTS" shall mean the proprietary technology owned by BHEL pertaining to the product / process, including but not limited to patents, patent applications, confidential information, copyrighted information including trademarks and any trade secrets used in the manufacturing / executing and supply / rendering of the product / service.

7.0 GENERAL INSTRUCTIONS:

7.1 Vendor to check the receipt of complete documents referred as enclosures in the relevant clause of this specification. In the event of PO, the entire specification will form part of purchase order for compliant during execution.

7.2 Deviation if any, shall be clearly brought out in the "Deviation Schedule" (enclosed). Otherwise it will be construed that the vendor is fully complying with the specification.

7.3 The vendor is advised to promptly clarify with BHEL any issue of technical ambiguity or non-clarity.

8.0 SPECIAL INSTRUCTIONS TO VENDOR:

8.1 Vendor shall follow BHEL specification BOM and drawings for inspection. Deviation, if any will not be accepted after placement of PO.

8.2 *Nothing in this specification shall be construed to relieve the vendor from his responsibility. The specification covers briefly the requirements of the module. It is the responsibility of vendor to take care of other basic and essential requirements to manufacture a quality product*.

Annexure-1

BOM FOR RELAY INTERFACE MODULE

RESISTORS:

S. N	LEGEND	QTY	DETAIL	DESCRIPTION	Make
01	R1,R2,R3,R4, R5,R6,R7,R8, R9,R10,R11,R12	12 nos.	4.7K	0.25 watt, MFR 1% 50ppm	Philips/Keltron/AEC/ Vishay/Thermax/MFR/ Luke electronics

LED's:

02	D1,D2,D3,D4, D5,D6,D7,D8, D9,D10,D11,D12	12 nos.	5mm Red LEDs with base	Diffused type	Kwality/CDIL/Namtech

MISCELLANEOUS:

03	Relays : RLY1, RLY2, RLY3, RLY4, RLY5, RLY6, RLY7, RLY8, RLY9, RLY10, RLY11, RLY12	12 nos.	68 – 24 – 2CE	Miniature sealed power Relay	OEN Make, with CSA / UL marking
04	Terminal Blocks : J1, J4, J7, J10, J13, J16, J19, J22, J25, J28, J31, J34	12 nos.	254-452-000-008	2 Position TBs (cage clamp)	Wago
05	Terminal Blocks: J2, J3, J5, J6, J8, J9, J11, J12, J14, J15, J17, J18, J20, J21, J23, J24, J26, J27, J29, J30, J32, J33, J35, J36	24 no.	254-453-000-008	3 Position TBs (cage clamp)	Wago
06	PCB carrier	1 no.	288-620	105X330mm	Wago
07	PCB carrier lateral cover	2 nos.	288-621	Lateral cover (Grey colour)	Wago
08	Rail support to PCB carrier	2 nos.	288-622	(Grey colour) fixing foot	Wago
09	Relay Interface module PCB	1no.	FR4 / 1.6 mm, Thick / 35 micron Cu, Double sided	Size: 100 (H) x 330(W)mm Reputed make of industrial grade	Material used is from Nanya Plastics/ ILM Supplied by LCSO Approved vendors Isola/Meenackts/ Prototech/Micropack/ AnandElectronics/ Capronics
10	Diode	12 Nos.	1N4148		Philips/Fairchild/ Motorola/MIC /CDIL/Vishay/Central semi/ Diode Inc.

Annexure-2

BOM FOR PULSE RELAY MODULE

SL.	LEGEND	QTY.	PART. NO.	DESCRIPTION	Make
1	Solid state relay module	1 no.	PLC-OSC- 24DC/ 24DC/ 2 - 2966634	Solid state relay with Relay socket DIN rail mountable	Phoenix contact

Annexure-3

BOM FOR BACK PLANE WITH 8 SLOTS

SL.	LEGEND	QTY.	PART NO.	DESCRIPTION	Make
1	J1 to J8	8 nos.	09-03-296-6825 / 8609-396-81-14-755	96 Pin Euro Connectors (Female)	Harting / FCI
2	Multi Layer Back plane PCB	1no.	6 Layer FR4 / 3.2mm Thick	Size: 3U (130 mm)(H) x 42T (212+/-0.5 mm) (W)	Material used is from Nanya Plastics/ ILM Supplied by LCSO Approved vendors Isola/Meenackts/ Prototech/Micropack/Anand Electronics/Capronics
3	Terminal Block CN1 & CN2	2 nos.	254-452-000-008	2 Position TB	Wago

Annexure-4

BOM FOR INTERFACE MODULE BETWEEN CPU AND I /O RACK

SL.	LEGEND	QTY.	PART NO.	DESCRIPTION	MAKE
1	SCSI Connectors: BT1,BT2,SCSI1 & SCSI2	4 nos.		50 Pin Female, Industrial grade	Amphenol/Multicomp/ FCI/OEN
2	PCB carrier	1 no.	288-620	105X180mm	Wago
3	PCB carrier lateral cover	2 nos.	288-621	Lateral cover (Grey colour)	Wago
4	Rail support to PCB carrier	2 nos.	288-622	(Grey colour) fixing foot	Wago
5	CPU to I/O Rack interface module PCB	1no.	FR4 / 1.6mm Thick / 35micron Cu	Size: 100(H) x 175mm(W)	Material used is from Nanya Plastics/ ILM Supplied by LCSO Approved vendors Isola/Cosmic/Meena ckts/Prototech

Annexure-5

SPECIFICATION FOR PREFABRICATED I/O CABLE SET

Termination Details

- One end of the cable to be crimped with connector pin and inserted to the euro connector mounted on z rails fixed on the Euro rack. Shield wire shall be provided with eye type lug.
- Other end of the cable should be provided with ferruling and tubular lug (0.5mm x 10mm). Details will be given to the successful bidder.

Cable Specifications

- Fine strands of tinned copper wire
- PVC based core insulation
- Colour coded to DIN 47100
- Film wrapping
- Screen braiding of tinned copper wire
- Outer sheath of special PVC-based compound
- Flame retardant according to VDE 0472,Part 804, Test Type B(IEC 332.1)
- Temperature range : static : -30°C to +70°C
- Working voltage: 250V,AC
- Approvals : UL/CSA

Sl	ITEM	QUANTITY	DESCRIPTION	MAKE
1	Shielded Cable 16 core x 0.25 sq. mm	1 SET	Model No. TRONIC-CY(LIY-CY) QMM/20038 500V Length : 2.00 m (DOM)	Helukabel
2	Shielded Cable 16 core x 0.25 sq. mm	1 SET	Model No. TRONIC-CY(LIY-CY) QMM/20038 500V Length : 1.00 m (DIM)	Helukabel
3	8 twisted pairs x 0.25 sq. mm Pairs twisted into layers	1 SET	Model No. PAAR TRONIC-CY QMM/21040 300/500V Length : 1.5m (AIM)	Helukabel

4	8 twisted pairs x 0.25 sq. mm Pairs twisted into layers	1 SET	Model No. PAAR TRONIC-CY QMM/21040 300/500V Length : 1.00m (AOM)	Helukabel
5	8 twisted pairs x 0.25 sq. mm Pairs twisted into layers	1 SET	Model No. PAAR TRONIC-CY QMM/21040 300/500V Length : 2.00 m (PIM)	Helukabel
6	Cable mount clamp plastic	5 SET		Industrial grade
7	Cable tie with marker I.D	10 SET		Industrial grade
8	96 Pin Euro connector	5 Nos.	096-3214	Harting
9	Crimping Pin	80 Nos.	09020008484	Harting
10	Ferrules for cables terminating to terminal block	57 SET	2.5 mm ID white sleeve with black letters screen printing	Industrial grade
11	Crimping lugs 0.5mm x 10mm	57	216-201	Wago
12	Heatsrinkable sleeve (10mm dia.) 1.10Mtrs.	1 NO.		
13	Heatsrinkable sleeve (3mm dia.) 1.0Mtrs.	1 NO.		
14	Heatsrinkable sleeve (2mm dia.) 30cm.	1 NO.		
15	2.5 dia. Round lugs solder type	5 NO.		Industrial grade
16	“P” Clamps	10 NO.		
17	Name tags with marking of DOM,DIM,AIM,AOM,PIM	10 NO.		
18	1.5 dia. Tubular lugs for sheild	2		Industrial grade

Annexure – 6

BOM FOR RS232C CABLE

SL	ITEM	UNIT	QUANTITY	DESCRIPTION	MAKE
1.	SHIELDED CABLE	m	3 m	4 CORE x 0.25 sq cm Industrial Grade	Helukabel
2.	CONNECTORS with dust covers and fixing screws	NO	1	9 PIN D-TYPE MALE (Panel mountable)	OEN (FCI) / Essen
3.	CONNECTORS with dust covers and fixing screws	NO	1	9 PIN D-TYPE FEMALE (Panel mountable)	OEN (FCI) /Essen

9 PIN D Connector Termination Details

Male	Color Code	Female	Remark
PIN 1	RED	PIN 5	
PIN 3	GREEN	PIN 3	
PIN 4	YELLOW	PIN 2	
	WHITE	PIN 1 – PIN 9	Loop
BODY	BLACK	BODY	Soldered to body

Annexure – 7

BOM FOR 50 PIN SCSI CABLE

SL	ITEM	UNIT	QTY	DESCRIPTION	MAKE
1.	SCSI CABLE WITH MALE CONNECTORS AT BOTH ENDS.	SET	1	50 CORE SCSI CABLE Length 1.5 m	Industrial grade/ Imported
2.	SCSI CABLE WITH MALE CONNECTORS AT BOTH ENDS.	SET	2	50 CORE SCSI CABLE Length 0.5 m	Industrial grade/ Imported

 Cable should be supplied with end connectors crimped as a set.
 Crimping of ribbon cable to be (with clamp at the crimping end) such that the force will not act directly on the cable crimping portion during plugging/un-plugging.

Annexure – 8

BOM FOR EURO RACK

SR.	DESCRIPTION	PART. NO	UNIT	QUANTITY/ Rack	MAKE
1	SIDE PANELS	RP 3684 529/ 2331-1263-04-04	NO.	2	Rittal/DIN Rack
2	19” MOUNTING FLANGES	RP 3684 624/ 2331-1263-04-23	NO.	2	Rittal/DIN Rack
3	FRONT HORIZONTAL RAIL	RP 3684 565/ 2331-1263-04-06-A	NO.	2	Rittal/DIN Rack
4	TAPPED STRIP	RP 3684 608/ 2331-1263-04-32	NO.	2	Rittal/DIN Rack
5	REAR HORIZONTAL RAIL C1	RP 3684 570/ 2331-1263-04-06-B	NO.	2	Rittal/DIN Rack
6	REAR HORIZONTAL RAIL D1	RP 3684 580/ 2331-1263-04-06-C	NO.	1	Rittal/DIN Rack
7	M4 X 12 HEAD SCREWS	RP 3684 881/ 1010	NO.	10	Rittal/DIN Rack
8	GUIDE RAILS PLASTIC PACK	RP 3684 669/ 2326,2327	NO.	16	Rittal/DIN Rack
9	M2.5 X 6 ASSEMBLY SCREWS WITH NUT AND WASHER	RP 3654 340/ 1405	NO.	62	Rittal/DIN Rack
10	Z RAILS FOR CONNECTORS	RP 3684 600/ 2331-1263-04-48	NO.	2	Rittal/DIN Rack
11	96 pin euro connector	096-3214	NO.	5	Harting/FCI
12	Module location sticker		NO.	1	
13	“P” clamp fixing M2.5x12mm screws, planes, spring & nut CHD	Chromium plated	SET	10	
14	M3 plane washers	Nickel plated	NO.	30	

Note:

- The rack should be supplied in assembled condition.