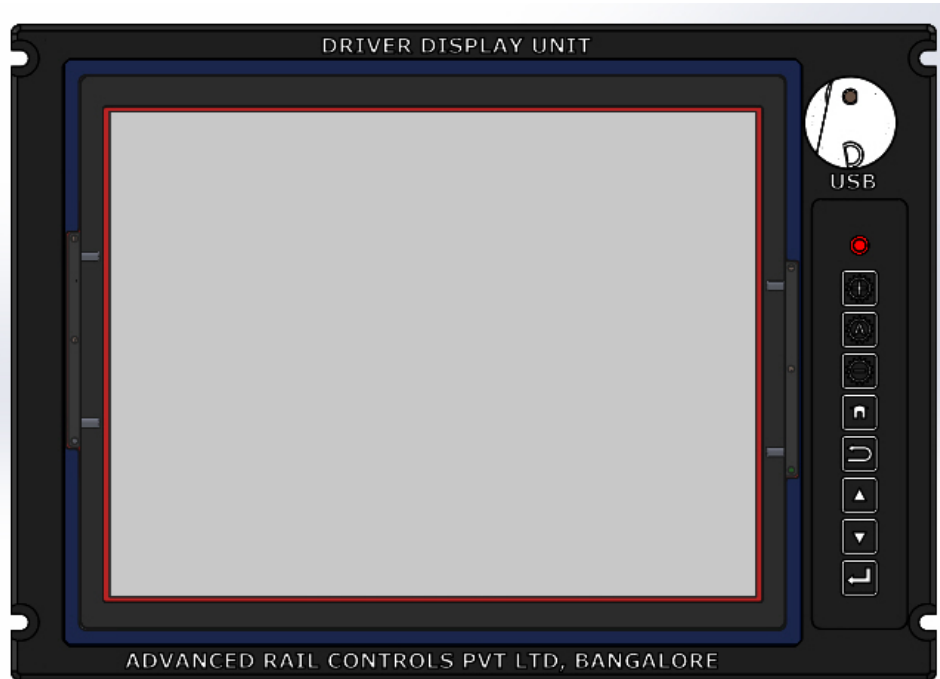


# MVB BASED GRAPHICAL DRIVER DISPLAY

ARC/DDU/V2.1-B

## USER MANUAL



December 20, 2017

RELEASE 1.0



Advanced Rail Controls Private Limited

Bangalore-560092

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## IMPORTANT NOTICE

**This is a sophisticated microprocessor based equipment and can be serviced only by trained skilled personnel. Opening the equipment by any unauthorized person will make the warranty null and void.**

## 1.0 SCOPE

This document describes the technical details of Graphic Driver Display Unit (DDU) used in 3-Phase Electric Locomotives of WAP5, WAP7, WAG9 & WAG9H classes being operated by Indian Railways. The DDU is a man machine interface device able to communicate with locomotive control system through MVB. The LED backlit 10.4" XGA LCD screen provides better readability even during daylight conditions, thanks to brightness control. The DDU has various pre-defined screens which can be used for investigative monitoring.

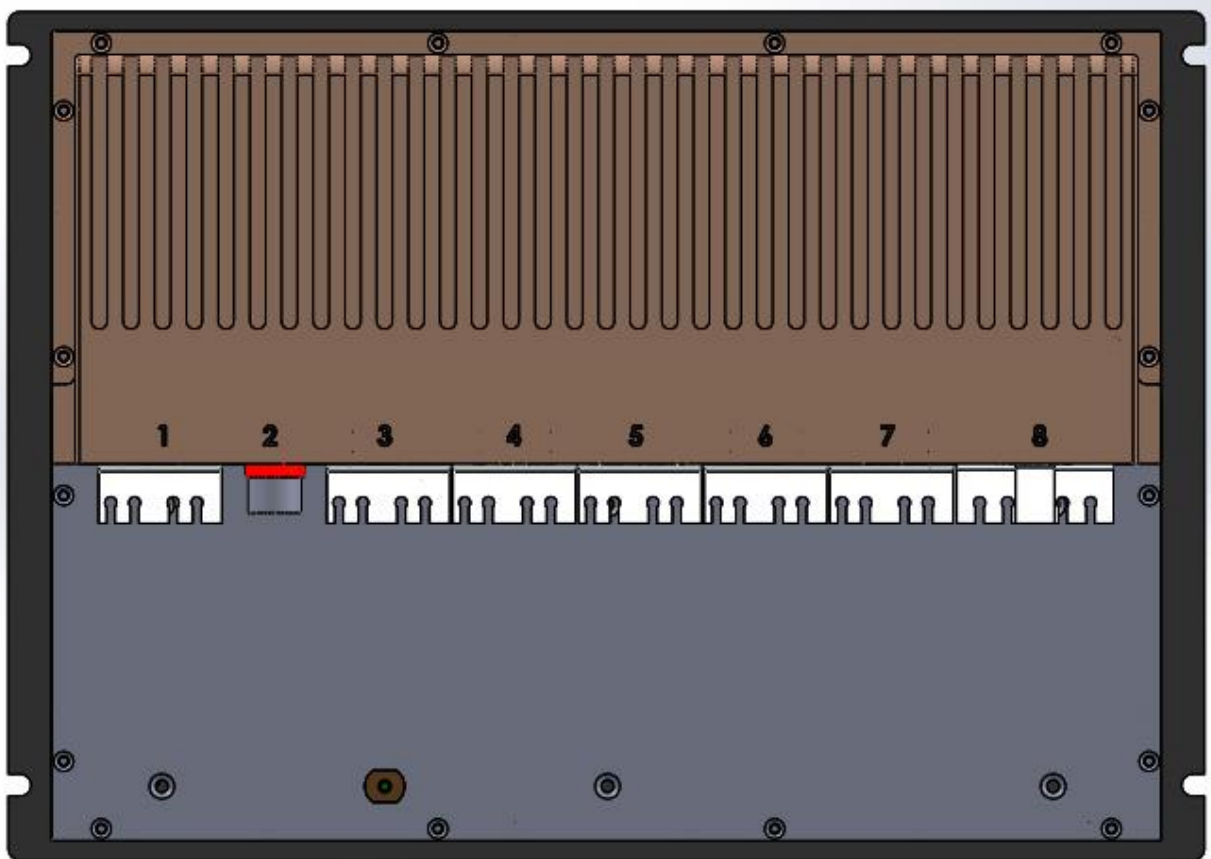
## 2.0 KEY DESIGN FEATURES

The key design features incorporated in this DDU are listed below

SL.No.	Features	Values/Conformance
1	LCD Display Size	10.4 inch, XGA
2	Overall outer dimensions	302 X 82 X 214 in mm
3	Brightness Control Auto/Manual	Available
4	Multiple Screen Selection	Available
5	MVB Connectivity	EMD
6	Isolated RS-485/RS-422	Available
7	Isolated RS-232	Available
8	USB Interface	Available
9	Ethernet	Available
10	Ingress Protection	Totally enclosed (IP-65)
11	Cooling	Natural Chassis cooling
12	Keypad	Membrane, Functional keys
13	LCD screen resolution	1024x768
14	Operating Temperature	-25 to +70° C
15	Operating Voltage	70V DC to 137.5V DC
16	Memory	1GB NAND Flash, 1GB DDR3 RAM
17	Processor	ARM CORTEX-A8
18	Operating System	LINUX
18	Normative Standard Conforming	IEC-60571
19	Touch screen	Available, P-CAP

### 3.0 MECHANICAL DESIGN

The driver display is made from Aluminium material and exterior is hard anodised black. The special function keys are located on the right side of the facia. The USB interface is provided on the right-side top, just above the special function key pad.



The rear side of the driver display uses a milled structure with in-built heat sink for chassis cooling. The heat generated internally by the heat producing elements like the DC-DC converters and processor is directly transferred to the chassis. The heat generated by other small components is transferred to the chassis indirectly through convection using internal circulating fan.

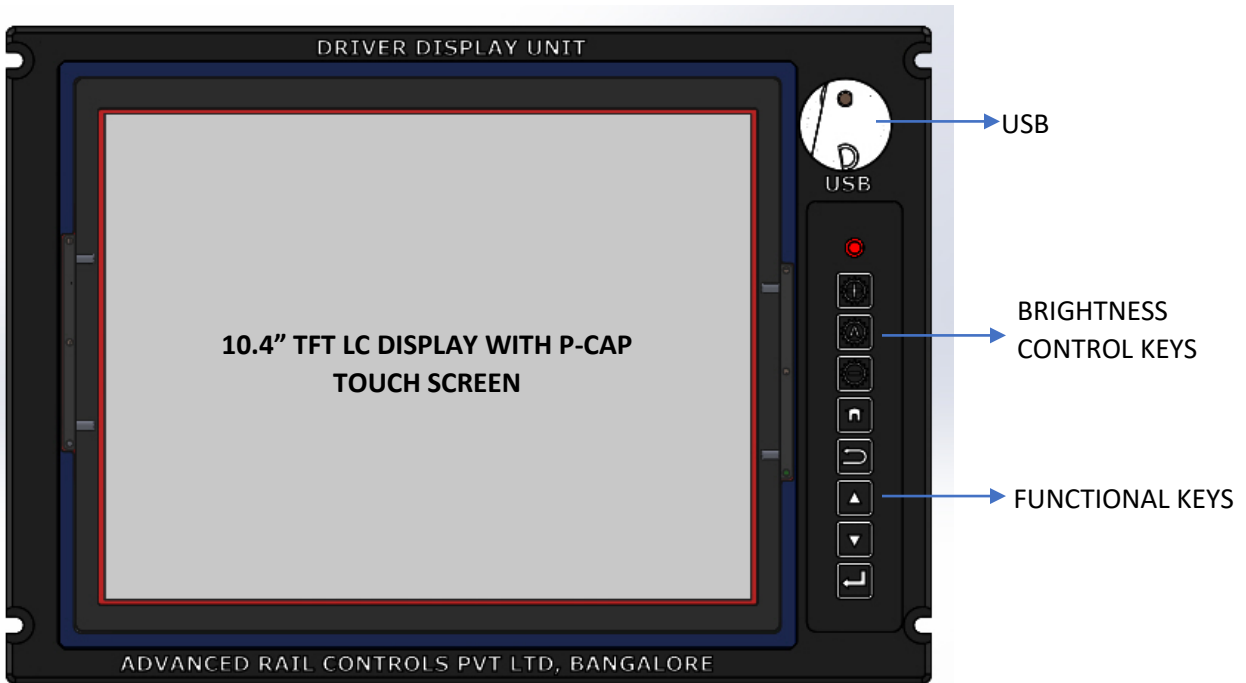
All the field interface connectors are terminated on the rear plate below the heat sink as shown in Figure above.

### 3.1 INTERFACE DETAILS

Sl. No	Interface Details	Connector Type
1	MVB	9 pin D-SUB Male connector
2	Ethernet	M12 circular connector
3	MVB	9 pin D-SUB Female connector
4	N/W Selection	9 pin D-SUB Female connector
5	RS-485/RS-422	9 pin D-SUB Male connector
6	CAN	9 pin D-SUB Male connector
7	RS-232	9 pin D-SUB Male connector
8	Power supply 110V DC	FMT 3W 3P-K120 Male, 3pin

The equipment can be directly mounted on the C-Panel using screws and the fully assembled C-Panel can be mounted on the driver desk. The mechanical dimensional drawings and mounting instructions are given at the end.

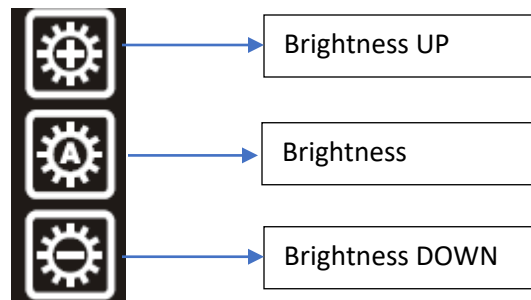
## 4.0 OPERATOR CONTROLS



The Driver Display has a rugged membrane keyboard on the right hand side. These keys are known as "Function" keypad and "Brightness Control" keypad. The "Function" keypad has 5 keys, each assigned to a separate function, and the "Brightness Control" keypad has 3 keys, each assigned to a separate function.

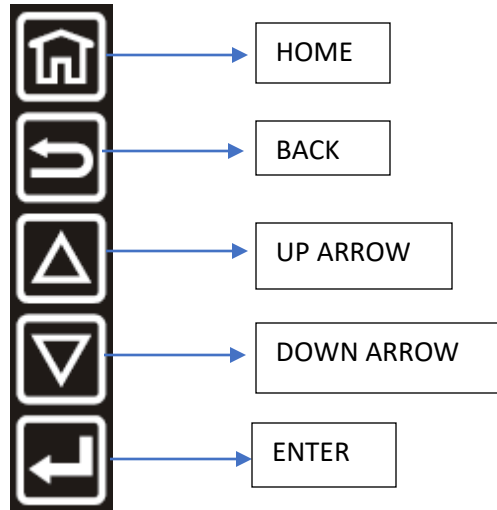
### 4.1 BRIGHTNESS CONTROL KEYS

The Brightness control keypad has 03 membrane keys of rugged type. The keys are protected from direct ingress of dust and moisture. The keys are suitable for operation by fingers. The function assigned to each key is given below:



## 4.2 FUNCTION KEYS

The function keys are 05 in number and are used for invoking special functions and screens as detailed below:



## 5.0 SCREENS

The Driver display has pre-defined dedicated screens to monitor real time process variables pertaining to a section or sub-system of the locomotive. However, such screens are meant for online monitoring by technical staff whenever required. The locomotive driver, however, needs to view the default screen only most of the times. The screens have been designed to take care of the specification requirement. The details of the screens are explained below.

### HOME SCREEN



Clicking on each of the locomotive diagram displays its respective sub-system status (sub system status is only a brief display in the home screen).



## SUB-SYSTEMS HOME

Displayed when clicked on sub-system status from home screen.

Clicking on any sub-system that is isolated, displays its respective fault(s) as shown in the next screen.

Clicking on "ALL" displays faults related to all the isolated sub-systems.

## SUB-SYSTEMS BROWSE

## PROCESS INFO - NODE INFORMATION

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

Node Information	
Node code Master ICP1	0
Node code Master subchart ICP1	715
Node code VIU1	?????
Node code ALG1	????
Node code Master subchart ICP2	?????
Node code VIU2	?????
Node code ALG2	????

Node Information

Energy Consumption

Simulation Mode

Motor Temperatures

Software Version

Inching Mode

Set Date/Time

Condition Data

Motor Converter

19-12-2017 14:34:05

30260

30272

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

CLEAR

---

↓

ENTER

## PROCESS INFO - ENERGY CONSUMPTION

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

Energy Counter	
Loco Number	0
Consumed	0 kWh
Regenerated	0 kWh

Node Information

Energy Consumption

Simulation Mode

Motor Temperatures

Software Version

Inching Mode

Set Date/Time

Condition Data

Motor Converter

19-12-2017 14:34:09

30260

30272

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

CLEAR

---

↓

ENTER

## PROCESS INFO - SIMULATION MODE

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ▲ Fault

Simulation Mode	
Status:	●
UPRIM:	0 kV
VACT:	0.0 km/h
TE/BE Demand:	0 kN
FLG1:	12
SLG1:	?????

Node Information

Energy Consumption

Simulation Mode

Motor Temperatures

Software Version

Inching Mode

Set Date/Time

Condition Data

Motor Converter

19-12-2017 14:34:15

30260

1

←

30272

2

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

ENTER

## PROCESS INFO - MOTOR TEMPERATURES

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ▲ Fault

Motor Temperatures		
Motor 1	???	*C
Motor 2	???	*C
Motor 3	???	*C
Motor 4	???	*C
Motor 5	???	*C

Node Information

Energy Consumption

Simulation Mode

Motor Temperatures

Software Version

Inching Mode

Set Date/Time

Condition Data

Motor Converter

19-12-2017 14:34:19

30260

1

←

30272

2

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

ENTER

## PROCESS INFO - SOFTWARE VERSION

Software Versions	
ICP1	49.00
ICP2	????
VIU1	????
VIU2	????
ACI1	????
ACI2	????
ACI3	????
Gateway	2.1
DDU1*	3.6
DDU2	?????

\* This DDU

19-12-2017 14:34:22

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

30260 30272

1 2

## PROCESS INFO - INCHING MODE

Inching Mode	
Active	●
Actual Speed	0.0 km/h
Set Speed	0.8 km/h

19-12-2017 14:34:24

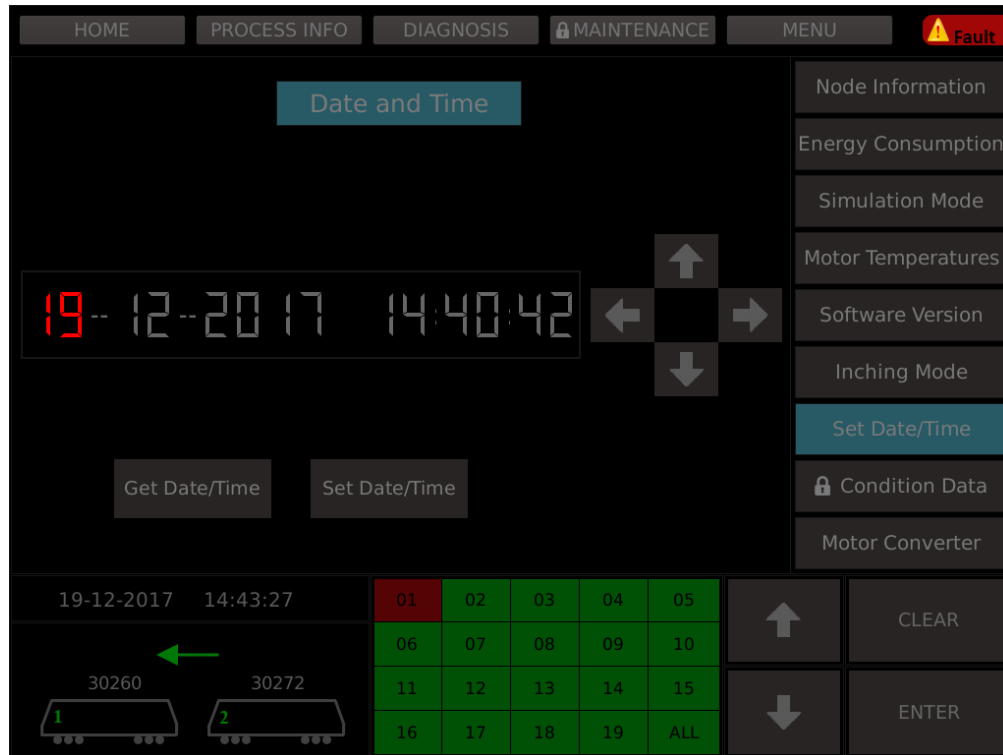
01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

30260 30272

1 2

Set Speed can be modified using the up and down arrows given in the bottom part of the screen.

## PROCESS INFO - SET DATE AND TIME

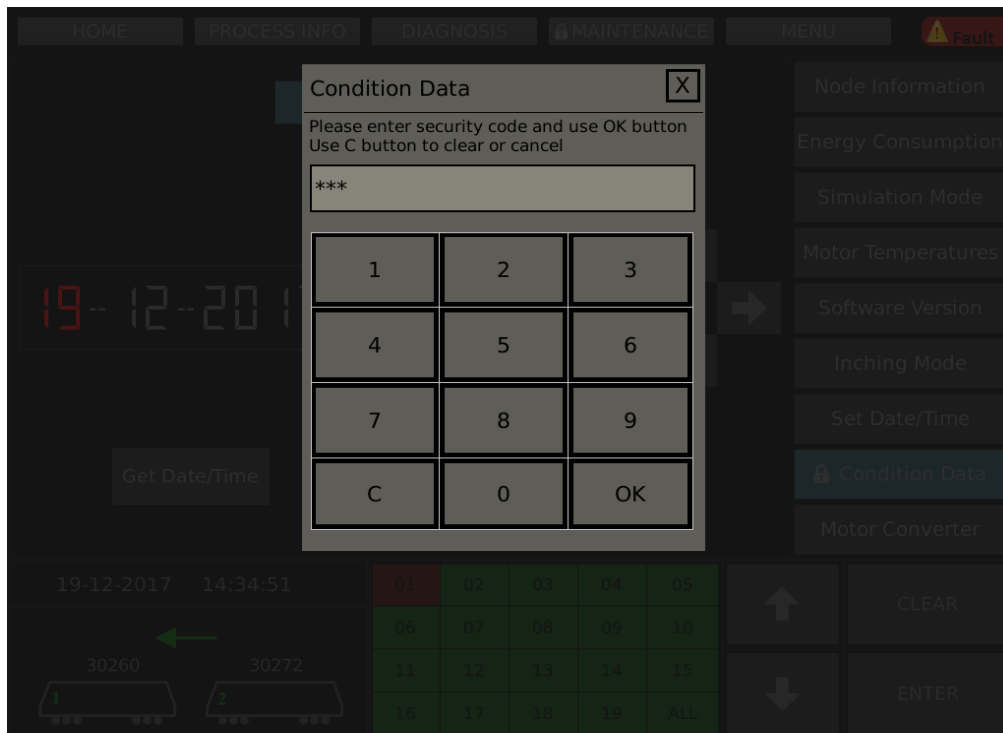


Date displayed as date – month—year. Time displayed as hours:minutes:seconds.

Up and Down arrows used to increment and decrement respectively the date/time values.

Left and right arrows used to navigate to each part of date and time i.e date,month,year,hour,minute and second.

## PROCESS INFO - CONDITION DATA PASSWORD ENTRY



Password has to be entered to display condition data screen.

## PROCESS INFO - CONDITION DATA

The screenshot displays the 'Condition Data' screen with the following table:

Condition Data			
Locomotive Number	31295	-	Edit
Bogie 1 Motor M1	0	mm	Edit
Bogie 1 Motor M2	0	mm	Edit
Bogie 1 Motor M3	0	mm	Edit
Bogie 2 Motor M1	0	mm	Edit
Bogie 2 Motor M2	0	mm	Edit
Bogie 2 Motor M3	0	mm	Edit
Energy Consumed	0	kWh	Reset
Energy Regenerated	0	kWh	Reset

Navigation menu on the right includes: Node Information, Energy Consumption, Simulation Mode, Motor Temperatures, Software Version, Inching Mode, Set Date/Time, Condition Data (highlighted), and Motor Converter.

Bottom control panel shows: Date/Time (19-12-2017 14:35:00), a keypad (01-19, ALL, CLEAR, ENTER), and locomotive diagrams (30260 and 30272).

Edit button can be used to alter the values.

Reset button can be used to only reset values to "0" where altering values is not allowed.

## PROCESS INFO CONDITION DATA EDIT VALUES

The screenshot shows the 'Condition Data' screen with a dialog box open for editing the 'Locomotive Number' field. The dialog box contains:

- Title: Condition Data
- Field: Locomotive Number (LOCO)
- Input field: 30260
- Numeric keypad (1-9, 0, C, OK)

The background screen shows the same 'Condition Data' table and navigation menu as in the previous screenshot, but with the 'Condition Data' menu item highlighted.

## PROCESS INFO - CONDITION DATA AFTER EDITING VALUE

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ▲ Fault

Condition Data			
Locomotive Number	30260	-	Edit
Bogie 1 Motor M1	0	mm	Edit
Bogie 1 Motor M2	0	mm	Edit
Bogie 1 Motor M3	0	mm	Edit
Bogie 2 Motor M1	0	mm	Edit
Bogie 2 Motor M2	0	mm	Edit
Bogie 2 Motor M3	0	mm	Edit
Energy Consumed	0	kWh	Reset
Energy Regenerated	0	kWh	Reset

Node Information

Energy Consumption

Simulation Mode

Motor Temperatures

Software Version

Inching Mode

Set Date/Time

🔒 Condition Data

Motor Converter

Save Changes Discard Changes

19-12-2017 14:35:32

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

30260 ← 30272

↑ CLEAR

↓ ENTER

## PROCESS INFO - MOTOR CONVERTER

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ▲ Fault

Motor Converter				
Motors	Status		Click to change status	
1	?	Enabled	Enable	Disable
2	?	Enabled	Enable	Disable
3	?	Enabled	Enable	Disable
4	?	Enabled	Enable	Disable
5	?	Enabled	Enable	Disable
6	?	Enabled	Enable	Disable

Node Information

Energy Consumption

Simulation Mode

Motor Temperatures

Software Version

Inching Mode

Set Date/Time

🔒 Condition Data

Motor Converter

Motor: 123 456

Apply Changes

Discard Changes

🔒 Reset Locked Motor Conv.

19-12-2017 14:35:40

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

30260 ← 30272

↑ CLEAR

↓ ENTER

# DIAGNOSIS

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ! Fault

**DIAGNOSIS** Database to USB Details

Position	Time ON	Time OFF	Proc	Sub	Fault Message
06/12/2...	06/12/2017 10:10:08	06/12/2017 10:10:10	RBU3	SS12	Transformer pump 2 MCB open
06/12/2...	06/12/2017 10:10:08	06/12/2017 10:10:10	RBU3	SS12	Transformer pump 2 MCB open
06/12/2...	06/12/2017 10:10:08	06/12/2017 10:10:10	RBU3	SS12	Transformer pump 2 MCB open
06/12/2...	06/12/2017 10:10:08	06/12/2017 10:10:10	RBU3	SS12	Transformer pump 2 MCB open

19-12-2017 14:35:50

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

30260 ← 30272

1 2

↑ CLEAR

↓ ENTER

# DIAGNOSIS - DDS DOWNLOAD

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ! Fault

**DIAGNOSIS DOWNLOAD**

Filename :	*.XML
Destination :	Insert USB Memory Stick
Number Of Records :	249(total) / 249(new)
Status :	Ready to start
Progress :	

Save All Save New Delete All <<

19-12-2017 14:35:56

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

30260 ← 30272

1 2

↑ CLEAR

↓ ENTER



## DIAGNOSIS - DETAILS SYMPTOMS

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### DIAGNOSIS DETAILS

Time ON	Time OFF	Proc	Sub	Fault Message
06/12/2017 10:10:08	06/12/2017 10:10:10	RBU3	SS12	Transformer pump 2 MCB open

Signal Name 09--\_0901-MMCBPumpT2

Symptoms

Transformer oil pump 2 MCB tripped.

Cause

Advice

19-12-2017 14:36:01

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

1

2

19-12-2017 14:36:04

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑

↓

CLEAR

30260 ←
 

30272

## DIAGNOSIS - DETAILS ADVICE

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### DIAGNOSIS DETAILS

Time ON	Time OFF	Proc	Sub	Fault Message
06/12/2017 10:10:08	06/12/2017 10:10:10	RBU3	SS12	Transformer pump 2 MCB open

Signal Name: 09--\_0901-MMCBPumpT2

Symptoms

No effect on normal operation. If transformer temperature increases then power may be reduced or shut down.

Cause

Advice

<<

19-12-2017 14:36:07

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑
CLEAR

←

↓
ENTER

30260  
1

30272  
2

## MAINTENANCE - PASSWORD ENTRY

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### DIAGNOSIS

Position	Time ON
06/12/2...	06/12/2017 10:10:08
06/12/2...	06/12/2017 10:10:08
06/12/2...	06/12/2017 10:10:08
06/12/2...	06/12/2017 10:10:08

Maintenance
X

Please enter security code and use OK button  
Use C button to clear or cancel

\*\*\*

1	2	3
4	5	6
7	8	9
C	0	OK

↑
CLEAR

←

↓
ENTER

30260  
1

30272  
2

## MAINTENANCE - DDU DISPLAY

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
▲ Fault

DDU DISPLAY

DDU

Restart
Exit Application

DDU Display

DDU Logging

MVB Telegram

MVB Freshness

MVB Variables

System

VCU

Close

Demo/Simulation mode

Active
On
Off

DDU Version Info

Installed DDU product	Version
DDU	1.0
Linux	3.60

30240 :??

19-12-2017 14:36:36

DDU1

## MAINTENANCE - DDU LOGGING

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
▲ Fault

DDU LOGGING

Date/Time	Error	Message	Exception	Stacktrace
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

DDU Display

DDU Logging

MVB Telegram

MVB Freshness

MVB Variables

System

VCU

Close

30240 :??

19-12-2017 14:36:41

DDU1

## MAINTENANCE - MVB TELEGRAM BINARY

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### MVB TELEGRAM

Port	↑
1	↑
4	↑
5	
7	
8	
19	
37	
40	
41	
43	
44	↓
103	↓
104	↓

Port number: 1      Port type: Sink Port  
 Status: OK      Freshness: 20

Binary	FEDCBA98	76543210
0X00	00000000	00000000
0X02	00000000	00000000
0X04	00000000	00000000
0X06	00000000	00000000
0X08	00000000	00000000
0X0A	00000000	00000000
0X0C	00000000	00000000
0X0E	00000000	00000000

- DDU Display
- DDU Logging
- MVB Telegram
- MVB Freshness
- MVB Variables
- System
- VCU
- Close

30240 :??

19-12-2017    14:36:45

DDU1

## MAINTENANCE - MVB TELEGRAM BYTE

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### MVB TELEGRAM

Port	↑
1	↑
4	↑
5	
7	
8	
19	
37	
40	
41	
43	
44	↓
103	↓
104	↓

Port number: 1      Port type: Sink Port  
 Status: OK      Freshness: 20

Binary	00 01 02 03 04 05 06 07
0X00	00 00 00 00 00 00 00 00
0X08	00 00 00 00 00 00 00 00

- DDU Display
- DDU Logging
- MVB Telegram
- MVB Freshness
- MVB Variables
- System
- VCU
- Close

30240 :??

19-12-2017    14:36:48

DDU1

## MAINTENANCE - MVB TELEGRAM WORD

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### MVB TELEGRAM

Port
1
4
5
7
8
19
37
40
41
43
44
103
104

Port number: 1      Port type: Sink Port  
 Status: OK      Freshness: 20

Binary

Byte

Word

	-00-	-02-	-04-	-06-
0X00	00	00	00	00
0X08	00	00	00	00

DDU Display

DDU Logging

MVB Telegram

MVB Freshness

MVB Variables

System

VCU

Close

30240 :??
19-12-2017    14:36:51
DDU1

## MAINTENANCE - MVB FRESHNESS

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### MVB FRESHNESS

Port	Freshness(ms)	Maximum Freshness(ms)	Reset Max
1	0	2	↑
4	0	2	↑
5	0	2	
7	0	2	
8	0	2	
19	0	2	
37	0	2	
40	0	2	
41	0	2	
43	0	2	
44	0	2	
103	0	2	↓
104	0	2	↓
105	0	2	
106	0	2	

DDU Display

DDU Logging

MVB Telegram

MVB Freshness

MVB Variables

System

VCU

Close

30240 :??
19-12-2017    14:36:56
DDU1

## MAINTENANCE - MVB VARIABLES

HOME | PROCESS INFO | DIAGNOSIS | **MAINTENANCE** | MENU Fault

**MVB PROCESS VARIABLES** Selected: 7

Sel	Telegram	Process Variable	Type
<input type="checkbox"/>	ICP1-1	14XX*Bit0	BIT
<input checked="" type="checkbox"/>	ICP1-1	CmdOpMode	BYTE
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit1	BIT
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit2	BIT
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit3	BIT
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit4	BIT
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit5	BIT
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit6	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit7	BIT

Buttons: Clear Selection | Filter | Load File | Save File | Display

30240 :?? 19-12-2017 14:37:25 DDU1

## MAINTENANCE - MVB VARIABLES FILTER

HOME | PROCESS INFO | DIAGNOSIS | **MAINTENANCE** | MENU Fault

**MVB PROCESS VARIABLES** Selected: 0

Sel	Telegram	Process Variable	Type
<input type="checkbox"/>	ICP1-1	14XX*Bit0	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit7	BIT

**FILTER PROCESSOR**

ALL     ACI1     ACI2     ACI3     DDU1  
 DDU2     ICP1     ICP2     IGW     RBU1  
 RBU2     RBU3     RBU4     RIOM1A     RIOM1B  
 RIOM2A     RIOM2B     VIU1     VIU2

Ok    Cancel

Buttons: Clear Selection | Filter | Load File | Save File | Display

30240 :?? 19-12-2017 14:37:42 DDU1

Only required processors whose details has to be viewed can be checked from the filter processor area (obtained on-click on Filter button).

## MAINTENANCE - MVB VARIABLES FILTERED PROCESSOR DETAILS

MVB PROCESS VARIABLES Selected: 0

Sel	Telegram	Process Variable	Type
<input type="checkbox"/>	ACI1-2000	05-XMVBLifeSig	GANZOHNE
<input type="checkbox"/>	ACI1-2000	05-MMVBDisturb	BIT
<input type="checkbox"/>	ACI1-2000	06-BVCBOFWIDis	BIT
<input type="checkbox"/>	ACI1-2000	06-MDisWoVCBOF	BIT
<input type="checkbox"/>	ACI1-2010	06-BSS06IsoDem	BIT
<input type="checkbox"/>	ACI1-2010	06-BSS06StpMSC	BIT
<input type="checkbox"/>	ACI1-2010	76-MVentLevel1	BIT
<input type="checkbox"/>	ACI1-2010	76-MVentLevel2	BIT
<input type="checkbox"/>	ACI1-2010	76-MVentLevel3	BIT

DDU Display  
DDU Logging  
MVB Telegram  
MVB Freshness  
MVB Variables  
System  
VCU  
Close

Clear Selection Filter Load File Save File Display

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Details of filtered processor.

## MAINTENANCE - MVB VARIABLES LOAD FILE

MVB PROCESS VARIABLES Selected: 0

Sel	Telegram	Process Variable	Type
<input type="checkbox"/>	ICP1-1	14XX*Bit0	BIT
<input type="checkbox"/>	ICP1-1	CmdOpMode	BYTE
<input type="checkbox"/>	ICP1-1	14XX*Bit1	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit5	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit6	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit7	BIT

LOAD FILE

1 2 3 4 5 6 Cancel

DDU Display  
DDU Logging  
MVB Telegram  
MVB Freshness  
MVB Variables  
System  
VCU  
Close

Clear Selection Filter Load File Save File Display

30240 :?? 19-12-2017 14:38:18 DDU1

On-click on Load File button the above screen is displayed with which details pertaining to required file can be viewed in the screen specified below.

## MAINTENANCE - MVB VARIABLES LOADED FILE DISPLAY

Telegram	Process Variable	Signal Status
ICP1-1	CmdLeadingDir	
ICP1-1	14XX*LebZeichZum	
ICP1-1	14XX*RelKont45	
ICP1-1	14XX*Word3	
ICP1-1	14XX*BVirtSlave	

Displays the signal status of selected file.

## MAINTENANCE - MVB VARIABLES SAVE FILE

Sel	Telegram	Process Variable	Type
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit0	BIT
<input checked="" type="checkbox"/>	ICP1-1	CmdOpMode	BYTE
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit1	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit5	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit6	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit7	BIT

Details of telegram(s) that are checked/ticked to be saved into any of the files specified in the save file area.



## MAINTENANCE - MVB VARIABLES CHECKED PROCESS VARIABLES

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ▲ Fault

**MVB PROCESS VARIABLES** Selected: 4

Sel	Telegram	Process Variable	Type
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit0	BIT
<input checked="" type="checkbox"/>	ICP1-1	CmdOpMode	BYTE
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit1	BIT
<input checked="" type="checkbox"/>	ICP1-1	14XX*Bit2	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit3	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit4	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit5	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit6	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit7	BIT

DDU Display  
DDU Logging  
MVB Telegram  
MVB Freshness  
**MVB Variables**  
System  
VCU  
Close

Clear Selection Filter Load File Save File Display

30240 :?? 19-12-2017 14:40:37 DDU1

## MAINTENANCE - MVB VARIABLES CHECKED PROCESS VARIABLES DISPLAY

HOME PROCESS INFO DIAGNOSIS MAINTENANCE MENU ▲ Fault

**MVB SELECTED PROCESS VARIABLES** <<

ICP1-1	14XX*Bit0		
ICP1-1	CmdOpMode		
ICP1-1	14XX*Bit1		
ICP1-1	14XX*Bit2		

DDU Display  
DDU Logging  
MVB Telegram  
MVB Freshness  
**MVB Variables**  
System  
VCU  
Close

30240 :?? 19-12-2017 14:40:41 DDU1

Displays checked process variables from the above screen on-click on Display button.

## MAINTENANCE - VCU RIOM IO

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### VCU RIOM 1A I/O

**Source A**

Lifesign

Active

**Source B**

Lifesign

Active

34-1A10	34-1A11	34-1A12	34-1A13	34-1A14
K1	K1	K1	K1	STS ?
K2	K2	K2	K2	O1 <input type="text" value="0.0V"/>
K3	K3	K3	K3	O2 <input type="text" value="0.0V"/>
K4	K4	K4	K4	O3 <input type="text" value="0.0V"/>
K5	K5	K5	K5	O4 <input type="text" value="0.0V"/>
K6	K6	K6	K6	
K7	K7	K7	K7	
K8	K8	K8	K8	
Comm. <input checked="" type="radio"/>	Comm. <input checked="" type="radio"/>	Comm. <input checked="" type="radio"/>	Comm. <input checked="" type="radio"/>	Comm. <input type="radio"/>
STS <input checked="" type="radio"/>	STS <input checked="" type="radio"/>	STS <input checked="" type="radio"/>	STS <input checked="" type="radio"/>	STS ?
I1 <input checked="" type="radio"/>	I1 <input checked="" type="radio"/>	I1 <input checked="" type="radio"/>	I1 <input checked="" type="radio"/>	I1 <input type="text" value="0.0mA"/>
I2 <input checked="" type="radio"/>	I2 <input checked="" type="radio"/>	I2 <input checked="" type="radio"/>	I2 <input checked="" type="radio"/>	I2 <input type="text" value="0.0mA"/>
I3 <input checked="" type="radio"/>	I3 <input checked="" type="radio"/>	I3 <input checked="" type="radio"/>	I3 <input checked="" type="radio"/>	I3 <input type="text" value="0.0mA"/>
I4 <input checked="" type="radio"/>	I4 <input checked="" type="radio"/>	I4 <input checked="" type="radio"/>	I4 <input checked="" type="radio"/>	I4 <input type="text" value="0.0mA"/>
I5 <input checked="" type="radio"/>	I5 <input checked="" type="radio"/>	I5 <input checked="" type="radio"/>	I5 <input checked="" type="radio"/>	
I6 <input checked="" type="radio"/>	I6 <input checked="" type="radio"/>	I6 <input checked="" type="radio"/>	I6 <input checked="" type="radio"/>	
I7 <input checked="" type="radio"/>	I7 <input checked="" type="radio"/>	I7 <input checked="" type="radio"/>	I7 <input checked="" type="radio"/>	
I8 <input checked="" type="radio"/>	I8 <input checked="" type="radio"/>	I8 <input checked="" type="radio"/>	I8 <input checked="" type="radio"/>	

RIOM 1A I/O

RIOM 1A Info

RIOM 1B I/O

RIOM 1B Info

RIOM 2A I/O

RIOM 2A Info

RIOM 2B I/O

RIOM 2B Info

System

VCU

Close

30240 :??
19-12-2017
14:42:54
DDU1

## MAINTENANCE - VCU RIOM INFO

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
Fault

### VCU 1 RIOM A Version Information

RIOM Extension	Firmware Application	Default parametres	Saved Parametres	MVB D 2000 Configuration
0	1.15.0	2.0.0	2.0.0	1.18.0
1	1.15.0	2.0.0	2.0.0	-
2				
3				
4				
5				
6	1.10.0	1.10.0	1.10.0	-
7				

LifeSign

RIOM 1A I/O

RIOM 1A Info

RIOM 1B I/O

RIOM 1B Info

RIOM 2A I/O

RIOM 2A Info

RIOM 2B I/O

RIOM 2B Info

System

VCU

Close

30240 :??
19-12-2017
15:02:31
DDU1

## FAULT DISPLAY

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
! Fault

**Fault Message** Received 08/12/2017 13:27:56

Loco {0:00000} ; SS01:Main power  
 TRANSFORMER OIL TEMP. OR PRESSURE NOT OK  
 TE/BE reduction or VCB trip's  
 Try to close the VCB if open F0105P1

Driver Advice

19-12-2017 14:33:33

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑  
 ↓

CLEAR  
  
 ENTER

## FAULT DISPLAY - DRIVER ADVICE

HOME
PROCESS INFO
DIAGNOSIS
MAINTENANCE
MENU
! Fault

**Fault Messages** Received 08/12/2017 13:27:56

Loco {0:00000} ; SS01:Main power  
 TRANSFORMER OIL TEMP. OR PRESSURE NOT OK  
 TE/BE reduction or VCB trip's  
 Try to close the VCB if open F0105P1

Driver Advice

1. Bring throttle to '0' position.
2. Try to clear the block section by coasting.
3. Check manually if Transformer oil pumps are working by touching the pumps outlets and inlet pipes in the under frame. Check if MCB 62.1/1 and HB1& 62.1/2 in HB2 Cubicle. If found tripped open VCB and reset MCB once. (Procedure for resetting MCB: see Advice Page 2) If MPH not working then
  - a) Switch OFF and ON Electronics.
  - b) Keep loco in idle mode for 10 minutes.
4. Check the oil level in both the expansion tanks of transformer in Machine room located near Oil Cooling Unit. It should be in between the Max & Min Mark.
5. Driver should check the working of Oil cooler blower unit located in machine room; If it is not working then ensure that MCB 59.1/1 (in HB-1 Cubicle) & 59.1/2 (in HB-2 Cubicle) should not be in tripped condition. If found tripped, then open VCB & reset MCB only once. If OCBs are not working, then
  - a) Switch OFF and ON Electronics.
  - b) Keep loco in idle mode for 10 minutes.

19-12-2017 14:33:39

01	02	03	04	05
06	07	08	09	10
11	12	13	14	15
16	17	18	19	ALL

↑  
 ↓

CLEAR  
  
 ENTER

Remaining driver advice can be viewed using navigation keys i.e up and down keys.

# ERROR DISPLAY

The screenshot shows a software interface with a dark theme. At the top, there are navigation tabs: HOME, PROCESS INFO, DIAGNOSIS, MAINTENANCE, and MENU. A red 'Fault' indicator is visible in the top right corner. The main area is titled 'MVB PROCESS VARIABLES' and shows a table with columns for 'Sel', 'Telegram', 'Process Variable', and 'Type'. The 'Selected' count is 0. A 'Message Box' is overlaid on the table, displaying a red 'X' icon and the text 'No Signals Selected' with an 'OK' button. The bottom of the interface includes a status bar with the number '30240 :??', a date and time '19-12-2017 15:02:48', and the identifier 'DDU1'. There are also several control buttons at the bottom: Clear Selection, Filter, Load File, Save File, Display, and Close.

Sel	Telegram	Process Variable	Type
<input type="checkbox"/>	ICP1-1		
<input type="checkbox"/>	ICP1-1		
<input type="checkbox"/>	ICP1-1		
<input type="checkbox"/>	ICP1-1		
<input type="checkbox"/>	ICP1-1		
<input type="checkbox"/>	ICP1-1	14XX*Bit4	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit5	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit6	BIT
<input type="checkbox"/>	ICP1-1	14XX*Bit7	BIT



## 7.0 SPARE ITEMS & ACCESSORIES

SL.No.	Item name	UID NUMBER	Quantity /Unit
1	Processor board,ARM CORTEX-A8, 1GB NAND flash and 1GB DDR3 RAM	2222131006	One
2	10.4" TFT Display with in-built touch screen (P-CAP)	1113141114	One
3	Power supply Board (70V DC to 137.5 V DC nominal 110V DC, protection against surge and short circuit)	331013161K	One
4	MVB Controller Board with EMD physical medium	331013101M&331013101L	One
5	Processor base board	331013101O	One
6	8 keys membrane key board	2220101207	One
7	Set of Connectors Sub-D 9 Male	11121523CW	Four
7	Set of Connectors Sub-D 9Female	111215235R	Two
8	Power Connector	11121515ES	One
9	M12 Ethernet connector	111215237N	One