

GT Display Description

for

YAMAMA GT6-GT9

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1 General

1.1 Purpose of this document

In the document *HMI Description*, the basic layouts of the Advant displays are described. This document describes the displays used in a standard GT10B plant delivery.

1.2 The GT10B displays

The GT10B interactive displays are built up of a number of “pages”, each having a certain purpose. The system displays are based on the Process & Instrumentation Diagrams (P&ID) included in the Operator Documentation.

Note! **The displays in this document are taken from YAMAMA 3 and used as an example for each Gas Turbine. The only differences are the prefixes Disp6xx for YAMAMA 6 and Disp7xx for YAMAMA 7 etc.**

2 DISP300 Display Overview

2.1 General

This display is the index to the GT10B displays where you can choose from a number of displays, each having a certain purpose.

DISP300 Display Overview



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3 DISP301 Unit Start/Stop Display

3.1 General

This display is used during start up and shut down sequence. It includes functions to select turbine and generator controller, select loading ramp, synchronising mode, select fuel and to start and stop. The display also indicates whether a certain Function Group (FG) is in operation or not in the columns Start and Stop Indication. The most important values such as temperature, pressure and vibrations can also be observed on this display.

DISP301 Unit Start/Stop



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Unfilled box means function NOT in operation

Dynamic keys D1-D10

Click on this PID icon to change frequency preferences

Start/Stop

3.2 DISP301 abbreviations

<u>MIMIC DISPLAY</u>	
T0/H0	Ambient temperature/humidity
T2/P2	Compressor inlet temperature/pressure
T3/P3	Compressor discharge temperature/pressure
T7/P8	Exhaust gas temperature/ pressure
IGV	Inlet guide vane
BV1	Bleed valve 1 (open/closed valve)
BV2	Bleed valve 2 (control valve)
UN	Net (grid) voltage
FN	Net (grid) frequency
U	Voltage
P	Active power (Gas turbine)
Q	Reactive power
f	Current
GCB	Generator Circuit Breaker

<u>EXHAUST TEMP</u>	
T7	Displays the exhaust temperature

<u>CONTROLLERS</u>	
MVAr	Reactive power.
COS PHI	Power factor.
FCR	Field current regulator.
LOAD	Load/Frequency droop control. If the load controller is selected before start the frequency controller will be in operation until the generator circuit breaker is closed

FREQUENCY	Frequency (zero droop) control
------------------	--------------------------------

<u>FUEL</u>	
GAS	Select fuel before start-up,
LIQUID	fuel change etc.

<u>UNIT OPERATION</u>	
READY TO START	All START orders are ignored (Start interlock) until the unit is ready for start.
START/STOP	Function Group (FG) for start and stop of GT.
GCB SYNCH/OFF	Generator Circuit Breaker control.

<u>START INDICATION</u>	
Ventilation	Is indicating when the ventilation is put into service and purging of all rooms of the unit is proceeding.
Lubrication Oil	The lubricating oil system is activated.
Purging/Fuel Prep.	The barring starts and purging of the turbine is proceeding and the fuel system is started.
Pilot Ignition	Ignition of pilot flame.
Main Ignition	Ignition of main flames.
Acc Starter	Acceleration of the gas turbine is done by the start motor.
Acceleration	Start motor is stopped and acceleration is carried out by combustion of fuel.
Excitation	When the power turbine speed reaches 85%, the excitation of the AC-generator is switched on.
Synchronizing	Automatic synchronising is activated.
Unit In Service	Turbine and AC-generator in service and unit on LOAD.

<u>STOP INDICATION</u>	
UNIT TRIP	A shutdown is initiated. The GCB is opened and the turbine shutoff valves are closed.
GCB TRIP	A GCB trip is initiated. The GCB is opened.
UNLOADING TRIP	An unloading shutdown is initiated. The unit will be unloaded until the fault disappears or the active load is zero.
STOPPING	Indicates that the stop sequence is activated.
WARM TURBINE	Indicates that the cooling down sequence will be activated after a stop or trip.
COOLING TIME	Indicates the elapsed time for the cooling down sequence.
BARRING	Indicates turning of GG-shaft.

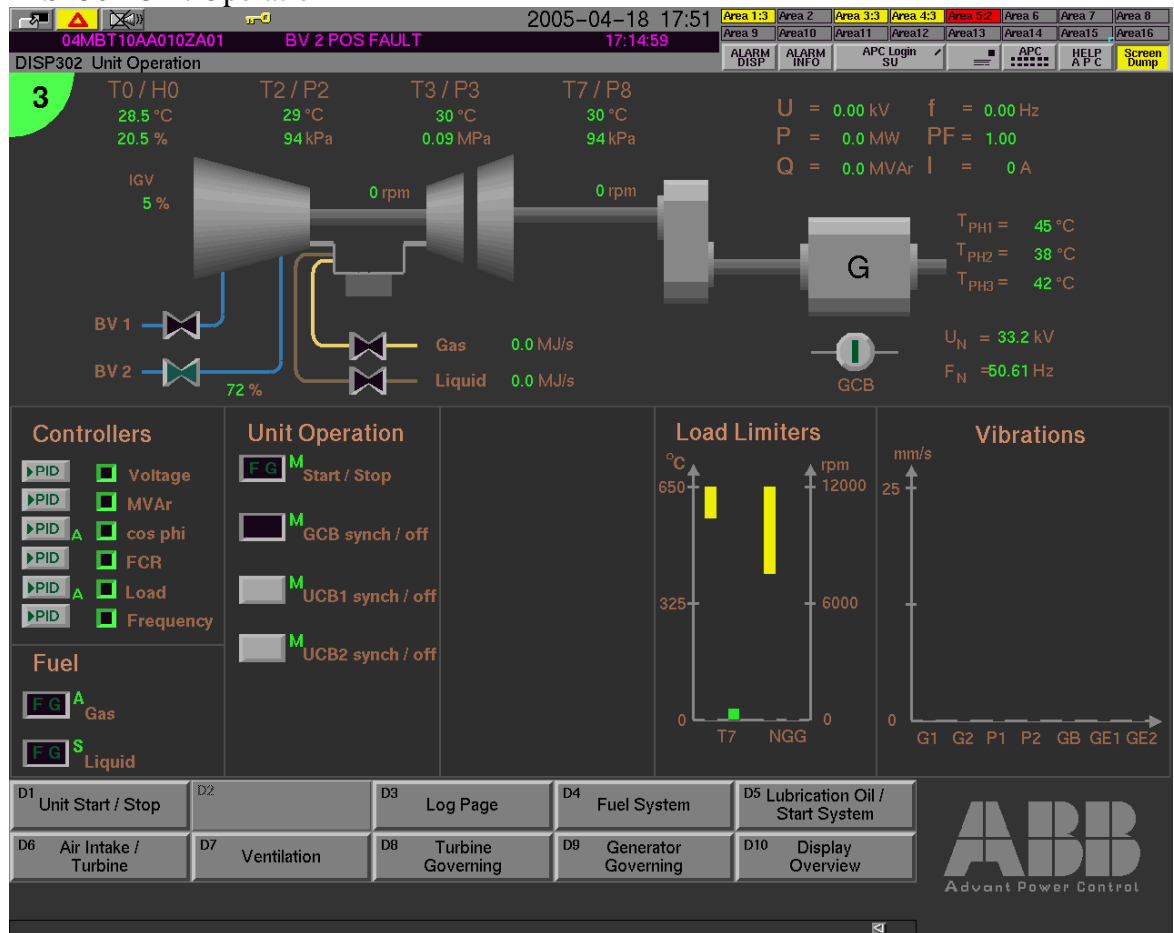
<u>VIBRATIONS</u>	
G1	Bearing 1 (cold bearing) of the gas generator.
G2	Bearing 2 (hot bearing) of the gas generator.
P1	Bearing 3 of the power turbine.
P2	Bearing 4 of the power turbine.
GB	Load gearbox bearing (high speed side)
A1	AC-generator driven end.
A2	AC-generator non-driven-end.

4 DISP102 Unit Operation

4.1 General

This display is used during normal operation of the gas turbine unit. The display allows you to change load ramp, control mode etc. This display shows more values than the display 301 (start and stop), though less values than the display 304 (log page).

DISP302 Unit Operation



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4.2 DISP302 abbreviations

<u>MIMIC DISPLAY</u>	
T_{PH1}, T_{PH2}, T_{PH3}	Temperatures of the phases in AC-generator.
<u>POWER LIMITERS</u>	
T7L	Limits the average turbine exhaust temperature T7. The set point is calculated acc. to the ambient air conditions.
NGG	Limits the speed of the gas generator rotor. The set point is calculated according to the ambient air conditions. The limiter uses two setting levels, one for start and one for service.
The limiters are presented with one bargraph for the measured value and one for the limiting set point. The limit set point bargraph starts at the top of the diagram and expand downwards by decreasing value.	

5 DISP303 Log Page

5.1 General

The display 303 is used when you need all possible values presented on one page. This page is also used when performing a Routine Reading printout, see the document *Routine Readings*. In the figure below you can overview all the values presented on the log page.

DISP303 Log Page 1



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5.2 DISP303 abbreviations

<u>BEARINGS</u>	
GG	Gas generator
PT	Power turbine
GENERATOR DE-SIDE	The driven end of the generator
GENERATOR NDE-SIDE	The non-driven end of the generator
AXIAL DISPL	Axial displacement

<u>EXHAUST TEMP T7</u>	
XE02	Shows the 2:nd ring of measuring points
T7 MIN	Shows the lowest temperature compared to average
T7 MAX	Shows the highest temperature compared to average
AVERAGE	Average temperature
MAX START	Max average temperature during start

<u>TURBINE DATA</u>	
NGG	Rotation speed of the gas generator shaft
NGG*	Normalised rotation speed (according to ambient temperature) of the gas generator shaft
NPT	Rotation speed of the power turbine shaft
IGV	Inlet guide vane
BV1	Bleed valve #1
BV2	Bleed valve #2
FUEL	Total fuel flow
GAS	Gaseous fuel flow
LIQUID	Liquid fuel flow
BARRING	Barring is activated Factor used to calculate equivalent working

CX	hours
<u>COOL & SEAL AIR, AIR INTAKE</u>	
DP INT FILTERS	Differential pressure over the air intake filter
COMPR DEL PRESS	Compressor delivery (discharge) pressure
COMPR DIS TEMP	Compressor discharge temperature

<u>LUBRICATION OIL</u>	
BEARING 2 DP	Differential pressure between lube oil pressure and bearing house pressure.

<u>GEAR BEARINGS</u>	
1 RAD T	Temperature of the four journal
2 RAD T	bearings
3 RAD T	
4 RAD T	

<u>ELECTRICAL DATA</u>	
I PH 1	Current, phase 1
I PH 2	Current, phase 2
I PH 3	Current, phase 3
IF	Field current

<u>GENERATOR</u>	
ST T PH 1	Stator temperature, phase 1
ST T PH 2	Stator temperature, phase 2
ST T PH 3	Stator temperature, phase 3

6 DISP304 Log Page Extended

6.1 General

This display shows all 48 measuring points for the exhaust temperature (T7). Also values shown in DISP304 are repeated in this display.

DISP304 Log Page Extended

The screenshot displays the 'DISP304 Log Page Extended' interface. At the top, it shows the date and time '2005-04-18 17:51' and a status bar with '04MBT10AA010ZA01' and 'BV 2 POS FAULT'. The main content is divided into three columns: 'Exhaust Temp T7', 'Lubrication Oil', and 'Turbine Data'. The 'Exhaust Temp T7' column lists 48 measuring points (CT005 to CT080) with values in degrees Celsius. The 'Lubrication Oil' column shows parameters like Bearing 2 DP, Supply Press, Supply Temp, and Tank Heaters. The 'Turbine Data' column shows parameters like Compressor Inlet Temperature, Compressor Inlet Pressure, Compressor Inlet Flow, Turbine Inlet Massflow, Compressor Discharge Temperature, and Compressor Delivery Pressure. A 'Historical Data' section is also present, showing Operating Time (Total: 111 h, Start No: 59, Equivalent hours: 414) and energy production (Total: 503 MWh, MVAR pos: 124 MVARh, MVAR neg: 1 MVARh). The bottom of the screen features a navigation bar with buttons for 'Unit Start / Stop', 'Unit Operation', 'Log Page 1', 'Fuel System', 'Lubrication Oil / Start System', 'Air Intake / Turbine', 'Ventilation', 'Turbine Governing', 'Generator Governing', and 'Display Overview'. The ABB logo and 'Advant Power Control' are visible in the bottom right corner.

[°C]	XE01:	XE02:	XE03:
CT005	31	31	31
CT010	32	32	32
CT015	30	30	30
CT020	31	31	31
CT025	29	30	30
CT030	30	30	30
CT035	29	29	29
CT040	30	30	30
CT045	28	29	30
CT050	30	30	31
CT055	30	30	30
CT060	30	30	30
CT065	30	30	30
CT070	30	30	31
CT075	30	30	30
CT080	31	31	32
T7av Stn 2	30	30	30
T7av Stn 3	30	31	31
T7 MIN to Average			1
T7 MAX to Average			1
Average			30
Max Start			442

	1	2
Bearing 2 DP	-3 kPa	-4 kPa
Supply Press	0 kPa	2 kPa
Supply Temp	37 °C	38 °C
Tank Heaters	■	■

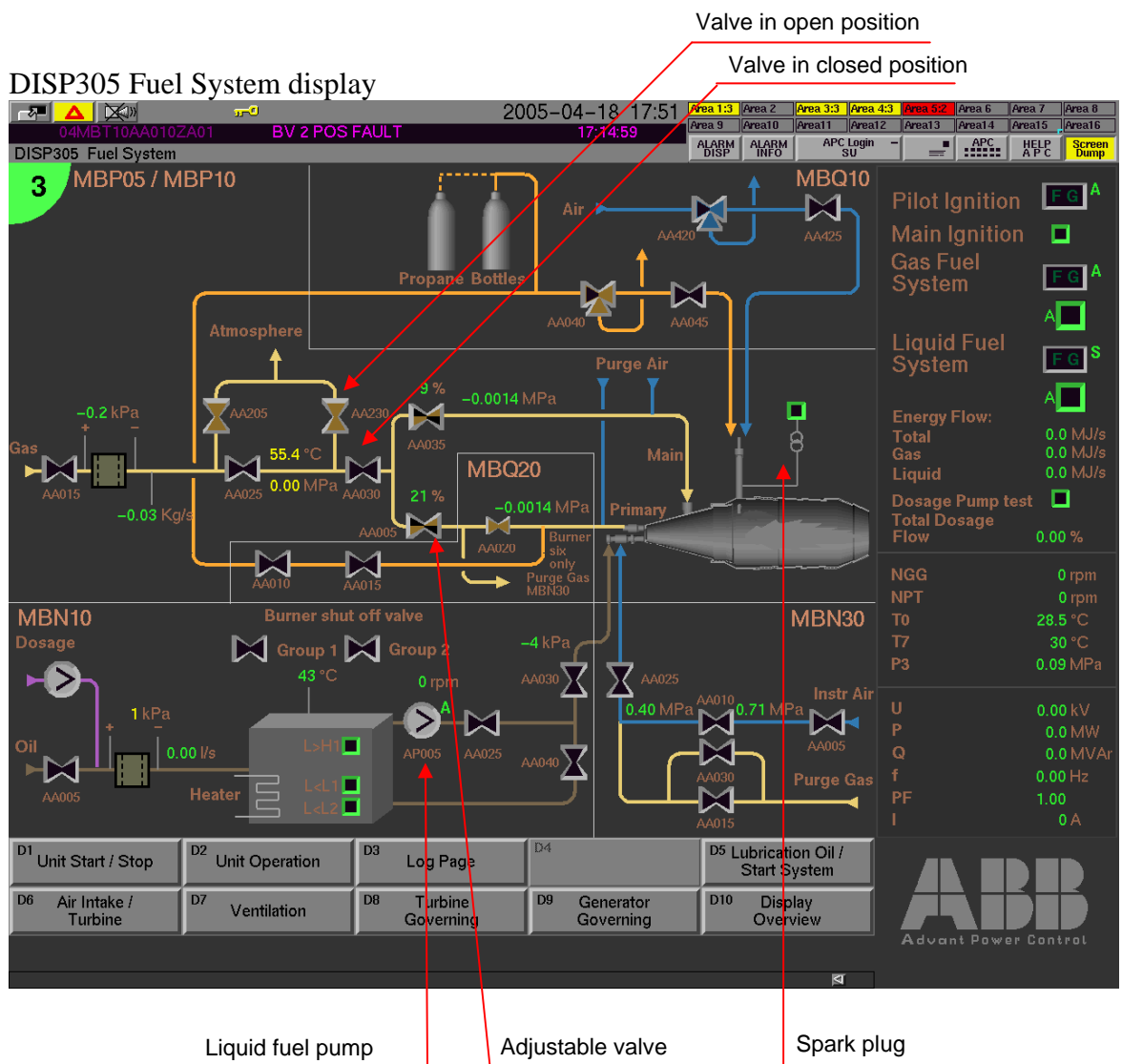
	1	2	3
Compressor Inlet Temperature	30 °C	30 °C	29 °C
Compressor Inlet Pressure	94 kPa		
Compressor Inlet Flow	0 kPa		
Turbine Inlet Massflow	0.0 kg/s		
Compressor Discharge Temperature	30 °C	29 °C	29 °C
Compressor Delivery Pressure	0.09 MPa	0.09 MPa	0.09 MPa

Historical Data	
Operating Time:	
Total	111 h
Start No	59
Equivalent hours	414
Total:	
MWh	503 MWh
MVAR pos	124 MVARh
MVAR neg	1 MVARh

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7 DISP305 Fuel System

The display 305 includes three systems: the ignition gas system (MBQ), the liquid fuel system (MBN) and the gas fuel system (MBP). For more information about the systems, see the Process & Instrumentation Diagrams, System Descriptions and the Component Lists.



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7.1 DISP305 abbreviations

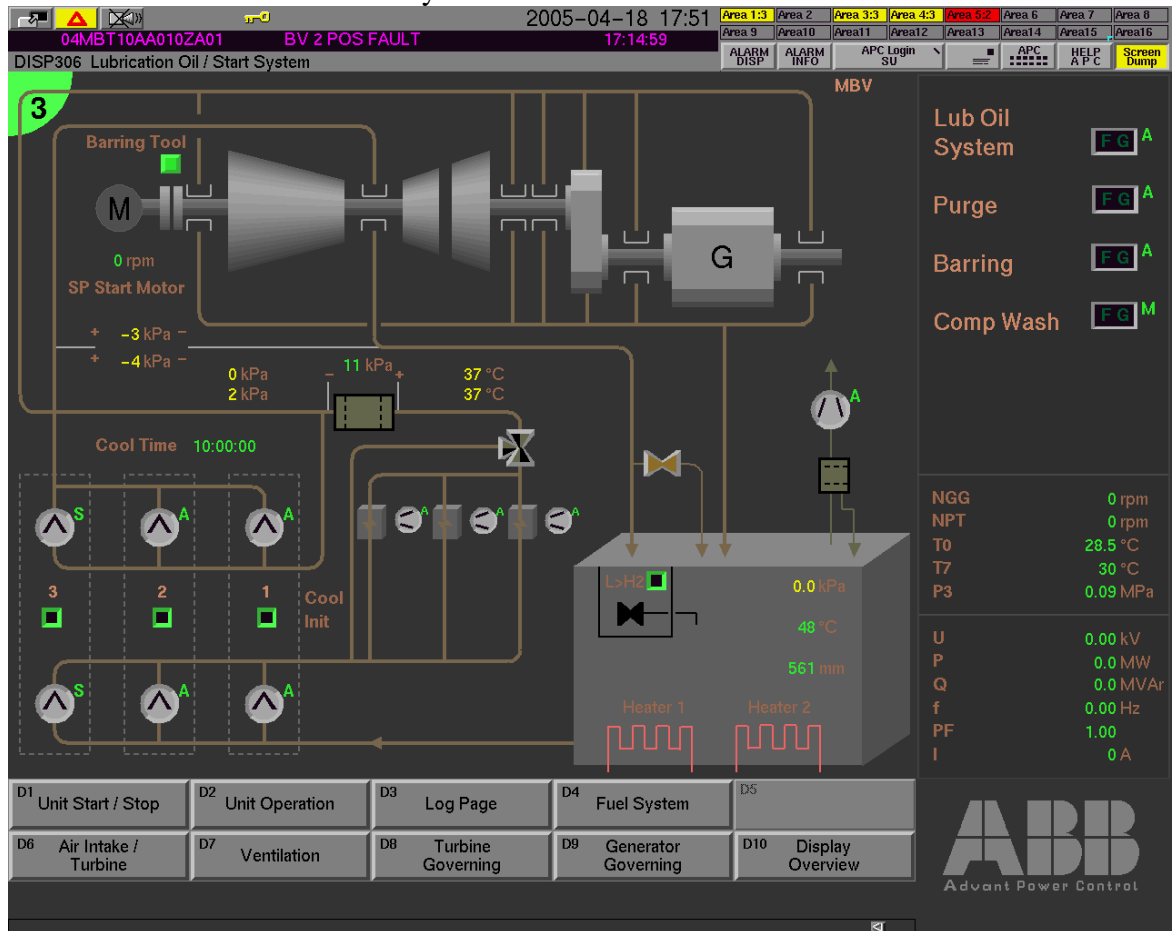
<u>FUEL SYSTEM</u>	
Note! The abbreviations apply for dual fuel. In the case of single fuel, only the actual fuel is presented in the display.	
GAS	Corrected energy flow, gas fuel
LIQUID	Corrected energy flow, liquid fuel.
TOTAL	Total energy flow (sum of the above)

8 DISP306 Lubrication Oil / Start System

8.1 General

The display 306 includes two systems: the lube oil system and the start system. The figure below shows the lube oil tank, the lube oil pumps, filters, pipes and bearings. For more information about the systems, see the Process & Instrumentation Diagrams, System Descriptions and the Component Lists.

DISP306 Lubrication Oil/Start system



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8.2 Disp306 Abbreviations

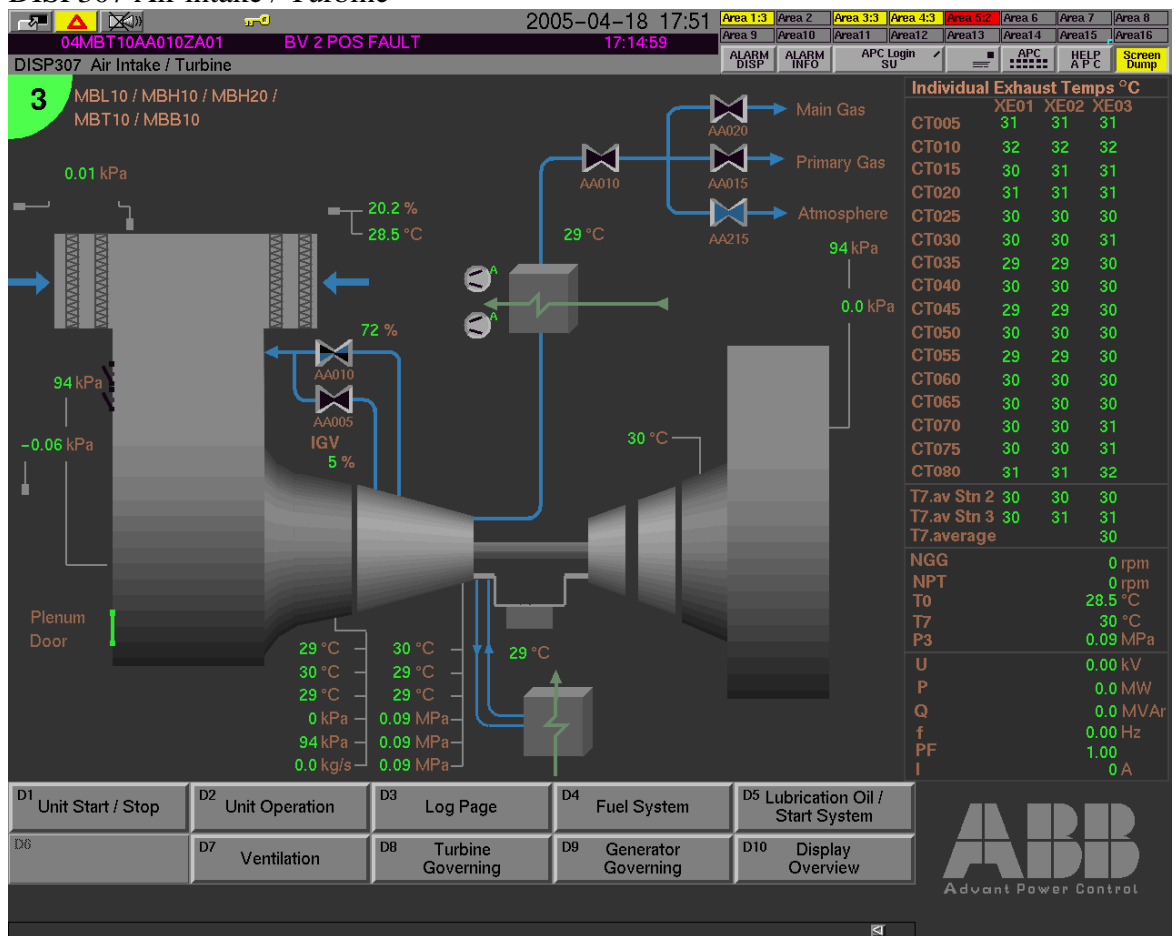
<u>LUBRICATION OIL / START SYSTEM</u>	
COMP WASH	Compressor washing, see <i>Compressor Washing Instruction</i> (file 3A-3).

9 DISP307 Air intake / Turbine

9.1 General

This display includes the Air Intake, Cooling and Sealing Air and Gas generator/Power turbine system.

DISP307 Air intake / Turbine



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9.2 DISP307 abbreviations

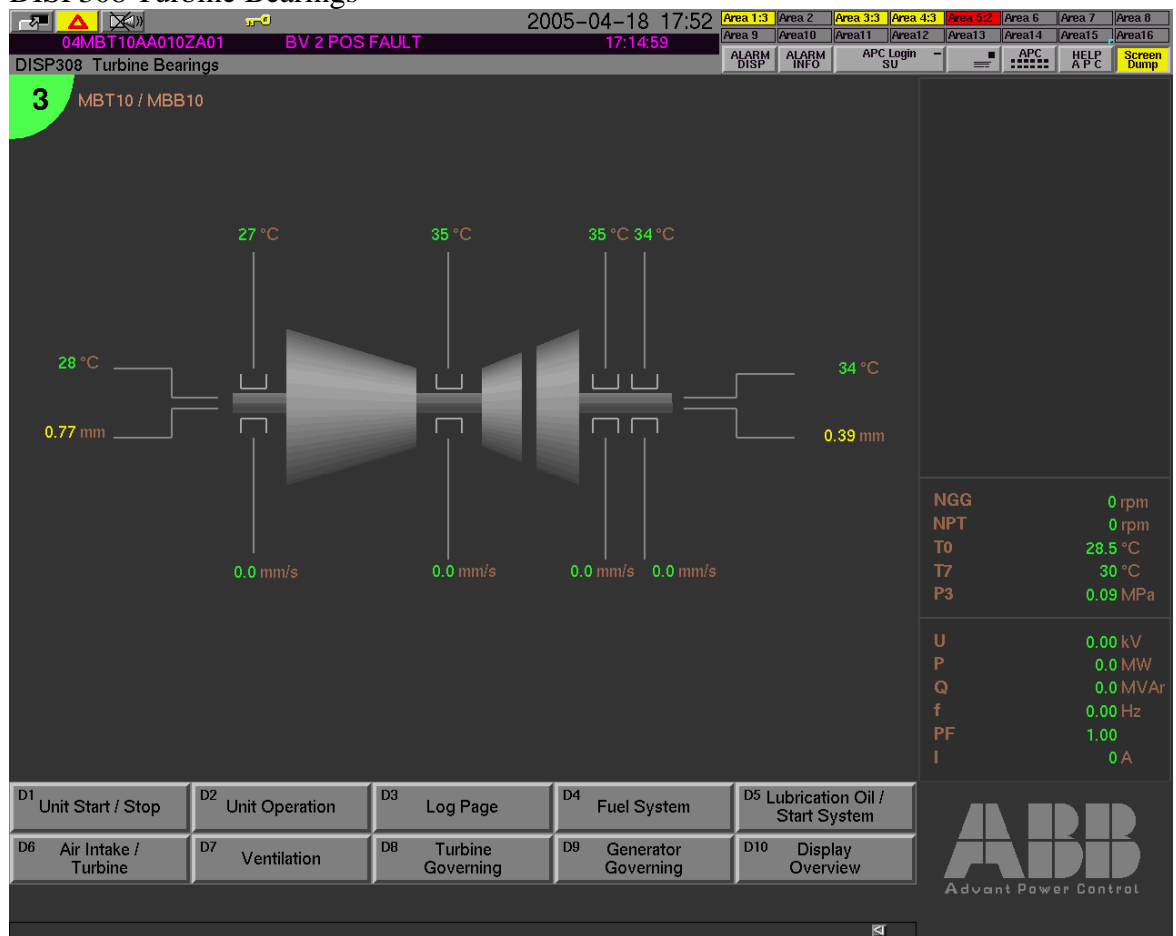
<u>MIMIC DISPLAY</u>	
IGV	Inlet guide vane
BV1	Bleed valve #1
BV2	Bleed valve #2
T7.av Stn 2	Average from security station 02 where 8 of the total 16 measuring points are connected.
T7.av Stn 3	Average from security station 03 where 8 of the total 16 measuring points are connected.

10 DISP308 Turbine Bearings

10.1 General

This display contains temperature/vibration information about the axial bearings as well as the radial bearings.

DISP308 Turbine Bearings



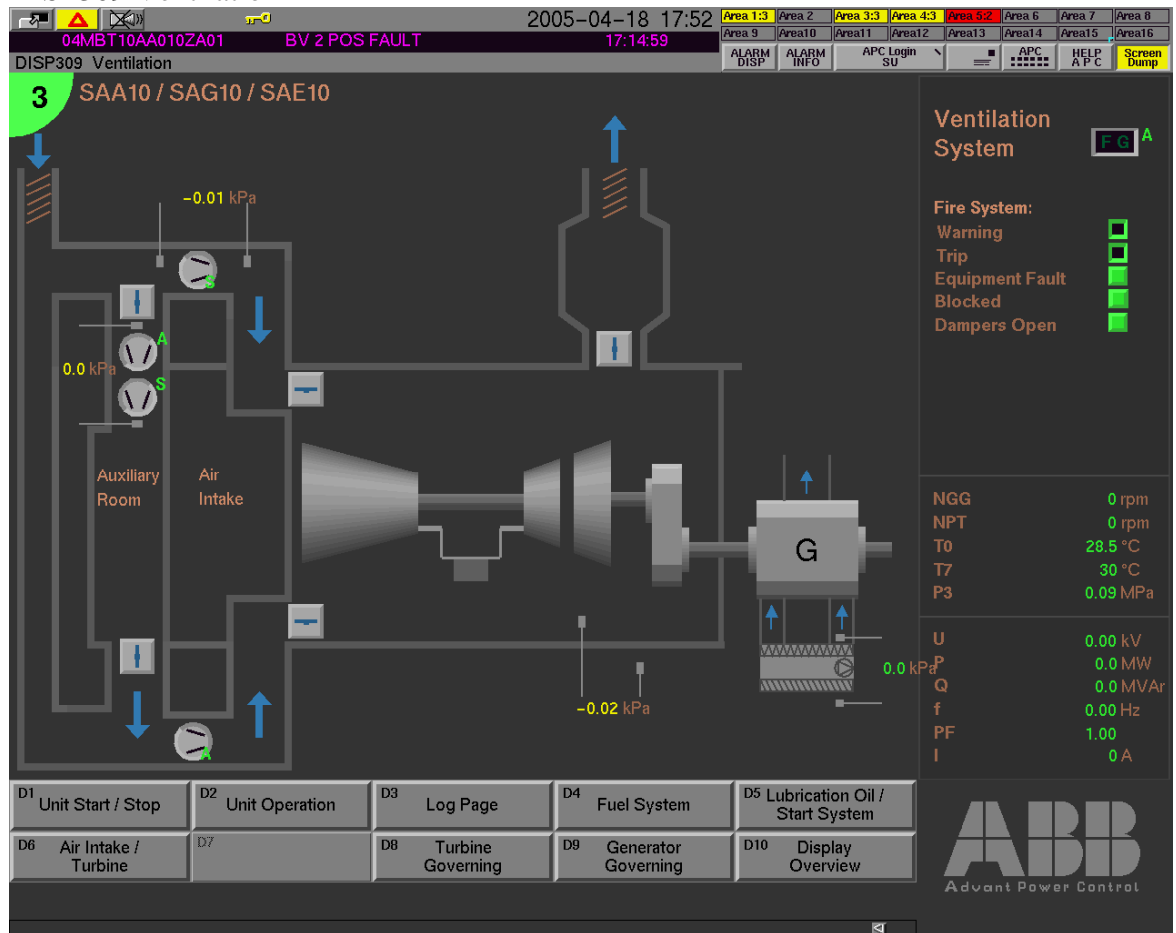
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11 DISP309 Ventilation

11.1 General

This display shows the position of fire shutter and operation modes of the fans for the ventilation system.

DISP309 Ventilation



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11.2 DISP309 abbreviations

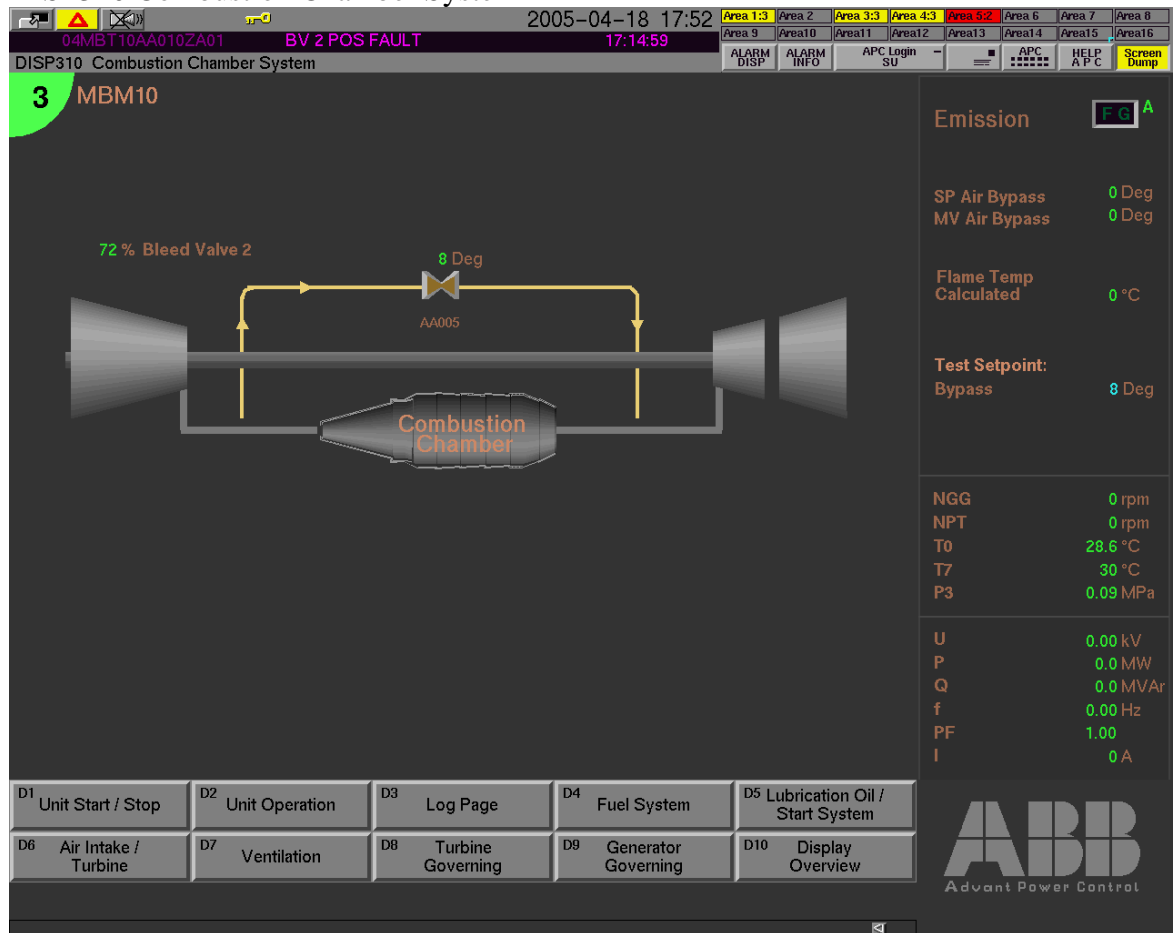
<u>VENTILATION</u>	
The abbreviations apply for single fan system.	
WARNING	Fire warning
TRIP	Fire trip
EQUIPMENT FAULT	Malfunction of the fire detection equipment.
DAMPERS OP	Fire shut off dampers open.

12 Disp310 Combustion Chamber system

12.1 General

The display shows the position of the six by-pass valves of the combustion chamber system.

DISP310 Combustion Chamber System



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12.2 DISP310 abbreviations

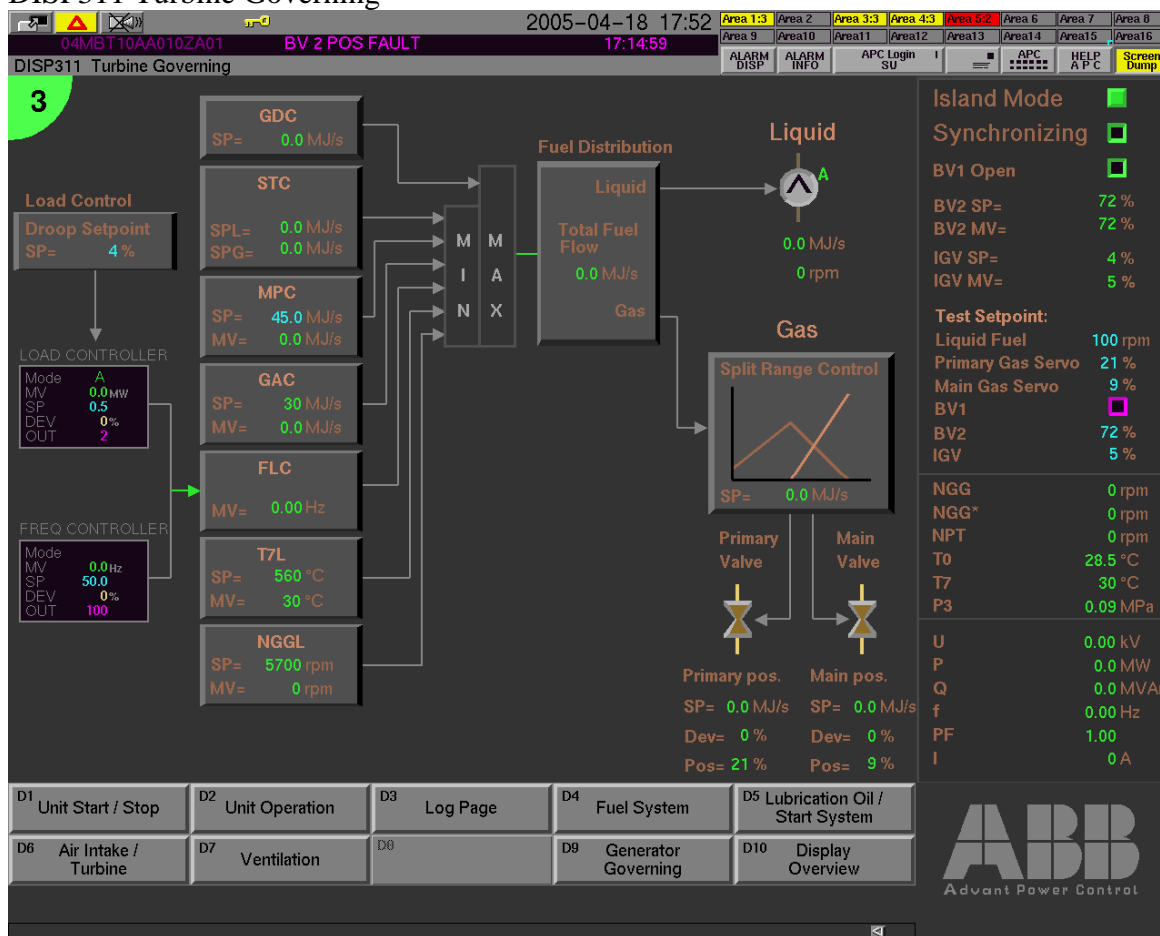
<u>GT COMBUST CHAMBER SYSTEM</u>	
SP AIR BYPASS	Current set point of air bypass, calculated from the control system
M AIR BYPASS	Measured value of air bypass
CALC FLAME TEMP	Calculated flame temperature
TEST SETPOINT BYPASS	Test setpoint to operate the air bypass system

13 DISP311 Turbine Governing

13.1 General

This display shows the turbine controller in operation.

DISP311 Turbine Governing



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13.2 DISP311 Abbreviations

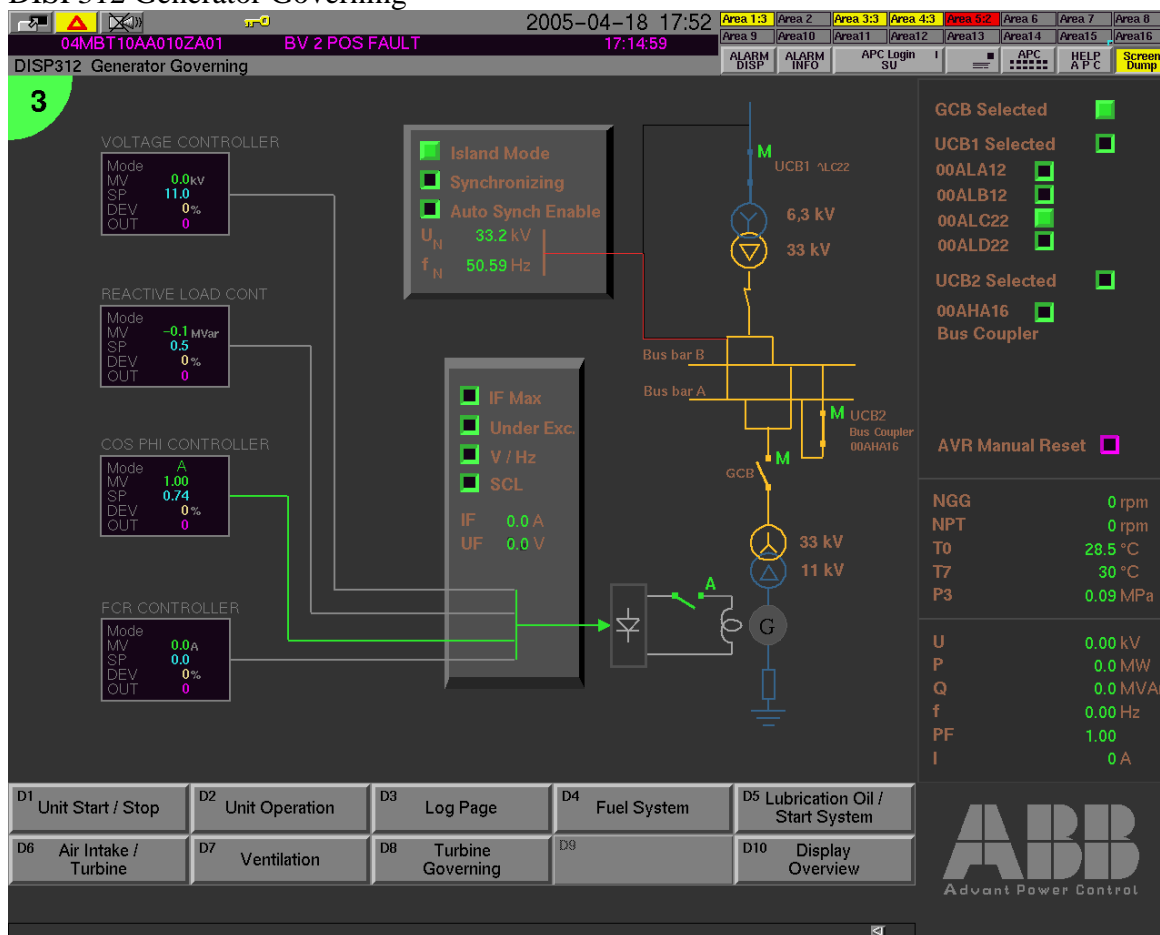
<u>TURBINE GOVERNING</u>	
SP	Set point
SPL	Set point liquid
SPG	Set point gas
MV	Measured value
OUT	Process output signal
STC	Start controller, liquid fuel, gas fuel
GDC	Gas generator deceleration controller
GAC	Gas generator acceleration controller (limiter)
FLC	Frequency load controller
MPC	Max position controller. Fuel control tests, gas and liquid fuel.
T7L	Exhaust temperature controller (limiter)
NGGL	Gas generator speed limiter
ISLAND MODE	Gas turbine is in Island mode
DEV	Deviation from SP and pos of primary and main valve

14 DISP312 Generator Governing

14.1 General

The display 312 shows the generator governor in operation.

DISP312 Generator Governing



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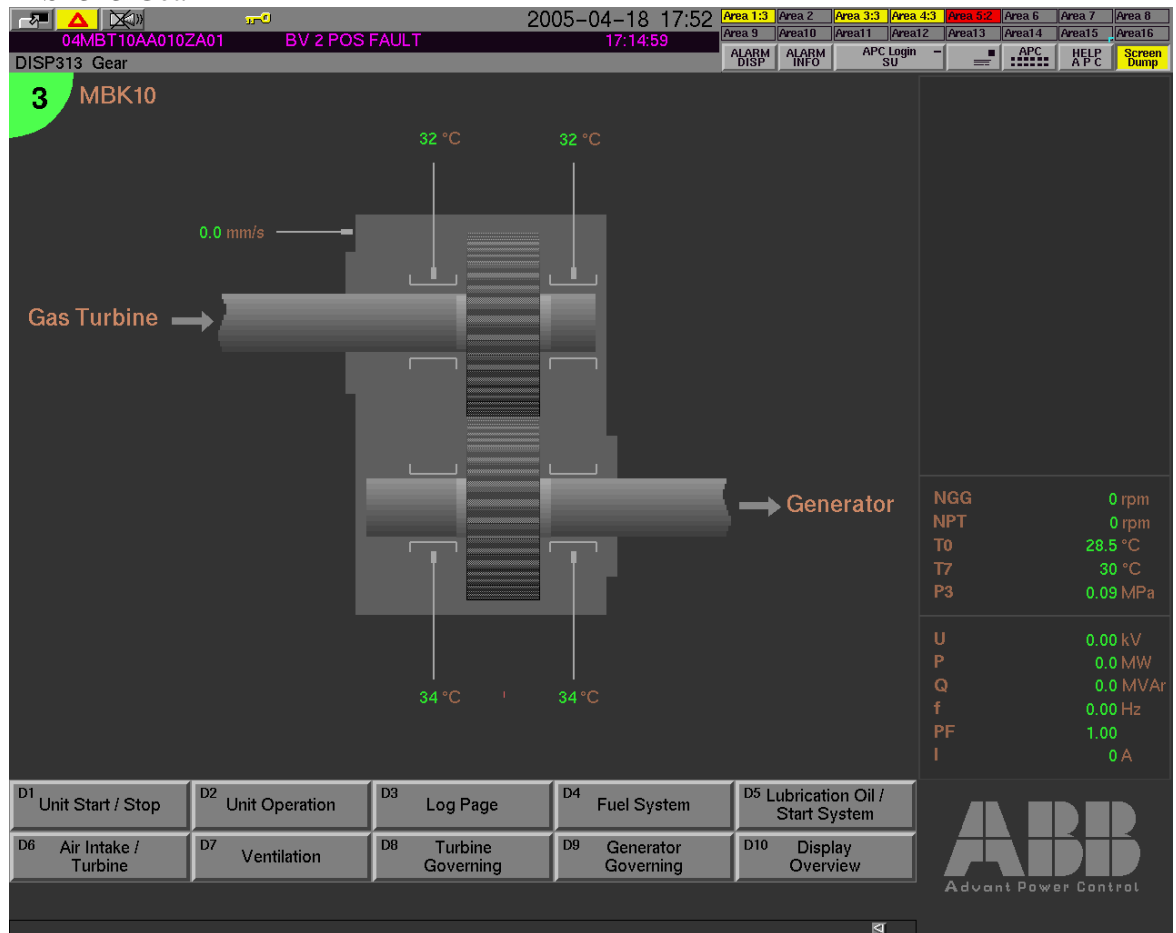
14.2 DISP312 abbreviations

<u>AC-GENERATOR GOVERNING</u>	
IF MAX	Max field current (limiter)
UNDER EXC.	Under excitation (limiter)
V/Hz	Volt per Hertz limiter
SCL	Stator current limiter
IF	Field current
UF	Field voltage
UCB1	Unit circuit breaker 1 (external)
UCB2	Unit circuit breaker 2 (external)

15 DISP313 Gear Box

The display 313 has no abbreviations.

DISP313 Gear

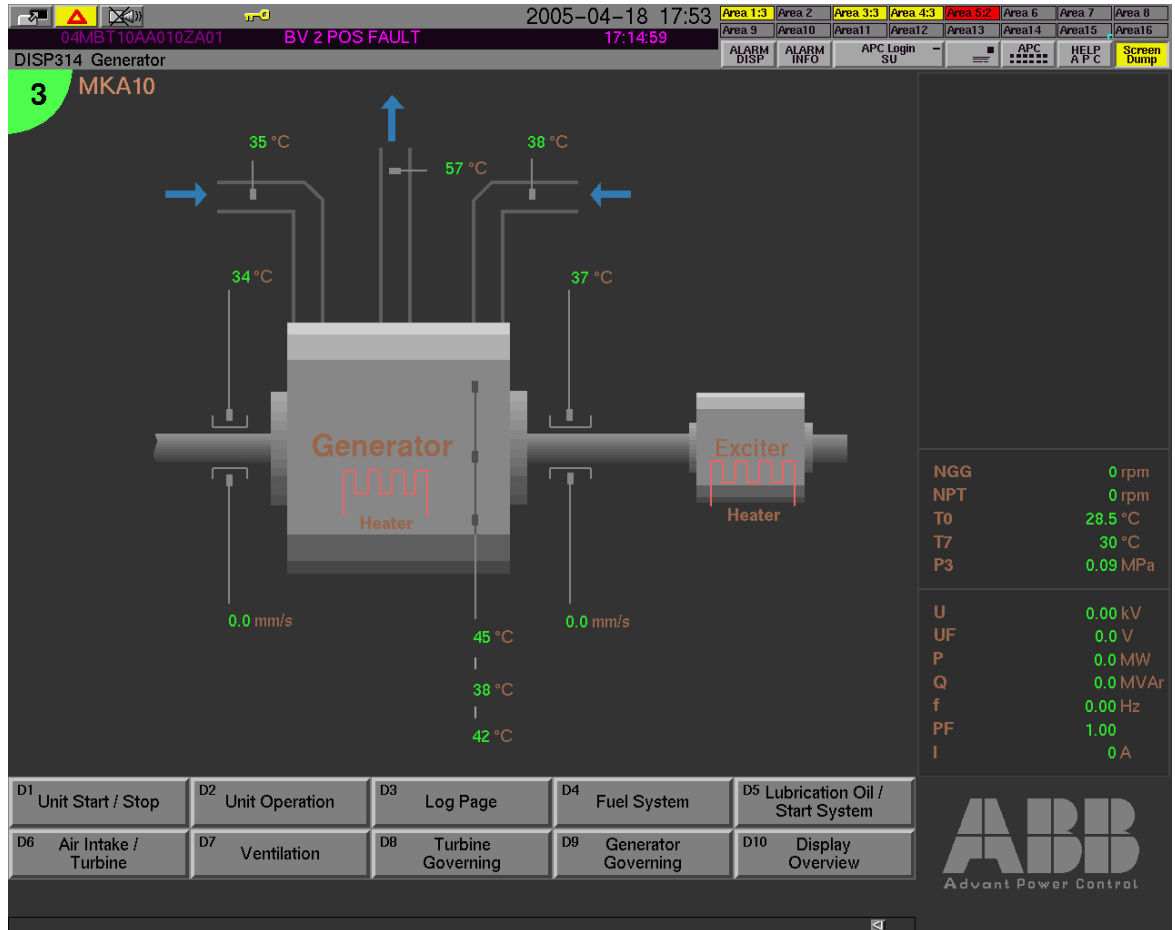


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16 DISP314 Generator

The display 314 has no abbreviations.

DISP314 AIR Generator



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17 Object displays

The following status signals are used in the object displays:

<u>STATUS</u>	
Implemented	The signal is implemented (used) in the process database
Updated	Value is updated (during the last program execution)
Manual entered	The value is manually entered (process update is blocked)
Normal treat	Event handling is selected for the signal
Unacknowledged	The alarm status is not acknowledged
Normal position	Not alarm status used for alarm evaluation
Inverted	Digital signal value is inverted in the database
Fault	Alarm status
Repeat fail blk	New alarm and update is possible only after acknowledge of previous
PC alarm blk	The alarm is blocked by the PC-program
Signal fault	Sensor-, transmitter- or system fault
Tested	Used for manual indication after test

<u>BLOCKING</u>	
Db update	The database update is blocked (manually or by PC-program)
Alarm	Alarm handling is blocked
Printout	Print-out at the event printer is blocked (manually)

<u>DYNAMIC VALUES</u>	
MV	Measured value. The actual analogue or digital value
SP	Set point. The working set point of a controller
OUT	Output signal from the controller
AUTO SP	Auto set point. The set point entered by the operator

<u>CONTROL MODES</u>	
Bal	Balanced. The controller is not selected to be in operation. The controller is in tracking mode
Man	The controller is in manual control mode
Auto	The controller is in auto mode. This implies that the controller is selected to be in operation and is not in tracking mode
E1	The controller is selected to be in operation but the set point is controlled from central control room.

<u>ALARM LIMITS</u>	
H1/H2	High alarm limits/High shutdown limits
L1/L2	Low alarm limits/Low shutdown limits

<u>LIMITS</u>	
Set point H/L	High/low limit for the auto set point
Out H/L	High/low limit for the output signal

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