



PURCHASE SPECIFICATION

P. S. No.: PS/445/2719

Rev. No.: 00

Page 1 of 35

Group: Traction Engineering

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

Code No.: TI0668086190

Revision History Sheet

Rev. No.	Date	Nature of Issue	Reasons	Prepared By	Approved By
00	01.05.2020	First issue		Girish Chand	Venkateshalu K

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

Venkateshalu K

(Venkateshalu K)

Prepared by:

Girish

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains
1. Introduction

Purpose of this technical specification document is to give requirement information about Driver Display Unit mounted on driver's desk in EMU/MEMU trains.

The DDU is used as a modern interface from driver to train control. It displays detailed information from the equipment/sensors in the train. It also enables the user to add function control elements without hardware changes in the drivers' desk.

2. Scope
2.1 Scope of supply

Following shall be the scope of supply for each piece of Driver Display Unit.

	Item Description	Qty/DDU
1.	Driver Display Unit loaded with OS and screen software	1 No.
2.	Copy of loaded screen software in pen drive	1 set
3.	Fasteners required for mounting	1 set

2.2 Design approval and equipment commissioning

- The design of the equipment as offered shall be finally approved by RDSO/ICF/IR. Supplier shall provide all necessary documents, drawings, software related documents required towards approval of design.
- Supervision of installation, commissioning and interfacing (hardware + software) of DDU with complete system shall be in scope of supplier. Supplier to depute team of skilled staff for commissioning and interfacing at User Railways.
- Supplier shall provide continuous support after supply which may include updation of screens or any other requirement till acceptance by user railways without price implication to BHEL.

3. Equipment Testing

Type tests, as mentioned in clause 8 of this document, are to be done on one number of unit at accredited labs in India or abroad. Type test certificates to be submitted along with supply.

If type tests have been done on similar item, then certificates to be submitted along with techno-commercial bid.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

(Venkateshalu K)

Prepared by:

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains
4. Specifications
Major parameters are as follows:

	Parameter	Value
1	Power Supply:	a) 77V DC to 137.5V DC b) Reverse polarity protection c) Thermal shutdown protection d) Over-voltage protection e) Under-voltage protection
2	Display:	a) 10.4" TFT, 640x480 Pixel (VGA) or higher. b) Resistive touch screen with anti-reflective coating and calibration feature c) Brightness: 350 cd/m2 d) Automatic and/or manual illumination control e) Viewing angle horizontal: -50 / +70 degrees; vertical: -60 / +70 degrees f) Backlight lifetime > 50.000 h until half brightness
3	Operating system:	Latest Windows, or Linux based OS
4	CPU:	Low power type, because of the high ambient temperature
5	Memory:	RAM: Min 1 GB, Compact Flash: Min. 1 GB
6	Electrical Interfaces:	Refer to clause 5
7	Construction:	a) Casing and connector panel: High-grade steel, matt pickled b) Heat sink: Aluminum c) Front plate: Black anodised
8	IP Rating	IP-65 from front
9	Reliability, Maintainability, Lifetime:	a) MTBF > 50,000 hours b) Lifetime > 15 years c) Spare parts > 15 years (form, fit and function compatible)
10	Keypad:	a) Rugged membrane keypad. b) Following function keys required on the front side: Home, Back, Up, Down, Enter c) Following brightness control function keys required on the front side: Brightness Increase, Brightness Decrease, Brightness Auto
11	PCBs:	Printed Circuit Boards must have conformal coating as relative humidity > 95%, and during 3-4 months of rainy season per year frequent condensation can occur.
12	Applicable standards:	EN 50155, EN 50121-3-2, IEC-60571

 COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

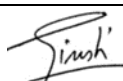
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

5. Interfaces

5.1 Connector and interfaces details:

	Interface	Connector	Function and Description
1.	X1	FCT 3W3	Power
2.	X3	9 pin D-Sub Male	COM3. RS422 / RS485, Isolated, default setting is RS485
3.	X4	9 pin D-Sub Male	COM1. RS232, preferably isolated
4.	X5	9 pin D-Sub Female	MVB. MVB communication with an internal MVB-EMD board (preferably Duagon D113 LT-P4A)
5.	X6	9 pin D-Sub Male	
6.	X7	9 pin D-Sub Male	Audio line-output. Output level symmetric 1V rms, 2 channels (stereo), preferably short circuit proof.
7.	X8	9 pin D-Sub Female	Ethernet 10/100 Base T
8.	X9	USB	USB 2.0. Accessible from front side.
9.	X10	USB	USB 2.0.
10.	X11	USB	USB 2.0.
11.	X12	CF Type I	Compact Flash memory slot
12.	X13	CF Type I	Compact Flash Memory slot

Note: Connectors shall be parallel to the back side of the unit to allow for easy cabling in very restricted space available in driver's desk.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

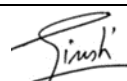
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

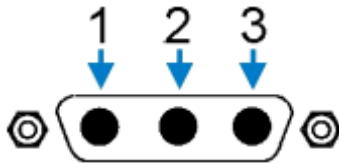
01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

5.2 Pin details of connectors/interfaces

5.2.1 X1 – Power Supply Connector

The supply voltage is to be connected via pins A1 and A2.



Pin	Description
1	+V
2	-V
3	NC

5.2.2 X3 – COM3 / RS485

The RS485-Interface is electrically isolated through opto-couplers. Switching between sending and receiving and inversely is controlled by the -DTR-register of COM3.

Pin	Signal	Description
1	Data+	Data+
2	Data-	Data-
3	SGnd	Signal Ground

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

Venkateshalu K

(Venkateshalu K)

Prepared by:

Girish

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains
5.2.3 X4 – COM1 / RS232-C

The interface is electrically isolated through opto-couplers and designed for the V.24/RS-232-C standard.

Pin	Signal	I/O	Remark
1	DCD	I	Data Carrier Detect
2	RxD	I	Receive Data
3	TxD	O	Transmit Data
4	DTR	O	Data Terminal Ready
5	SGnd	-	Signal Ground
6	DSR	I	Data Set Ready
7	RTS	O	Request To Send
8	CTS	I	Clear To Send
9	RI	I	Ring Indicator

5.2.4 X5, X6 – MVB Interfaces

Pin	signal ESD / EMD
1	A.Data_P
2	A.Data_N
3	VN_RSV1
4	B.Data_P
5	B.Data_N
6	A.Bus_GND / A.Term_P
7	B.Bus_GND / A.Term_N
8	A.Bus_5V / B.Term_P
9	B.Bus_5V / B.Term_N

5.2.5 X7 – Audio Output

The line out shall be two channel (stereo) and symmetrical audio output signal. The audio line-output shall be short circuit protected.

Pin	Signal	Description
1	Gnd	Ground
2	L+	Left channel (+)
3	Gnd	Ground
4	R+	Right channel (+)
5	Gnd	Ground
6	Gnd	Ground
7	L-	Left channels (-)
8	Gnd	Ground
9	R-	Right channel (-)

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

(Venkateshalu K)

Prepared by:

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains
5.2.6 X8 – Ethernet

Pin	Signal	Description
1	reserved	
2	reserved	
3	RxD-	Receive Data B
4	Reserved	
5	TxD-	Transmit Data B
6	reserved	
7	n.c.	
8	RxD+	Receive Data A
9	TxD+	Transmit Data A

5.2.7 X9, X10, X11 – USB

Standard 4 pin USB Type A connector

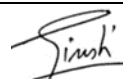
5.2.8 X12, X13 – Compact Flash Memory

Standard CF Type I Compact Flash memory slot.

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00
Approved by:


(Venkateshalu K)

Prepared by:


(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains
6. DDU Input/output port mapping details

Signal details for port mapping are as follows. Port Number, Cycle time, Byte offset, Bit offset shall be finalised during detailed design stage.

Port mapping details provided below is tentative. List will be finalised during detailed design stage.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
1.	Lifesign		byte
2.	Qn1_DDU_DriverLogin	Driver has logged in	bool
3.	Qn1_DDU_GuardLogin	Guard has logged in	bool
4.	Qn1_DDU_MaintenanceLogin	Maintenance man has logged in	bool
5.	Qn1_DDU_Logout	DDU has been logged out	bool
6.	_spare		bool
7.	_spare		bool
8.	_spare		bool
9.	_spare		bool
10.	Qn1_DDU_SwVersion_Major	DDU software version Major	byte
11.	Qn1_DDU_SwVersion_Minor	DDU software version Minor	byte
12.	Qn1_DDU_UserId_LSB	Current user ID	UInt16
13.	Qn1_DDU_UserId_MSB	Current user ID	byte
14.	Lifesign		byte
15.	_spare		byte
16.	_spare		byte
17.	Qn1_DDU_TrainNumber	Train number set by the Driver via the DDU	UInt32
18.	Lifesign		byte
19.	_spare		byte
20.	_spare		byte
21.	Qn1_DDU_UnixTimestamp	Unix timestamp	UInt32
22.	Lifesign		byte
23.	_spare		byte
24.	_spare		byte
25.	Qn1_DDU_StartTestMbc		bool
26.	Qn1_DDU_StopTestMbc		bool
27.	Qn1_DDU_ReleaseHoldBrake		bool
28.	Qn1_DDU_NormalHoldBrake		bool
29.	_spare		bool
30.	_spare		bool
31.	_spare		byte
32.	_spare		byte
33.	_spare		byte
34.	_spare		byte
35.	_spare		byte

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

(Venkateshalu K)

Prepared by:

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

 COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
36.	Lifesign		byte
37.	Qn1_DDU_UnitID	The ID of the unit for whom the data is intended	byte
38.	Qn1_DDU_CoachType	The type of the coach for whom the data is intended	byte
39.	_spare		byte
40.	Qn1_DDU_CoachNumberDigit	Coach number digit	UInt16
41.	Qn1_DDU_CoachNumberChar	Coach number character	byte
42.	_spare		byte
43.	Lifesign		byte
44.	Qn1_DDU_Dtc_NormalEpBr1	Set the EP brakes of a single coach in normal mode	bool
45.	Qn1_DDU_Dtc_NormalEpBr2	Set the EP brakes of a single coach in normal mode	bool
46.	Qn1_DDU_Dtc_NormalEpBr3	Set the EP brakes of a single coach in normal mode	bool
47.	Qn1_DDU_Dtc_NormalEpBr4	Set the EP brakes of a single coach in normal mode	bool
48.	Qn1_DDU_Dtc_NormalEpBr5	Set the EP brakes of a single coach in normal mode	bool
49.	Qn1_DDU_Dtc_NormalEpBr6	Set the EP brakes of a single coach in normal mode	bool
50.	Qn1_DDU_Dtc_IsolateEpBr1	Isolate EP brakes of a single coach	bool
51.	Qn1_DDU_Dtc_IsolateEpBr2	Isolate EP brakes of a single coach	bool
52.	Qn1_DDU_Dtc_IsolateEpBr3	Isolate EP brakes of a single coach	bool
53.	Qn1_DDU_Dtc_IsolateEpBr4	Isolate EP brakes of a single coach	bool
54.	Qn1_DDU_Dtc_IsolateEpBr5	Isolate EP brakes of a single coach	bool
55.	Qn1_DDU_Dtc_IsolateEpBr6	Isolate EP brakes of a single coach	bool
56.	Qn1_DDU_Mc_NormalEpBr1	Set the EP brakes of a single coach in normal mode	bool
57.	Qn1_DDU_Mc_NormalEpBr2	Set the EP brakes of a single coach in normal mode	bool
58.	Qn1_DDU_Mc_NormalEpBr3	Set the EP brakes of a single coach in normal mode	bool
59.	Qn1_DDU_Mc_NormalEpBr4	Set the EP brakes of a single coach in normal mode	bool
60.	Qn1_DDU_Mc_NormalEpBr5	Set the EP brakes of a single coach in normal mode	bool
61.	Qn1_DDU_Mc_NormalEpBr6	Set the EP brakes of a single coach in normal mode	bool
62.	Qn1_DDU_Mc_IsolateEpBr1	Isolate EP brakes of a single coach	bool
63.	Qn1_DDU_Mc_IsolateEpBr2	Isolate EP brakes of a single coach	bool
64.	Qn1_DDU_Mc_IsolateEpBr3	Isolate EP brakes of a single coach	bool
65.	Qn1_DDU_Mc_IsolateEpBr4	Isolate EP brakes of a single coach	bool
66.	Qn1_DDU_Mc_IsolateEpBr5	Isolate EP brakes of a single coach	bool
67.	Qn1_DDU_Mc_IsolateEpBr6	Isolate EP brakes of a single coach	bool
68.	Qn1_DDU_Tc_NormalEpBr1	Set the EP brakes of a single coach in normal mode	bool
69.	Qn1_DDU_Tc_NormalEpBr2	Set the EP brakes of a single coach in normal mode	bool
70.	Qn1_DDU_Tc_NormalEpBr3	Set the EP brakes of a single coach in normal mode	bool
71.	Qn1_DDU_Tc_NormalEpBr4	Set the EP brakes of a single coach in normal mode	bool
72.	Qn1_DDU_Tc_NormalEpBr5	Set the EP brakes of a single coach in normal mode	bool
73.	Qn1_DDU_Tc_NormalEpBr6	Set the EP brakes of a single coach in normal mode	bool
74.	Qn1_DDU_Tc_IsolateEpBr1	Isolate EP brakes of a single coach	bool
75.	Qn1_DDU_Tc_IsolateEpBr2	Isolate EP brakes of a single coach	bool
76.	Qn1_DDU_Tc_IsolateEpBr3	Isolate EP brakes of a single coach	bool
77.	Qn1_DDU_Tc_IsolateEpBr4	Isolate EP brakes of a single coach	bool
78.	Qn1_DDU_Tc_IsolateEpBr5	Isolate EP brakes of a single coach	bool
79.	Qn1_DDU_Tc_IsolateEpBr6	Isolate EP brakes of a single coach	bool
80.	Qn1_DDU_IsolateParkBrake	Isolate Park Brake speed limitation	bool

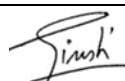
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

 COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
81.	Qn1_DDU_NormalParkBrake	Normalize Park Brake speed limitation	bool
82.	_spare	Release Hold Brake	bool
83.	_spare	Normalize Hold Brake	bool
84.	Qn1_DDU_IsolateParkBrakeUnit1	Isolate Park Brake speed limitation Unit 1	bool
85.	Qn1_DDU_IsolateParkBrakeUnit2	Isolate Park Brake speed limitation Unit 2	bool
86.	Qn1_DDU_IsolateParkBrakeUnit3	Isolate Park Brake speed limitation Unit 3	bool
87.	Qn1_DDU_IsolateParkBrakeUnit4	Isolate Park Brake speed limitation Unit 4	bool
88.	Qn1_DDU_IsolateParkBrakeUnit5	Isolate Park Brake speed limitation Unit 5	bool
89.	Qn1_DDU_IsolateParkBrakeUnit6	Isolate Park Brake speed limitation Unit 6	bool
90.	_spare		bool
91.	_spare		bool
92.	Lifesign		byte
93.	Qn1_DDU_FansOn_Tc_U3	Turn on the fans of the TC coach Unit 3	bool
94.	Qn1_DDU_FansOff_Tc_U3	Turn off the fans of the TC coach Unit 3	bool
95.	Qn1_DDU_LightsFull_Dtc_U4	Turn on the full lights of the DTC coach Unit 4	bool
96.	Qn1_DDU_LightsHalf_Dtc_U4	Turn on the half lights of the DTC coach Unit 4	bool
97.	Qn1_DDU_LightsOff_Dtc_U4	Turn off the lights of the DTC coach Unit 4	bool
98.	Qn1_DDU_FansOn_Dtc_U4	Turn on the fans of the DTC coach Unit 4	bool
99.	Qn1_DDU_FansOff_Dtc_U4	Turn off the fans of the DTC coach Unit 4	bool
100.	Qn1_DDU_LightsFull_Mc_U4	Turn on the full lights of the MC coach Unit 4	bool
101.	Qn1_DDU_LightsHalf_Mc_U4	Turn on the half lights of the MC coach Unit 4	bool
102.	Qn1_DDU_LightsOff_Mc_U4	Turn off the lights of the MC coach Unit 4	bool
103.	Qn1_DDU_FansOn_Mc_U4	Turn on the fans of the MC coach Unit 4	bool
104.	Qn1_DDU_FansOff_Mc_U4	Turn off the fans of the MC coach Unit 4	bool
105.	Qn1_DDU_LightsFull_Tc_U4	Turn on the full lights of the TC coach Unit 4	bool
106.	Qn1_DDU_LightsHalf_Tc_U4	Turn on the half lights of the TC coach Unit 4	bool
107.	Qn1_DDU_LightsOff_Tc_U4	Turn off the lights of the TC coach Unit 4	bool
108.	Qn1_DDU_FansOn_Tc_U4	Turn on the fans of the TC coach Unit 4	bool
109.	Qn1_DDU_FansOff_Tc_U4	Turn off the fans of the TC coach Unit 4	bool
110.	Qn1_DDU_LightsFull_Dtc_U5	Turn on the full lights of the DTC coach Unit 5	bool
111.	Qn1_DDU_LightsHalf_Dtc_U5	Turn on the half lights of the DTC coach Unit 5	bool
112.	Qn1_DDU_LightsOff_Dtc_U5	Turn off the lights of the DMC coach Unit 5	bool
113.	Qn1_DDU_FansOn_Dtc_U5	Turn on the fans of the DTC coach Unit 5	bool
114.	Qn1_DDU_FansOff_Dtc_U5	Turn off the fans of the DTC coach Unit 5	bool
115.	Qn1_DDU_LightsFull_Mc_U5	Turn on the full lights of the MC coach Unit 5	bool
116.	Qn1_DDU_LightsHalf_Mc_U5	Turn on the half lights of the MC coach Unit 5	bool
117.	Qn1_DDU_LightsOff_Mc_U5	Turn off the lights of the MC coach Unit 5	bool
118.	Qn1_DDU_FansOn_Mc_U5	Turn on the fans of the MC coach Unit 5	bool
119.	Qn1_DDU_FansOff_Mc_U5	Turn off the fans of the MC coach Unit 5	bool
120.	Qn1_DDU_LightsFull_Tc_U5	Turn on the full lights of the TC coach Unit 5	bool

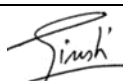
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

 COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
121.	Qn1_DDU_LightsHalf_Tc_U5	Turn on the half lights of the TC coach Unit 5	bool
122.	Qn1_DDU_LightsOff_Tc_U5	Turn off the lights of the TC coach Unit 5	bool
123.	Qn1_DDU_FansOn_Tc_U5	Turn on the fans of the TC coach Unit 5	bool
124.	Qn1_DDU_FansOff_Tc_U5	Turn off the fans of the TC coach Unit 5	bool
125.	Qn1_DDU_LightsFull_Dtc_U6	Turn on the full lights of the DTC coach Unit 6	bool
126.	Qn1_DDU_LightsHalf_Dtc_U6	Turn on the half lights of the DTC coach Unit 6	bool
127.	Qn1_DDU_LightsOff_Dtc_U6	Turn off the lights of the DTC coach Unit 6	bool
128.	Qn1_DDU_FansOn_Dtc_U6	Turn on the fans of the DTC coach Unit 6	bool
129.	Qn1_DDU_FansOff_Dtc_U6	Turn off the fans of the DTC coach Unit 6	bool
130.	Qn1_DDU_LightsFull_Mc_U6	Turn on the full lights of the MC coach Unit 6	bool
131.	Qn1_DDU_LightsHalf_Mc_U6	Turn on the half lights of the MC coach Unit 6	bool
132.	Qn1_DDU_LightsOff_Mc_U6	Turn off the lights of the MC coach Unit 6	bool
133.	Qn1_DDU_FansOn_Mc_U6	Turn on the fans of the MC coach Unit 6	bool
134.	Qn1_DDU_FansOff_Mc_U6	Turn off the fans of the MC coach Unit 6	bool
135.	Qn1_DDU_LightsFull_Tc_U6	Turn on the full lights of the TC coach Unit 6	bool
136.	Qn1_DDU_LightsHalf_Tc_U6	Turn on the half lights of the TC coach Unit 6	bool
137.	Qn1_DDU_LightsOff_Tc_U6	Turn off the lights of the TC coach Unit 6	bool
138.	Qn1_DDU_FansOn_Tc_U6	Turn on the fans of the TC coach Unit 6	bool
139.	Qn1_DDU_FansOff_Tc_U6	Turn off the fans of the TC coach Unit 6	bool
140.	_spare		bool
141.	Lifesign		byte
142.	Qn1_DDU_VenOn1_100%	Turn on the Ventilation of a single unit 100%	bool
143.	Qn1_DDU_VenOn2_100%	Turn on the Ventilation of a single unit 100%	bool
144.	Qn1_DDU_VenOn3_100%	Turn on the Ventilation of a single unit 100%	bool
145.	Qn1_DDU_VenOn4_100%	Turn on the Ventilation of a single unit 100%	bool
146.	Qn1_DDU_VenOn5_100%	Turn on the Ventilation of a single unit 100%	bool
147.	Qn1_DDU_VenOn6_100%	Turn on the Ventilation of a single unit 100%	bool
148.	Qn1_DDU_VenOff1	Turn off the Ventilation of a single unit	bool
149.	Qn1_DDU_VenOff2	Turn off the Ventilation of a single unit	bool
150.	Qn1_DDU_VenOff3	Turn off the Ventilation of a single unit	bool
151.	Qn1_DDU_VenOff4	Turn off the Ventilation of a single unit	bool
152.	Qn1_DDU_VenOff5	Turn off the Ventilation of a single unit	bool
153.	Qn1_DDU_VenOff6	Turn off the Ventilation of a single unit	bool
154.	Qn1_DDU_VenOn1_50%	Turn on the Ventilation of a single unit 50%	bool
155.	Qn1_DDU_VenOn2_50%	Turn on the Ventilation of a single unit 50%	bool
156.	Qn1_DDU_VenOn3_50%	Turn on the Ventilation of a single unit 50%	bool
157.	Qn1_DDU_VenOn4_50%	Turn on the Ventilation of a single unit 50%	bool
158.	Qn1_DDU_VenOn5_50%	Turn on the Ventilation of a single unit 50%	bool
159.	Qn1_DDU_VenOn6_50%	Turn on the Ventilation of a single unit 50%	bool
160.	_spare		byte

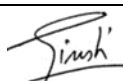
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
161.	_spare		byte
162.	Lifesign		byte
163.	Qn1_DDU_OverrideCompr1	Override a single compressor	bool
164.	Qn1_DDU_OverrideCompr2	Override a single compressor	bool
165.	Qn1_DDU_OverrideCompr3	Override a single compressor	bool
166.	Qn1_DDU_OverrideCompr4	Override a single compressor	bool
167.	Qn1_DDU_OverrideCompr5	Override a single compressor	bool
168.	Qn1_DDU_OverrideCompr6	Override a single compressor	bool
169.	Qn1_DDU_NormalCompr1	Set a single compressor in normal mode	bool
170.	Qn1_DDU_NormalCompr2	Set a single compressor in normal mode	bool
171.	Qn1_DDU_NormalCompr3	Set a single compressor in normal mode	bool
172.	Qn1_DDU_NormalCompr4	Set a single compressor in normal mode	bool
173.	Qn1_DDU_NormalCompr5	Set a single compressor in normal mode	bool
174.	Qn1_DDU_NormalCompr6	Set a single compressor in normal mode	bool
175.	Qn1_DDU_IsolateCompr1	Isolate a single compressor	bool
176.	Qn1_DDU_IsolateCompr2	Isolate a single compressor	bool
177.	Qn1_DDU_IsolateCompr3	Isolate a single compressor	bool
178.	Qn1_DDU_IsolateCompr4	Isolate a single compressor	bool
179.	Qn1_DDU_IsolateCompr5	Isolate a single compressor	bool
180.	Qn1_DDU_IsolateCompr6	Isolate a single compressor	bool
181.	_spare		bool
182.	_spare		bool
183.	_spare		bool
184.	_spare		bool
185.	_spare		bool
186.	_spare		bool
187.	_spare		byte
188.	_spare		byte
189.	_spare		byte
190.	Lifesign		byte
191.	Qn1_DDU_NormalUnit1	Set a single unit back in normal mode	bool
192.	Qn1_DDU_NormalUnit2	Set a single unit back in normal mode	bool
193.	Qn1_DDU_NormalUnit3	Set a single unit back in normal mode	bool
194.	Qn1_DDU_NormalUnit4	Set a single unit back in normal mode	bool
195.	Qn1_DDU_NormalUnit5	Set a single unit back in normal mode	bool
196.	Qn1_DDU_NormalUnit6	Set a single unit back in normal mode	bool
197.	Qn1_DDU_IsolateUnit1	Isolate a single unit	bool
198.	Qn1_DDU_IsolateUnit2	Isolate a single unit	bool
199.	Qn1_DDU_IsolateUnit3	Isolate a single unit	bool
200.	Qn1_DDU_IsolateUnit4	Isolate a single unit	bool

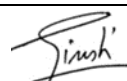
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

 COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
201.	Qn1_DDU_IsolateUnit5	Isolate a single unit	bool
202.	Qn1_DDU_IsolateUnit6	Isolate a single unit	bool
203.	_spare		bool
204.	_spare		bool
205.	_spare		bool
206.	_spare		bool
207.	_spare		byte
208.	_spare		byte
209.	_spare		byte
210.	_spare		byte
211.	Lifesign		byte
212.	Qn1_DDU_UnitID	The ID of the unit for whom the data is intended	byte
213.	Qn1_DDU_CounterType	Used to determine which type of counter should get a new value (Qn1_DDU_CounterValue)	byte
214.	_spare		byte
215.	Qn1_DDU_CounterValue	The new value of the counter	UInt32
216.	Lifesign		byte
217.	Qn1_DDU_UnitID	The ID of the unit for whom the data is intended	byte
218.	Qn1_DDU_FaultAcknowledge	Fault acknowledged by the driver	bool
219.	Qn1_DDU_FaultReset	Driver fault reset	bool
220.	Qn1_DDU_MaintenanceReset	Maintenance fault reset	bool
221.	_spare		bool
222.	_spare		byte
223.	Qn1_DDU_AckFaultNumber	The number of the fault which is acknowledged by the	UInt16
224.	_spare		byte
225.	_spare		byte
226.	Lifesign		byte
227.	Qn1_DDU_UnitID	The ID of the unit for whom the data is intended	byte
228.	_spare		byte
229.	_spare		byte
230.	Qn1_DDU_WheelDiameter		UInt16
231.	_spare		UInt16
232.	Lifesign		byte
233.	Qn1_DDU_NormalBogie1	Set bogie 1 and 2 back to normal mode in a unit	bool
234.	Qn1_DDU_NormalBogie2	Set bogie 1 and 2 back to normal mode in a unit	bool
235.	Qn1_DDU_NormalBogie3	Set bogie 1 and 2 back to normal mode in a unit	bool
236.	Qn1_DDU_NormalBogie4	Set bogie 1 and 2 back to normal mode in a unit	bool
237.	Qn1_DDU_NormalBogie5	Set bogie 1 and 2 back to normal mode in a unit	bool
238.	Qn1_DDU_NormalBogie6	Set bogie 1 and 2 back to normal mode in a unit	bool
239.	Qn1_DDU_IsolateBogie11	Isolate boggie 1 in a unit	bool
240.	Qn1_DDU_IsolateBogie12	Isolate boggie 2 in a unit	bool

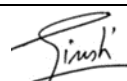
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

 COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
241.	Qn1_DDU_IsolateBogie21	Isolate boggie 1 in a unit	bool
242.	Qn1_DDU_IsolateBogie22	Isolate boggie 2 in a unit	bool
243.	Qn1_DDU_IsolateBogie31	Isolate boggie 1 in a unit	bool
244.	Qn1_DDU_IsolateBogie32	Isolate boggie 2 in a unit	bool
245.	Qn1_DDU_IsolateBogie41	Isolate boggie 1 in a unit	bool
246.	Qn1_DDU_IsolateBogie42	Isolate boggie 2 in a unit	bool
247.	Qn1_DDU_IsolateBogie51	Isolate boggie 1 in a unit	bool
248.	Qn1_DDU_IsolateBogie52	Isolate boggie 2 in a unit	bool
249.	Qn1_DDU_IsolateBogie61	Isolate boggie 1 in a unit	bool
250.	Qn1_DDU_IsolateBogie62	Isolate boggie 2 in a unit	bool
251.	_spare		bool
252.	_spare		bool
253.	_spare		bool
254.	_spare		bool
255.	_spare		bool
256.	_spare		bool
257.	_spare		byte
258.	_spare		byte
259.	_spare		byte
260.	Lifesign		byte
261.	Qn1_DDU_OverrideBPMonitoring	Override BP Monitoring	bool
262.	Qn1_DDU_NormalBPMonitoring	Normalize BP Monitoring	bool
263.	Qn1_DDU_OverrideBPMonitoringUnit1	Override BP Monitoring Unit 1	bool
264.	Qn1_DDU_OverrideBPMonitoringUnit2	Override BP Monitoring Unit 2	bool
265.	Qn1_DDU_OverrideBPMonitoringUnit3	Override BP Monitoring Unit 3	bool
266.	Qn1_DDU_OverrideBPMonitoringUnit4	Override BP Monitoring Unit 4	bool
267.	Qn1_DDU_OverrideBPMonitoringUnit5	Override BP Monitoring Unit 5	bool
268.	Qn1_DDU_OverrideBPMonitoringUnit6	Override BP Monitoring Unit 6	bool
269.	_spare		byte
270.	_spare		byte
271.	_spare		byte
272.	_spare		byte
273.	_spare		byte
274.	Lifesign		byte
275.	Qn1_DDU_Dtc_OverrideAirSpringVLimitUnit1	Override Speed limit Air Spring Unit 1 Dtc	bool
276.	Qn1_DDU_Dtc_OverrideAirSpringVLimitUnit2	Override Speed limit Air Spring Unit 2 Dtc	bool
277.	Qn1_DDU_Dtc_OverrideAirSpringVLimitUnit3	Override Speed limit Air Spring Unit 3 Dtc	bool
278.	Qn1_DDU_Dtc_OverrideAirSpringVLimitUnit4	Override Speed limit Air Spring Unit 4 Dtc	bool
279.	Qn1_DDU_Dtc_OverrideAirSpringVLimitUnit5	Override Speed limit Air Spring Unit 5 Dtc	bool
280.	Qn1_DDU_Dtc_OverrideAirSpringVLimitUnit6	Override Speed limit Air Spring Unit 6 Dtc	bool

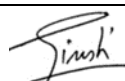
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

 COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

DDU Source Port			
Sl. No	Source Signal Name	Source Signal Description	Source Signal Type
281.	Qn1_DDU_Dtc_NormalAirSpringVLimitUnit1	Normalise Speed limit Air Spring Unit 1 Dtc	bool
282.	Qn1_DDU_Dtc_NormalAirSpringVLimitUnit2	Normalise Speed limit Air Spring Unit 2 Dtc	bool
283.	Qn1_DDU_Dtc_NormalAirSpringVLimitUnit3	Normalise Speed limit Air Spring Unit 3 Dtc	bool
284.	Qn1_DDU_Dtc_NormalAirSpringVLimitUnit4	Normalise Speed limit Air Spring Unit 4 Dtc	bool
285.	Qn1_DDU_Dtc_NormalAirSpringVLimitUnit5	Normalise Speed limit Air Spring Unit 5 Dtc	bool
286.	Qn1_DDU_Dtc_NormalAirSpringVLimitUnit6	Normalise Speed limit Air Spring Unit 6 Dtc	bool
287.	Qn1_DDU_Mc_OverrideAirSpringVLimitUnit1	Override Speed limit Air Spring Unit 1 Mc	bool
288.	Qn1_DDU_Mc_OverrideAirSpringVLimitUnit2	Override Speed limit Air Spring Unit 2 Mc	bool
289.	Qn1_DDU_Mc_OverrideAirSpringVLimitUnit3	Override Speed limit Air Spring Unit 3 Mc	bool
290.	Qn1_DDU_Mc_OverrideAirSpringVLimitUnit4	Override Speed limit Air Spring Unit 4 Mc	bool
291.	Qn1_DDU_Mc_OverrideAirSpringVLimitUnit5	Override Speed limit Air Spring Unit 5 Mc	bool
292.	Qn1_DDU_Mc_OverrideAirSpringVLimitUnit6	Override Speed limit Air Spring Unit 6 Mc	bool
293.	Qn1_DDU_Mc_NormalAirSpringVLimitUnit1	Normalise Speed limit Air Spring Unit 1 Mc	bool
294.	Qn1_DDU_Mc_NormalAirSpringVLimitUnit2	Normalise Speed limit Air Spring Unit 2 Mc	bool
295.	Qn1_DDU_Mc_NormalAirSpringVLimitUnit3	Normalise Speed limit Air Spring Unit 3 Mc	bool
296.	Qn1_DDU_Mc_NormalAirSpringVLimitUnit4	Normalise Speed limit Air Spring Unit 4 Mc	bool
297.	Qn1_DDU_Mc_NormalAirSpringVLimitUnit5	Normalise Speed limit Air Spring Unit 5 Mc	bool
298.	Qn1_DDU_Mc_NormalAirSpringVLimitUnit6	Normalise Speed limit Air Spring Unit 6 Mc	bool
299.	Qn1_DDU_Tc_OverrideAirSpringVLimitUnit1	Override Speed limit Air Spring Unit 1 Tc	bool
300.	Qn1_DDU_Tc_OverrideAirSpringVLimitUnit2	Override Speed limit Air Spring Unit 2 Tc	bool
301.	Qn1_DDU_Tc_OverrideAirSpringVLimitUnit3	Override Speed limit Air Spring Unit 3 Tc	bool
302.	Qn1_DDU_Tc_OverrideAirSpringVLimitUnit4	Override Speed limit Air Spring Unit 4 Tc	bool
303.	Qn1_DDU_Tc_OverrideAirSpringVLimitUnit5	Override Speed limit Air Spring Unit 5 Tc	bool
304.	Qn1_DDU_Tc_OverrideAirSpringVLimitUnit6	Override Speed limit Air Spring Unit 6 Tc	bool
305.	Qn1_DDU_Tc_NormalAirSpringVLimitUnit1	Normalise Speed limit Air Spring Unit 1 Tc	bool
306.	Qn1_DDU_Tc_NormalAirSpringVLimitUnit2	Normalise Speed limit Air Spring Unit 2 Tc	bool
307.	Qn1_DDU_Tc_NormalAirSpringVLimitUnit3	Normalise Speed limit Air Spring Unit 3 Tc	bool
308.	Qn1_DDU_Tc_NormalAirSpringVLimitUnit4	Normalise Speed limit Air Spring Unit 4 Tc	bool
309.	Qn1_DDU_Tc_NormalAirSpringVLimitUnit5	Normalise Speed limit Air Spring Unit 5 Tc	bool
310.	Qn1_DDU_Tc_NormalAirSpringVLimitUnit6	Normalise Speed limit Air Spring Unit 6 Tc	bool
311.	_spare		bool
312.	_spare		bool
313.	_spare		bool
314.	_spare		bool
315.	_spare		byte
316.	Lifesign		byte
317.	Qn1_DDU_ScreenNumber	Number of the current DDU screen	UInt16
318.	Lifesign		byte
319.	In1_DDU_ScreenNumber	Number of the current DDU screen	UInt16

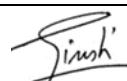
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

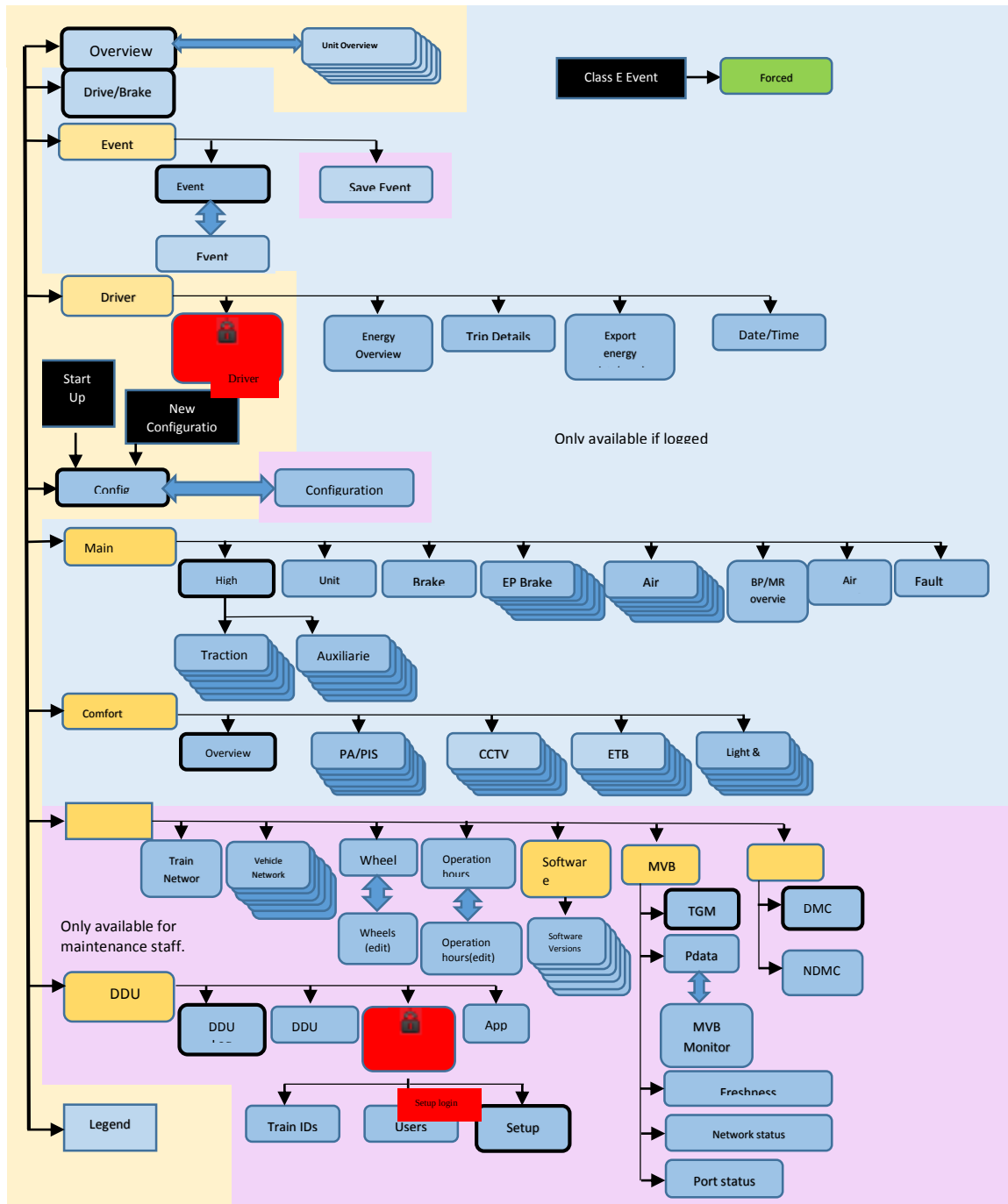
01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7. Menu tree and legend of screen

Menu Tree provided below is tentative. Final menu tree will be provided during detailed design stage.

7.1 Screen Menu Tree



Revisions 00

Approved by:

(Venkateshalu K)

Prepared by:

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

OPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

7.1.1 Estimated (approximate) number of screens= 120

7.1.2 Legend for the menu tree



Screen



Default screen. When entering a new (sub) menu this screen is shown first



Screen with unit selection. First unit is default.



Login screen for Driver, guard, maintenance or setup.



Pops up when serious (class E) event occurs.



Indicates that a sub menu is entered.

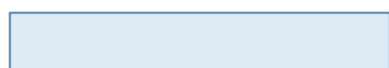


Event.

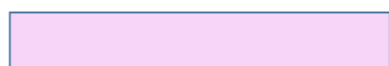
Background colors:



Items are always available.



Only available if logged in as driver or Guard.



Only available if logged in as maintenance.

Revisions 00

Approved by:

Venkateshalu K

(Venkateshalu K)

Prepared by:

Girish

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

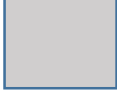
Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2 List of legends

Symbols shown below are tentative. List will be finalised during detailed design stage.

7.2.1 Symbol color definition

Symbol colour is an important part of easy recognition of problems in specific parts of train. Each symbol has a default background colour, white which indicates that specific system part is ready. By changing the background colour of a symbol different states can be identified. Below the different colour states are described.

Symbol	Explanation	Symbol Color	Back Color
	Ready, released for operation + OFF	Black	White
	Fault Communication	Yellow	Red
	Not ready	Black	Light gray
	Power Supply OFF; MCB tripped	Yellow	Gray
	Device isolated	Yellow	Black
	Alarm, defect of service.	Black	Red
	Warning	Black	Yellow
	ON or pressure OK	Black	Aqua
	Brake applied	Black	Purple
	Empty space	n.a.	Light gray

OPRYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in anyway detrimental to the interest of the company.

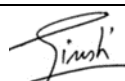
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2 Monitoring Symbols

7.2.2.1 Cabin Symbol

	No information available.
	Cab is not occupied.
	Vehicle has the master cabin.
	Fault, multiple cabins are manned.

7.2.2.2 Unit status symbol

	No information available.
	Unit OK, no category A, B or E fault active.
	Category B fault active but no A or E fault.
	Category A or E fault active.
	Unit is isolated.

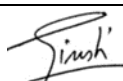
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.3 Neutral section symbol

	No information available.
	
	Neutral section.

7.2.2.4 Pantograph symbol

	No information available.
	Pantograph is down.
	Pantograph is up.
	Pantograph is up and OHE is available.
	Pantograph is faulty, does not rise after command.
	Unit is isolated.
	Emergency off.

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

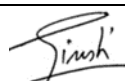
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.5 VCB symbol

	No information available.
	VCB is open.
	VCB is closed.
	VCB is faulty, does not close after command.
	Unit is isolated.

7.2.2.6 APC symbol

	No information available.
	Automatic Power Control receiver not triggered.
	Automatic Power Control receiver triggered.

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

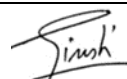
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.7 Traction power symbols

			No information available.
			Traction power is off.
			Running and OK.
			Running and warning.
			Fault.
			Status unknown.
			Fault in communication with device.
			Device isolated.

7.2.2.8 Emergency off symbol

	No information available.
	Emergency off not active.
	Emergency button pushed.

7.2.2.9 Interior lighting symbol

			No information available.
			Lights are OFF.
			Lights are ON.

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.10 Fans symbol

			No information available.
			Fans are OFF.
			Fans are ON.

7.2.2.11 Passenger information system symbol

	No information available.
	Passenger information system not ok.
	Passenger information system ok.

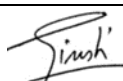
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.12 Main Air Compressor

This symbol shows two background colors, the outside color gives the status of the compressor and pressure, the inside color indicates whether the compressor is running or not.

	No information available.
	MAC: released.
	MAC: running +pressure low.
	MAC: running +pressure ok.
	MAC: is OFF+ pressure ok.
	MAC: running in Manual Mode or isolated mode (bypass)
	MAC: fault.

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

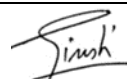
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.13 Aux Air Compressor symbol

This symbol shows two background colors, the outside color gives the status of the compressor and pressure, the inside color indicates whether the compressor is running or not.

	No information available.
	AAC: released.
	AAC: running + pressure low
	AAC: running + pressure ok
	AAC: is OFF+ pressure ok
	AAC: running, run time too long

7.2.2.14 Passenger Alarm Symbol

	No information available.
	Passenger alarm not active.
	Passenger alarm active.

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

Venkateshalu K

(Venkateshalu K)

Prepared by:

Girish

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.15 Brake symbol

	No information available.
	Brake release
	Brake applied.
	AWS brake active and brake applied
	Emergency brake applied
	AWS emergency brake active and brake applied.
	Device isolated.

7.2.2.16 Parking brake symbol

	No information available.
	Parking brake released.
	Parking brake applied.
	Device isolated.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

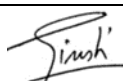
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.17 ABC brake symbol

	No information available
	Auto brake released
	Auto brake applied

7.2.2.18 GEBA brake symbol

	No information available
	Guard emergency brake released
	Guard emergency brake applied

7.2.2.19 TCMS symbols

		No information available
		TCMS ICP 1/2 is not running
		TCMS ICP 1/2 is running
		MVB line A or B faulty on ICP

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

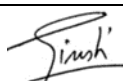
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

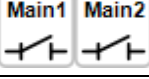
Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains
7.2.2.20 Contactor symbol

	Contactor 110Vac from adjacent unit
	Contactor 110Vac supply
	Contactor compressor supply from adjacent unit
	Contactor compressor supply
	Contactor main supply 1,2
	Contactor 415Vac from adjacent unit
	Contactor 415Vac supply
	Contactor 415Vac compressor supply
	Contactor 415Vac redundant supply
	Contactor 415Vac main supply
	Battery isolating switch
	Battery main contactor

Possible states of contactors:

	No information available
	Contactor open
	Contactor closed

Revisions 00

Approved by:

(Venkateshalu K)

Prepared by:

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.21 Traction FQC symbols F1, F2

		No information is available.
		Traction power is off.
		Running and OK.
		Running and warning.
		Fault.
		Status unknown.
		Fault in communication with the device.

7.2.2.22 Down chopper symbol

	No information available.
	Off.
	Running and OK

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

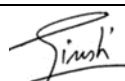
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.23 Auxiliary/ Compressor inverter symbol

		No information available.
		Power is off.
		Running and ok.
		Running and warning.
		Fault.
		Status unknown.
		Fault in communication with device.

7.2.2.24 Battery charger symbol

	No information available.
	Power is off
	Running and OK
	Running and warning
	Fault
	Status unknown
	Fault in communication with the device.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

Venkateshalu K

(Venkateshalu K)

Prepared by:

Girish

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

7.2.2.25 Governor symbols

			No information available
			Off
			Pressure OK
			Pressure OK and warning.
			Fault.
			Status unknown.

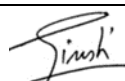
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains
8. Tests to be performed on DDU

Following tests shall be carried out as per IEC-60571 [Edition 3, 2012-09].

	Name of test	Clause no of IEC-60571	Type	Routine
1.	Visual Inspection	12.2.2	☒	☒
2.	Performance Test	12.2.3	☒	☒
3.	Dry Heat Test	12.2.5	☒	
4.	Damp Heat Test, Cyclic	12.2.6	☒	
5.	Supply Over Voltages	12.2.7	☒	
6.	Surges, Electrostatic Discharge and Transient Burst Susceptibility Test	12.2.8	☒	
7.	Radio Frequency Emission Test	12.2.9.2	☒	
8.	Insulation Test	12.2.10	☒	☒
9.	Salt Mist Test	12.2.11	☒	
10.	Vibration, Shock and Bump Test	12.2.12	☒	
11.	Water Tightness Test (test for IP65 compliance)	12.2.13	☒	
12.	Equipment Stress Screening [as per RDSO's stress screening procedure]	12.2.14	☒	

Type test shall be witnessed by BHEL and/or User railways.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

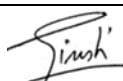
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

9. Test Protocol

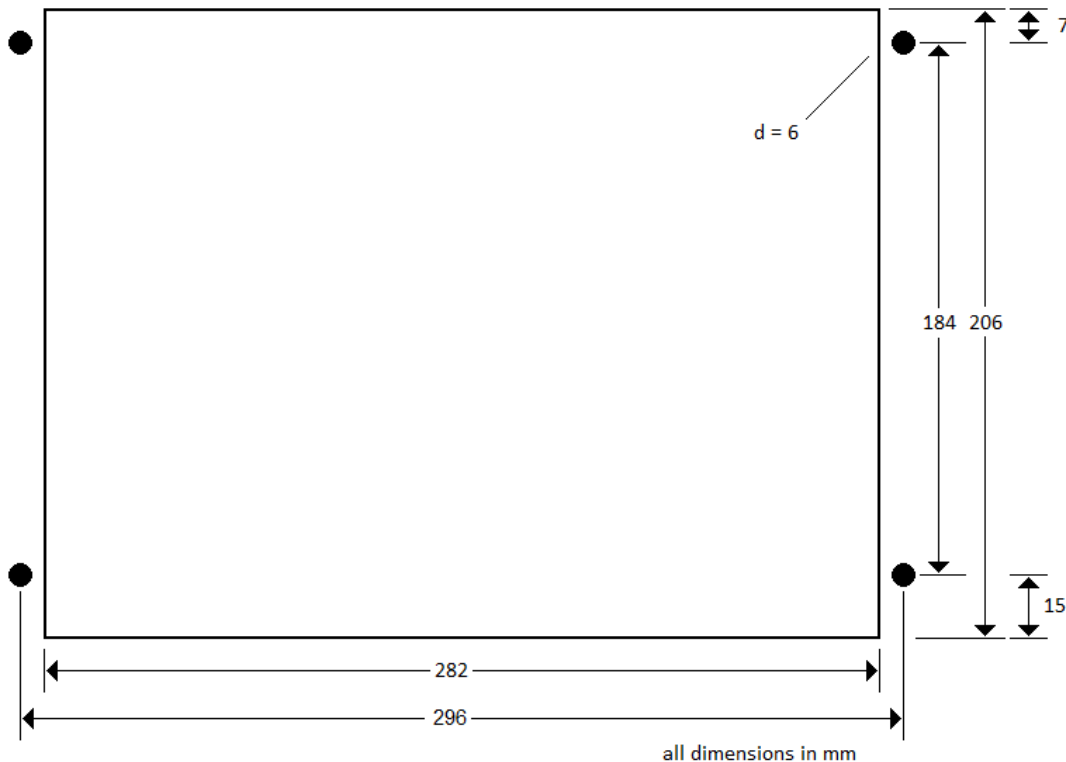
Supplier shall submit immediately after the receipt of the order, test protocol for Routine and Type tests as per clause 8 of this specification for BHEL approval.

10.Pre-shipment Inspection

Pre-shipment inspection will be carried out by BHEL engineers as per the approved test protocol. BHEL engineers will witness Routine tests before dispatch.

11.Mechanical dimension

Image below shows the dimensions of the cut-out required on Driver's Desk for mounting of the DDU unit. The offered DDU should match this footprint.



Mounting footprint of DDU.

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Revisions 00

Approved by:

Venkateshalu K

(Venkateshalu K)

Prepared by:

Girish

(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

12. Documentation

12.1 Information required along with techno commercial offer without which offer is liable for rejection.

12.1.1 Technical datasheet

12.1.2 Outline General Arrangement (OGA) and dimensional and mounting details.

12.1.3 Type test reports, if already conducted.

12.1.4 Supplier shall furnish clause wise confirmation/comments to the technical specification. Deviation, if any, shall be clearly brought out indicating the clause number, original specification, deviation sought with proper technical backup (catalogue, technical brochure, international standards, calculations etc.

12.1.5 If no deviations required, then supplier shall furnish certificate indicating "NO DEVIATION REQUESTED" and we comply fully with all the technical requirements of this specification no. PS/445/2719".

12.1.6 Supplier shall take a copy of this specification and sign on each page and submit the signed copy along with offer to confirm that the supplier has understood the specification and will comply with all clauses of this technical specification.

12.2 Information required after placement of order

12.2.1 Dimensional drawing for BHEL approval. Vendor to start manufacture only after obtaining BHEL approval.

12.2.2 Test protocol for BHEL approval.

12.3 Information required along with material supply

12.3.1 Two sets of Routine Test report.

12.3.2 User Manual.

13. Acceptance

- Dimensions as per approved drawings.
- Type test certificates (for first time supply)
- Routine test certificates (for regular supplies, along with valid Type test reports).

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

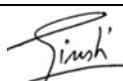
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020

Technical specification for Driver Display Unit (DDU) for EMU/MEMU trains

14. Rating plate details

Rating Plate with following information shall be fixed at a suitable position.

- Manufacturer's name
- Item type designation or number
- Item serial number
- Date and place of manufacturing
- Power rating

15. Environmental conditions

1.	Ambient Temp.	55°C
2.	Max. Temperature	75°C (when locomotive standing dead under sun) 60°C (when locomotive working)
3.	Avg. Temperature	47°C
4.	Humidity	Up to 100% during rainy season
5.	Altitude	up to 1776 m above mean sea level
6.	Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 1.6mg/cub meter

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

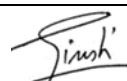
Revisions 00

Approved by:



(Venkateshalu K)

Prepared by:



(Girish Chand)

Issued by:

Traction Engg.

Date:

01.05.2020