







Diesel Remote Control Training (Basic)



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 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 1 of 8	

Annex 1:
List of Components for SULZER RTA
DENIS-1 type Control Air Diagram

 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 2 of 8	

Details of components for pneumatic control system of SULZER RTA, DENIS-1:

Refer the attached control air diagram.

112HC: Check valve

Check valve for supply of safety air to valve group E from safety air reservoir

112HD: Check valve

Check valve for supply of control air to valve group E from control air reservoir

112HF: Check valve

Check valve for supply of safety air from control air reservoir

112HE: Check valve

Check valve for supply of safety air from back up or standby air

287HA: Air reservoir (15lts)

Reduces time lag in the control air system

270HA: Safety valve

Relieves excess pressure from the control air reservoir

287HB: Air reservoir (15lts)

Reduces time lag in the safety air system

270HB: Safety valve

Relieves excess pressure from the safety air reservoir

168HI: Pressure switch

Activates alarm in case of low pressure in the safety air system

31HC: 3/2 way valve (Engine side local control valve)

When FUEL LEVER[3.12] is in EMERGENCY CONTROL position(0 ~ 10) : 31HC is deactivated to supply local control signal air to 53HC, 49HG and 29D to activate in LOCAL CONTROL.

When FUEL LEVER[3.12] is in REMOTE CONTROL position : 31HC is activated to cut off local control signal air.

129HA: 3/2 way solenoid valve (Start air cut-off solenoid valve)

When engine RPM is detected to be above 15 by Air Cut Level[T21], 129HA is activated electrically to cut off starting air supplied to Starting Air Distributor[2.01].

212HA: 3/2 way valve (Start cut off valve)

Supplies starting air to Starting Air Distributor[2.01] when activated and cuts off starting air on deactivation.

38HA: 3/2 way valve (Blocking valve on turning gear)

Cuts off starting air supply to air starting system when Turning Gear is in engaged position, and admits starting air if it is in disengaged position.

38HB: 3/2 way valve (Air drain valve on turning gear)

Vent off air remained in air starting line when Turning Gear is in engaged position.

A: Control air supply unit



112HA: Check valve

Check valve for supply of control air from main source

112HB: Check valve

Check valve for supply of control air from stand-by or back up source i.e. starting air

112HH: Check valve

 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 3 of 8	

Check valve for supply of control air to valve 38A from main source

112HG: Check valve

Check valve for supply of control air to valve 38A from stand-by or back up source i.e. starting air

342HA: Check valve

Check valve for supply of air spring from main source

342HB: Check valve

Check valve for supply of air spring from stand-by or back up source i.e. starting air

306HB: Pressure switch

Activates alarm in case of low pressure in the main source of control air

306HC: Pressure switch

Activates alarm in case of low pressure in the stand-by or back up source of spring air

117HA: Air Filter

Traps impurities in the stand-by or back up source of control air supply

19HA: Reducing valve

Reduces pressure of starting air, supplied directly from starting air reservoirs, to be used as back up source for spring air

19HB: Reducing valve

Reduces pressure of starting air, supplied directly from starting air reservoirs, to be used as back up source for control air

23HA: Reducing valve

Reduces pressure of control air, supplied directly from main source, to be used as main source for spring air

36HA: 3/2 way valve (Air spring venting valve)

Supplies or vents the spring air to spring air manifold

B: Valve group for the starting system

53HA: 3/2 way valve (Gov. booster air cut off valve)

Supplies boost air to Starting Booster for Governor 2.14, when it is not activated by the pilot oil signal from Stop valve 126HC via Double check valve 115HA.

216HA: Pressure indicator

Indicates whether valve 53HA is supplied with pilot oil signal from Stop valve 126HC or not.

53HB: 3/2 way valve (Rotation direction shut-off valve)

Supplies control signal air to Gov. Fuel "0" order Device[1.03] to stop engine and 53HA to cut off boost air to STARTING BOOSTER for governor[2.14] via double check valve[115HA], [115HC] and 49HH, when it is not activated by the pilot oil signal from rotation direction safeguard 6.01.



216HB: Pressure indicator

Indicates whether valve 53HB is supplied with pilot oil signal from rotation direction safeguard or not.

53HC: 3/2 way valve (Air cylinder supply air cut-off valve)

Vents the air cylinder 3.10, when the fuel lever 3.12 is in emergency control position. This allows control of fuel quantity by the fuel lever 3.12.

216HC: Pressure indicator

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		Revision Date 01/10/12	Prepared by TM	Page: 4 of 8	

Indicates whether valve 53HC is supplied with pilot air signal from valve 31HC or not.

9B: Double check valve

Allows either control or safety air to valve 53HC

D: Valve group for reversing blocking

53HL, HK....: 3/2 way valve (Shut-off valve for wrong direction)

Supplies pilot air signal to valve 53HA via 115HC, 49HH, 115HA to cut-off boost air to Starting Booster for Governor 2.14, when it is not activated by the pilot oil signal from reversing servomotor 5.01.

216HL, HK....: Pressure indicator

Indicates whether valve 53HI, HK....etc. are supplied with pilot oil signal from reversing servomotor 5.01.

113HA, HB....: Double check valve

Ensure pilot air signal to safety device on fuel pump, even if one servomotor has not reached to end position.

E: Valve group at ancillary drive gearbox

130HA: 3/2 way solenoid valve (Start AHD solenoid valve)

When energized, supplies pilot air signal to valve 49HA.

130HB: 3/2 way solenoid valve (Start AST solenoid valve)

When energized, supplies pilot air signal to valve 49HB.

130HC: 3/2 way solenoid valve (Start solenoid valve)

When energized, supplies pilot air signal to valve 49HC.

130HD: 3 way solenoid valve (AHD solenoid valve)

When energized, supplies pilot air signal to valve 49HD.

130HE: 3 way solenoid valve (AST solenoid valve)

When energized, supplies pilot air signal to valve 49HE.

49HA: 3 way valve (Start AHD valve)

Supplies control air to shift the Starting air distributor to AHD position and then pilot air signal to valve 2.17 and 2.18, when activated.

49HB: 3 way valve (Start AST valve)

Supplies control air to shift the Starting air distributor to AST position and then pilot air signal to valve 2.17 and 2.18, when activated.

49HC: 3 way valve (Start valve)

Supplies control air to valve 53HA and pilot air signal to valve 2.05, when activated.

Supplies pilot air signal to valve 23A and 2.05.

49HD: 3 way valve (AHD valve)

Supplies control air to shift the Reversing valve 5.02 to AHD position, when activated.



49HE: 3 way valve (AST valve)

Supplies control air to shift the Reversing valve 5.02 to AST position, when activated.

35HB: 3/2 way valve (Control air shut off valve)

When Local Maneuvering Lever[5.03] is in RC position, this valve supplies control signal air to 25A and 29B.

49HF: 3/2 way valve (Stop valve)

 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 5 of 8	

Supplies stop signal air to 126HC, when Stop Lever[5.07] is in STOP position and vents out pilot signal air from 29D, when Stop lever 5.07 is in RUN position.

126HB: 3/2 way solenoid valve (Emergency stop solenoid valve)

Cuts off fuel by activating the safety device on the fuel pump, when energized.

G: Valve group in pneumatic logic unit

25A: 3/2 way solenoid valve (Remote Control Take Over Valve)

Supplies pilot air signal to valve 29B during change of REMOTE CONTROL or BACK UP CONTROL mode and remains activated until 141HA is changed to on state by flow of control signal air.

29B: 3/2 way valve (Control air shut off valve)

Supplies pilot air signal to 29C and 49HH to actuate, when activated and remains activated by pressure of pilot air signal returned via 25A (when 25A is deactivated).

29D: 3/2 way valve (Speed set signal air shut-off valve)

Cuts off control signal air supplied to 35HB by local control signal air in LOCAL CONTROL, when activated.

49HH: 3/2 way valve (Stop signal air shut-off valve)

When 49HH is activated : Vent out air remained in pipe and cuts off control signal air from 53HB or 53HI, 53HK.

When 49HH is deactivated : Control signal air from 53HB or 53HI, 53HK is supplied to Gov. Fuel "0" order Device[1.03] to stop engine and 53HA to cut off boost air for STARTING BOOSTER[2.14], when any abnormality with Rotation direction safeguard or Reversing servomotor.

49HG: 3/2 way valve (Safety shut down cut off valve)

Supplies safety air to SAFETY CUT OUT DEVICE[6.04] to cut off fuel oil via double check valve[115HB], when activated during Local control operation.

115HB: Double check valve

Ensures an output pilot signal to safety device on fuel pump to cut-off fuel, when receives input signal from either valve 49HG or valve 126HB.

126HC: 3/2 way solenoid valve (Stop solenoid valve)

Supplies pilot signal air to Gov. Fuel "0" order Device[1.03] to stop engine and 53HA to cut off booster air for STARTING BOOSTER for governor[2.14], when energized.

141HA: Pressure switch

141HA changes engine control mode



When 141HA changes to ON : Control mode of engine changes to REMOTE CONTROL or BACK UP CONTROL

When 141HA changes to OFF : Control mode of engine changes to LOCAL CONTROL

141HB (PS5011C): Pressure switch

When oil from Reversing Servomotor[5.01] is cut off to deactivate 53HI or 53HK by trouble motion of Cam for Reversing Servomotor[5.01], control signal air through 53HI or 53HK is supplied to 141HB to change to ON.

REMOTE CONTROL or BACK UP CONTROL : When the state of 141HB is changed to ON, it causes Stop Valve126HC to be activated electrically and the reverse state of 141HB causes 126HC to be deactivated electrically.

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		Revision Date 01/10/12	Prepared by TM	Page: 6 of 8	

LOCAL CONTROL : Control air through 53HI or 53HK is supplied to Gov. Fuel "0" order Device[1.03] and 53HA via double check valve [115HA], [115HC] and 49HH.

141HC: Pressure switch

Indicates On or OFF state of Stop signal

141HE: Pressure switch

When desired direction of rotation is different from the actual engine one, oil from Rotation Direction Safeguard[6.01] is cut off to deactivate 53HB and control signal air through 53HB is supplied to 141HE to change to ON.

REMOTE CONTROL or BACK UP CONTROL : The state of 141HE is changed to ON to cause 126HC to be activated electrically and the reverse state of 141HE causes 126HC to be deactivated electrically.

LOCAL CONTROL : Control air through 53HB is supplied to Gov. Fuel "0" order Device[1.03] and 53HA via double check valve [115HA], [115HC] and 49HH.

7A: Check valve

Allows control air signal from valve 35HB to be supplied to valve 29C, 49HH and 29B via 25A

115HA: Double check valve

Allows either the control air signal from Stop valve 126HC or from 115HC to pass to Gov. Fuel "0" order Device[1.03] and 53HA to stop engine.

115HB: Double check valve

Allows either the control air signal from Emergency stop 126HB or from valve 49HG to pass to Safety device 6.04 on fuel pump to cut off fuel.

115HC: Double check valve

Allows either the control air signal from valve 53HI, HK, ... or from valve 53HB to pass to Gov. Fuel "0" order Device[1.03] and 53HA to stop engine.

9C: Double check valve

Allows either the control air signal from 31HC or 49HF to pass to 29D.

H: Pressure gauge board with pressure switches

M: Valve group for Local speed setting

29C: 3/2 way valve (Governor control air feed valve)

Supplies control signal air regulated by I/P Converter to Governor in REMOTE CONTROL and also supplies control signal air regulated by SPEED SET VALVE[15HA] to Governor in LOCAL CONTROL

231HA: Pressure gauge

Shows speed set air pressure from I/P converter in Remote control

231HB: Pressure gauge

Shows speed set air pressure from 15HA in Local control

11HA: Current pressure converter



Regulates the speed set air pressure in Remote control

15HA: Speed set valve

Regulates the speed set air pressure in Local control

9A: Double check valve

Allows either control air or Safety air to pass

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		Revision Date 01/10/12	Prepared by TM	Page: 7 of 8	

Speed setting system

1.02: Speed setting valve

1.03: Gov. Fuel "0" order Device (Air pressure shut Device)

Starting system

2.01: Starting air distributor

2.02: Cam for starting control valves

2.03: Shut off valve for starting air

2.04: Non-return valve

2.05: Control valve

2.06: Drain and test valve

2.07: Starting valve

2.08: Flame arrestor

2.09: Relief valve

2.13: Blocking valve on turning gear

2.14: Starting booster for Governor

2.17: Bypass valve for slow turning

2.18: Control valve

2.19: Adjustable throttle

2.20: Check valve

2.21: Venting valve

2.22: Reversing servomotor for starting system

134HA: 4/2 way valve

Controls opening or closing of starting air valves on the cylinder heads.

Fuel system

3.01: Fuel injection valve

3.02: Fuel injection pump

3.03: Fuel cam

3.04: Load indicator

3.05: Load dependent variable injection timing

3.07: Eccentric shaft for suction valve

3.08: Eccentric shaft for spill valve

3.09: Intermediate regulating shaft

3.10: Air cylinder for Governor / fuel linkage connection



3.11: Fuel linkage maximum limiting screw

3.12: Fuel lever

3.13: Relief valve

38A~F: 3/2 way solenoid valve

When energized due to any abnormality, supply pilot air signal to safety device on fuel pump to cut-off fuel to the engine.

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		Revision Date 01/10/12	Prepared by TM	Page: 8 of 8	

Exhaust valve drive

- 4.01: Exhaust valve
- 4.02: Hydraulic actuator pump
- 4.03: Actuator pump cam
- 4.04: Exhaust valve actuator
- 4.05: Air spring
- 4.06: Throttle
- 4.07: Relief valve
- 4.08: Air spring venting valve
- 270HD: Relief valve (F-2F)

Reversing system

- 5.01: Reversing servomotor
- 5.02: Reversing valve
- 5.03: Local maneuvering lever
- 5.07: Stop lever

Safety devices



- 6.01: Rotation direction safeguard
- 6.02: Sliding coupling
- 6.04: Safety cut out device

Monitoring



- 7.01: Tachometer with Revolution counter

Engine room

- 9.01: Starting air bottles

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		Revision Date 01/10/12	Prepared by TM	Page: 1 of 8	

Annex 1:
List of Components for SULZER RTA
DENIS-1 type Control Air Diagram

 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 2 of 8	

Details of components for pneumatic control system of SULZER RTA, DENIS-1:

Refer the attached control air diagram.

112HC: Check valve

Check valve for supply of safety air to valve group E from safety air reservoir

112HD: Check valve

Check valve for supply of control air to valve group E from control air reservoir

112HF: Check valve

Check valve for supply of safety air from control air reservoir

112HE: Check valve

Check valve for supply of safety air from back up or standby air

287HA: Air reservoir (15lts)

Reduces time lag in the control air system

270HA: Safety valve

Relieves excess pressure from the control air reservoir

287HB: Air reservoir (15lts)

Reduces time lag in the safety air system

270HB: Safety valve

Relieves excess pressure from the safety air reservoir

168HI: Pressure switch

Activates alarm in case of low pressure in the safety air system

31HC: 3/2 way valve (Engine side local control valve)

When FUEL LEVER[3.12] is in EMERGENCY CONTROL position(0 ~ 10) : 31HC is deactivated to supply local control signal air to 53HC, 49HG and 29D to activate in LOCAL CONTROL.

When FUEL LEVER[3.12] is in REMOTE CONTROL position : 31HC is activated to cut off local control signal air.

129HA: 3/2 way solenoid valve (Start air cut-off solenoid valve)

When engine RPM is detected to be above 15 by Air Cut Level[T21], 129HA is activated electrically to cut off starting air supplied to Starting Air Distributor[2.01].

212HA: 3/2 way valve (Start cut off valve)

Supplies starting air to Starting Air Distributor[2.01] when activated and cuts off starting air on deactivation.

38HA: 3/2 way valve (Blocking valve on turning gear)

Cuts off starting air supply to air starting system when Turning Gear is in engaged position, and admits starting air if it is in disengaged position.

38HB: 3/2 way valve (Air drain valve on turning gear)

Vent off air remained in air starting line when Turning Gear is in engaged position.

A: Control air supply unit



112HA: Check valve

Check valve for supply of control air from main source

112HB: Check valve

Check valve for supply of control air from stand-by or back up source i.e. starting air

112HH: Check valve

 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 3 of 8	

Check valve for supply of control air to valve 38A from main source

112HG: Check valve

Check valve for supply of control air to valve 38A from stand-by or back up source i.e. starting air

342HA: Check valve

Check valve for supply of air spring from main source

342HB: Check valve

Check valve for supply of air spring from stand-by or back up source i.e. starting air

306HB: Pressure switch

Activates alarm in case of low pressure in the main source of control air

306HC: Pressure switch

Activates alarm in case of low pressure in the stand-by or back up source of spring air

117HA: Air Filter

Traps impurities in the stand-by or back up source of control air supply

19HA: Reducing valve

Reduces pressure of starting air, supplied directly from starting air reservoirs, to be used as back up source for spring air

19HB: Reducing valve

Reduces pressure of starting air, supplied directly from starting air reservoirs, to be used as back up source for control air

23HA: Reducing valve

Reduces pressure of control air, supplied directly from main source, to be used as main source for spring air

36HA: 3/2 way valve (Air spring venting valve)

Supplies or vents the spring air to spring air manifold

B: Valve group for the starting system

53HA: 3/2 way valve (Gov. booster air cut off valve)

Supplies boost air to Starting Booster for Governor 2.14, when it is not activated by the pilot oil signal from Stop valve 126HC via Double check valve 115HA.

216HA: Pressure indicator

Indicates whether valve 53HA is supplied with pilot oil signal from Stop valve 126HC or not.

53HB: 3/2 way valve (Rotation direction shut-off valve)

Supplies control signal air to Gov. Fuel "0" order Device[1.03] to stop engine and 53HA to cut off boost air to STARTING BOOSTER for governor[2.14] via double check valve[115HA], [115HC] and 49HH, when it is not activated by the pilot oil signal from rotation direction safeguard 6.01.



216HB: Pressure indicator

Indicates whether valve 53HB is supplied with pilot oil signal from rotation direction safeguard or not.

53HC: 3/2 way valve (Air cylinder supply air cut-off valve)

Vents the air cylinder 3.10, when the fuel lever 3.12 is in emergency control position. This allows control of fuel quantity by the fuel lever 3.12.

216HC: Pressure indicator

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		Revision Date 01/10/12	Prepared by TM	Page: 4 of 8	

Indicates whether valve 53HC is supplied with pilot air signal from valve 31HC or not.

9B: Double check valve

Allows either control or safety air to valve 53HC

D: Valve group for reversing blocking

53HL, HK....: 3/2 way valve (Shut-off valve for wrong direction)

Supplies pilot air signal to valve 53HA via 115HC, 49HH, 115HA to cut-off boost air to Starting Booster for Governor 2.14, when it is not activated by the pilot oil signal from reversing servomotor 5.01.

216HL, HK....: Pressure indicator

Indicates whether valve 53HL, HK....etc. are supplied with pilot oil signal from reversing servomotor 5.01.

113HA, HB....: Double check valve

Ensure pilot air signal to safety device on fuel pump, even if one servomotor has not reached to end position.

E: Valve group at ancillary drive gearbox

130HA: 3/2 way solenoid valve (Start AHD solenoid valve)

When energized, supplies pilot air signal to valve 49HA.

130HB: 3/2 way solenoid valve (Start AST solenoid valve)

When energized, supplies pilot air signal to valve 49HB.

130HC: 3/2 way solenoid valve (Start solenoid valve)

When energized, supplies pilot air signal to valve 49HC.

130HD: 3 way solenoid valve (AHD solenoid valve)

When energized, supplies pilot air signal to valve 49HD.

130HE: 3 way solenoid valve (AST solenoid valve)

When energized, supplies pilot air signal to valve 49HE.

49HA: 3 way valve (Start AHD valve)

Supplies control air to shift the Starting air distributor to AHD position and then pilot air signal to valve 2.17 and 2.18, when activated.

49HB: 3 way valve (Start AST valve)

Supplies control air to shift the Starting air distributor to AST position and then pilot air signal to valve 2.17 and 2.18, when activated.

49HC: 3 way valve (Start valve)

Supplies control air to valve 53HA and pilot air signal to valve 2.05, when activated.

Supplies pilot air signal to valve 23A and 2.05.

49HD: 3 way valve (AHD valve)

Supplies control air to shift the Reversing valve 5.02 to AHD position, when activated.



49HE: 3 way valve (AST valve)

Supplies control air to shift the Reversing valve 5.02 to AST position, when activated.

35HB: 3/2 way valve (Control air shut off valve)

When Local Maneuvering Lever[5.03] is in RC position, this valve supplies control signal air to 25A and 29B.

49HF: 3/2 way valve (Stop valve)

 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 5 of 8	

Supplies stop signal air to 126HC, when Stop Lever[5.07] is in STOP position and vents out pilot signal air from 29D, when Stop lever 5.07 is in RUN position.

126HB: 3/2 way solenoid valve (Emergency stop solenoid valve)

Cuts off fuel by activating the safety device on the fuel pump, when energized.

G: Valve group in pneumatic logic unit

25A: 3/2 way solenoid valve (Remote Control Take Over Valve)

Supplies pilot air signal to valve 29B during change of REMOTE CONTROL or BACK UP CONTROL mode and remains activated until 141HA is changed to on state by flow of control signal air.

29B: 3/2 way valve (Control air shut off valve)

Supplies pilot air signal to 29C and 49HH to actuate, when activated and remains activated by pressure of pilot air signal returned via 25A (when 25A is deactivated).

29D: 3/2 way valve (Speed set signal air shut-off valve)

Cuts off control signal air supplied to 35HB by local control signal air in LOCAL CONTROL, when activated.

49HH: 3/2 way valve (Stop signal air shut-off valve)

When 49HH is activated : Vent out air remained in pipe and cuts off control signal air from 53HB or 53HI, 53HK.

When 49HH is deactivated : Control signal air from 53HB or 53HI, 53HK is supplied to Gov. Fuel "0" order Device[1.03] to stop engine and 53HA to cut off boost air for STARTING BOOSTER[2.14], when any abnormality with Rotation direction safeguard or Reversing servomotor.

49HG: 3/2 way valve (Safety shut down cut off valve)

Supplies safety air to SAFETY CUT OUT DEVICE[6.04] to cut off fuel oil via double check valve[115HB], when activated during Local control operation.

115HB: Double check valve

Ensures an output pilot signal to safety device on fuel pump to cut-off fuel, when receives input signal from either valve 49HG or valve 126HB.

126HC: 3/2 way solenoid valve (Stop solenoid valve)

Supplies pilot signal air to Gov. Fuel "0" order Device[1.03] to stop engine and 53HA to cut off booster air for STARTING BOOSTER for governor[2.14], when energized.

141HA: Pressure switch

141HA changes engine control mode



When 141HA changes to ON : Control mode of engine changes to REMOTE CONTROL or BACK UP CONTROL

When 141HA changes to OFF : Control mode of engine changes to LOCAL CONTROL

141HB (PS5011C): Pressure switch

When oil from Reversing Servomotor[5.01] is cut off to deactivate 53HI or 53HK by trouble motion of Cam for Reversing Servomotor[5.01], control signal air through 53HI or 53HK is supplied to 141HB to change to ON.

REMOTE CONTROL or BACK UP CONTROL : When the state of 141HB is changed to ON, it causes Stop Valve126HC to be activated electrically and the reverse state of 141HB causes 126HC to be deactivated electrically.

 NYK Maritime College	NYK SHIPMANAGEMENT PTE LTD Training Centre, No 25 Pandan Crescent #04-10 Tic Tech Centre, Singapore 128477	Original Date 01/07/07	Approved by DGM	Edition: 4 th	 NYK SHIPMANAGEMENT
		Revision Date 01/10/12	Prepared by TM	Page: 6 of 8	

LOCAL CONTROL : Control air through 53HI or 53HK is supplied to Gov. Fuel "0" order Device[1.03] and 53HA via double check valve [115HA], [115HC] and 49HH.

141HC: Pressure switch

Indicates On or OFF state of Stop signal

141HE: Pressure switch

When desired direction of rotation is different from the actual engine one, oil from Rotation Direction Safeguard[6.01] is cut off to deactivate 53HB and control signal air through 53HB is supplied to 141HE to change to ON.

REMOTE CONTROL or BACK UP CONTROL : The state of 141HE is changed to ON to cause 126HC to be activated electrically and the reverse state of 141HE causes 126HC to be deactivated electrically.

LOCAL CONTROL : Control air through 53HB is supplied to Gov. Fuel "0" order Device[1.03] and 53HA via double check valve [115HA], [115HC] and 49HH.

7A: Check valve

Allows control air signal from valve 35HB to be supplied to valve 29C, 49HH and 29B via 25A

115HA: Double check valve

Allows either the control air signal from Stop valve 126HC or from 115HC to pass to Gov. Fuel "0" order Device[1.03] and 53HA to stop engine.

115HB: Double check valve

Allows either the control air signal from Emergency stop 126HB or from valve 49HG to pass to Safety device 6.04 on fuel pump to cut off fuel.

115HC: Double check valve

Allows either the control air signal from valve 53HI, HK, ... or from valve 53HB to pass to Gov. Fuel "0" order Device[1.03] and 53HA to stop engine.

9C: Double check valve

Allows either the control air signal from 31HC or 49HF to pass to 29D.

H: Pressure gauge board with pressure switches

M: Valve group for Local speed setting

29C: 3/2 way valve (Governor control air feed valve)

Supplies control signal air regulated by I/P Converter to Governor in REMOTE CONTROL and also supplies control signal air regulated by SPEED SET VALVE[15HA] to Governor in LOCAL CONTROL

231HA: Pressure gauge

Shows speed set air pressure from I/P converter in Remote control

231HB: Pressure gauge

Shows speed set air pressure from 15HA in Local control

11HA: Current pressure converter



Regulates the speed set air pressure in Remote control

15HA: Speed set valve

Regulates the speed set air pressure in Local control

9A: Double check valve

Allows either control air or Safety air to pass

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		Revision Date 01/10/12	Prepared by TM	Page: 7 of 8	

Speed setting system

1.02: Speed setting valve

1.03: Gov. Fuel "0" order Device (Air pressure shut Device)

Starting system

2.01: Starting air distributor

2.02: Cam for starting control valves

2.03: Shut off valve for starting air

2.04: Non-return valve

2.05: Control valve

2.06: Drain and test valve

2.07: Starting valve

2.08: Flame arrestor

2.09: Relief valve

2.13: Blocking valve on turning gear

2.14: Starting booster for Governor

2.17: Bypass valve for slow turning

2.18: Control valve

2.19: Adjustable throttle

2.20: Check valve

2.21: Venting valve

2.22: Reversing servomotor for starting system

134HA: 4/2 way valve

Controls opening or closing of starting air valves on the cylinder heads.

Fuel system

3.01: Fuel injection valve

3.02: Fuel injection pump

3.03: Fuel cam

3.04: Load indicator

3.05: Load dependent variable injection timing

3.07: Eccentric shaft for suction valve

3.08: Eccentric shaft for spill valve

3.09: Intermediate regulating shaft

3.10: Air cylinder for Governor / fuel linkage connection



3.11: Fuel linkage maximum limiting screw

3.12: Fuel lever

3.13: Relief valve

38A~F: 3/2 way solenoid valve

When energized due to any abnormality, supply pilot air signal to safety device on fuel pump to cut-off fuel to the engine.

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		Revision Date 01/10/12	Prepared by TM	Page: 8 of 8	

Exhaust valve drive

- 4.01: Exhaust valve
- 4.02: Hydraulic actuator pump
- 4.03: Actuator pump cam
- 4.04: Exhaust valve actuator
- 4.05: Air spring
- 4.06: Throttle
- 4.07: Relief valve
- 4.08: Air spring venting valve
- 270HD: Relief valve (F-2F)

Reversing system

- 5.01: Reversing servomotor
- 5.02: Reversing valve
- 5.03: Local maneuvering lever
- 5.07: Stop lever

Safety devices

- 6.01: Rotation direction safeguard
- 6.02: Sliding coupling
- 6.04: Safety cut out device

Monitoring

- 7.01: Tachometer with Revolution counter

Engine room

- 9.01: Starting air bottles