A319/A320/A321

Fuel System
GENERAL

The fuel system:
— stores fuel in the tanks
— supplies fuel in the correct quantities to the fuel tanks during refueling
— supplies fuel to the engines and the auxiliary power unit (APU)
— circulates fuel to cool the integrated drive generator (IDG)
— keeps fuel in the outer wing for wing bending and flutter relief.

TANKS

The fuel is stored in the wings and the center section. The wings have inner and outer tanks.
There is a vent surge tank outboard of the outer tank in each wing.
When the aircraft has been refueled to maximum capacity, the fuel can expand by 2 % (20° temperature rise) without spilling.
There is an overpressure protector in each vent outer and inner tank and between the center tank and the left inner tank.

![Diagram of Airbus A319-320-321 Fuel System]

<table>
<thead>
<tr>
<th>USABLE FUEL</th>
<th>OUTER TANKS</th>
<th>INNER TANKS</th>
<th>CENTER TANK</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLUME</td>
<td>(liters)</td>
<td>(US gallons)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>880 x 2</td>
<td>232 x 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEIGHT *</td>
<td>(KG)</td>
<td>(LB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>691 x 2</td>
<td>1520 x 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Fuel density: 0.785 kg/l or 6.551 lb/US Gal.
ENGINE FEED

GENERAL

The main fuel pump system supplies fuel from the center tank or the inner wing tanks to the engines. The system has six main fuel pumps.

MAIN COMPONENTS

TANK PUMPS

R In normal operation each engine is supplied by one pump in the center tank or two pumps in its own side wing tank.
All wing tank pumps remain on throughout the flight. They are fitted with pressure relief sequence valves which ensure that, when all pumps are running, the center tank pumps will deliver fuel preferentially.

TRANSFER VALVES

Two electrical transfer valves are mounted in each wing to permit fuel transfer from outer to inner tank.

CROSS FEED VALVE

A cross feed valve controlled by a double motor allows both engines to be fed from one side or one engine to be fed from both sides.

ENGINE LP VALVES

The fuel flow to an engine can be stopped by its low pressure (LP) fuel valve, the closure of the LP fuel valve is by:
— the engine master switch, or
— the ENG FIRE PUSH pushbutton.

SUCTION VALVES

Closed by pumps pressure in normal operation, they allow engines to be fed by gravity if the inner tank pumps fail.

R Note: Center tank pumps are not fitted with suction valves. Therefore, gravity feeding is not possible from the center tank.
**GENERAL**

The fuel system:
- stores fuel in the tanks
- supplies fuel in the correct quantities to the fuel tanks during refueling
- supplies fuel to the engines and the auxiliary power unit (APU)
- controls the transfer of fuel from the center tank to the wing tanks
- circulates fuel to cool the integrated drive generator (IDG).

**TANKS**

Tanks in the wings and the center section store fuel. There is a vent surge tank outboard of each wing tank. When the aircraft has been refueled to maximum capacity, the fuel can expand by 2% (20° temperature rise) without spilling.

There is an overpressure protector in each vent and wing tank, and between the center tank and the left wing tank.

![Diagram of fuel tanks](image)

<table>
<thead>
<tr>
<th></th>
<th>WING TANKS</th>
<th>CENTER TANK</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VOLUME</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(liters)</td>
<td>2 x 7750</td>
<td>8200</td>
<td>23700</td>
</tr>
<tr>
<td>(US gallons)</td>
<td>2 x 2047</td>
<td>2166</td>
<td>6260</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(KG)</td>
<td>2 x 6084</td>
<td>6437</td>
<td>18605</td>
</tr>
<tr>
<td>(LB)</td>
<td>2 x 13410</td>
<td>14190</td>
<td>41010</td>
</tr>
</tbody>
</table>

* Fuel density: 0.785 kg/l or 6.551 lb/US Gal.
ENGINE FEED

GENERAL

The main fuel pump system supplies fuel from the wing tanks to the engines. The system has four main fuel pumps.

MAIN COMPONENTS

TANK PUMPS

In normal operation each engine is supplied from two pumps in its own side wing tank.

CROSS FEED VALVE

A cross feed valve controlled by a double motor allows both engines to be fed from one side or one engine to be fed from both sides.

ENGINE LP VALVES

The fuel flow to an engine can be stopped by its low pressure (LP) fuel valve. The closure of the LP fuel valve is controlled by:

- the engine master switch, or
- the ENG FIRE PUSH pushbutton.

SUCTION VALVES

Closed by pumps pressure in normal operation, they allow engines to be fed by gravity if the wing tank pumps fail.
GENERAL

The fuel system:
– stores fuel in the tanks
– supplies fuel in the correct quantities to the fuel tanks during refueling
– supplies fuel to the engines and the auxiliary power unit (APU)
– circulates fuel to cool the integrated drive generator (IDG)
– keeps fuel in the outer wing for wing bending and flutter relief.

TANKS

The fuel is stored in the wings and the center section. The wings have inner and outer tanks.
There is a vent surge tank outboard of the outer tank in each wing.
When the aircraft has been refueled to maximum capacity, the fuel can expand by 2 % (20°
temperature rise) without spilling.
There is an overpressure protector in each vent outer and inner tank and between the
center tank and the left inner tank.

![Diagram of fuel tanks](image)

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<td>(liters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>880 x 2</td>
<td>7099 x 2</td>
<td>8250</td>
<td>24209</td>
</tr>
<tr>
<td></td>
<td>(US gallons)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>232 x 2</td>
<td>1875 x 2</td>
<td>2180</td>
<td>6395</td>
</tr>
<tr>
<td>WEIGHT *</td>
<td>(KG)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>691 x 2</td>
<td>5573 x 2</td>
<td>6476</td>
<td>19004</td>
</tr>
<tr>
<td></td>
<td>(LB)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1520 x 2</td>
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<td>14281</td>
<td>41893</td>
</tr>
</tbody>
</table>

* Fuel density : 0.785 kg/l or 6.551 lb/US Gal.

Page 5
ENGINE FEED

GENERAL

The main fuel pump system supplies fuel from the center tank or the inner wing tanks to the engines. The system has six main fuel pumps.

MAIN COMPONENTS

TANK PUMPS

In normal operation each engine is supplied by one pump in the center tank or two pumps in its own side wing tank. All wing tank pumps remain on throughout the flight. They are fitted with pressure relief sequence valves which ensure that, when all pumps are running, the center tank pumps will deliver fuel preferentially.

TRANSFER VALVES

Two electrical transfer valves are mounted in each wing to permit fuel transfer from outer to inner tank.

CROSS FEED VALVE

A cross feed valve controlled by a double motor allows both engines to be fed from one side or one engine to be fed from both sides.

ENGINE LP VALVES

The fuel flow to an engine can be stopped by its low pressure (LP) fuel valve, the closure of the LP fuel valve is by:
- the engine master switch, or
- the ENG FIRE PUSH pushbutton.

SUCTION VALVES

Closed by pumps pressure in normal operation, they allow engines to be fed by gravity if the inner tank pumps fail.

Note: Center tank pumps are not fitted with suction valves. Therefore, gravity feeding is not possible from the center tank.
FUEL FEED SEQUENCE

The tanks empty in the following sequence:
1. center tank
2. inner tanks (down to 750 kg in each inner tank)
3. outer tanks (fuel transferred into the inner tanks)

CENTER TANK PUMPS CONTROL LOGIC

* Each center tank pump stops until approximately 500 kg (1100 lb) of its associated inner tank fuel has been used (when the fuel level reaches the underfull sensors).
FUEL FEED SEQUENCE

The wing tanks feed fuel to the engines. The tanks empty in the following sequence:
1. center tank (fuel transferred into wing tanks)
2. wing tanks

CENTER TANK FUEL TRANSFER

The transfer system controls the flow of fuel from the center tank to the wing tanks. The Fuel Level Sensing Control Unit (FLSCU) has automatic control of the transfer valve. When the transfer valve is open, fuel from the wing tank pumps flows through the jet pump and creates a suction in it. This suction moves the fuel from the center tank to the related wing tank.

Center tank transfer valve control logic

The FLSCU automatically closes the associated center tank transfer valve when the wing tank is full. The FLSCU then reopens the center tank transfer valve when the engine has used 250 kg (550 lb) of wing tank fuel (when the fuel level reaches the underfull sensors).
With the MODE SEL in MAN position, the center tank pumps will run. In manual mode the CTR TK PUMP pushbuttons must be selected off when the center tank is empty.

**FUEL TRANSFER FROM OUTER TO INNER TANKS**

The transfer valves automatically open when the inner tank fuel reaches the low level (about 750 kg/1650 lb), thus permitting fuel to drain from the outer to inner tanks. When open, the valves are latched open. They will automatically close at the next refuel operation (MODE SELECT at REFUEL position).

*Note*: 1. Two level sensors are installed in each inner tank. Each sensor controls two transfer valves, one in each wing, ensuring that transfer is simultaneous in both wings.
2. The 750 kg/1650 lb value is based on a level aircraft attitude with no acceleration. During steep descents or accelerations/decelerations, the transfer valves may open with more than 750 kg/1650 lb of fuel in each inner tank and the low level warning may be triggered.

**ECAM INDICATION**
**APU FEED**

A special fuel pump supplies fuel for APU startup when fuel feed pressure is low (due to loss of tank pumps or loss of normal AC electrical supply). This pump normally runs off the AC ESS SHED, but runs off the AC STAT INV BUS if the AC ESS SHED fails.

**FUEL RECIRCULATION SYSTEM**

See also 1.70.40 “IDG COOLING SYSTEM”. Some of the fuel supplied to each engine goes from the high-pressure fuel line in that engine, through the integrated drive generator (IDG) heat exchanger (where it absorbs heat), to the fuel return valve, and to the outer fuel tank. This operation ensures the IDG cooling when the oil temperature is high or when at low engine power. The FADEC controls the fuel return valve. If the outer tank is already full, the fuel overflows to the inner tank through a spill pipe. If center tank is feeding, the wing tank will tend to overfill and the system automatically selects the CTR TK PUMP off when the inner tank is full. The wing tank pumps will feed until the engine have used approximately 500 kg (1100 lb) of fuel when the fuel level reaches the underfull sensors. The logic circuits then restart the center tank pumps.
With the MODE SEL in MAN position, the center tank pumps will run. In manual mode the CTR TK PUMP pushbuttons must be selected off when the center tank is empty.

**FUEL TRANSFER FROM OUTER TO INNER TANKS**

The transfer valves automatically open when the inner tank fuel reaches the low level (about 750 kg/1650 lb), thus permitting fuel to drain from the outer to inner tanks. When open, the valves are latched open. They will automatically close at the next refuel operation (MODE SELECT at REFUEL position).

*Note*: 1. Two level sensors are installed in each inner tank. Each sensor controls two transfer valves, one in each wing, ensuring that transfer is simultaneous in both wings.

2. The 750 kg/1650 lb value is based on a level aircraft attitude with no acceleration. During steep descents or accelerations/decelerations, the transfer valves may open with more than 750 kg/1650 lb of fuel in each inner tank and the low level warning may be triggered.

**ECAM INDICATION**
**APU FEED**

A special fuel pump supplies fuel for APU startup when fuel feed pressure is low (due to loss of tank pumps or loss of normal AC electrical supply). This pump normally runs off the AC ESS SHED, but runs off the AC STAT INV BUS if the AC ESS SHED fails.

**FUEL RECIRCULATION SYSTEM**

See also 1.70.45 “IDG COOLING SYSTEM”.
Some of the fuel supplied to each engine goes from the high-pressure fuel line in that engine, through the integrated drive generator (IDG) heat exchanger (where it absorbs heat), to the fuel return valve, and to the outer fuel tank. This operation ensures the IDG cooling when the oil temperature is high or when at low engine power.
The FADEC controls the fuel return valve.
If the outer tank is already full, the fuel overflows to the inner tank through a spill pipe.
If center tank is feeding, the wing tank will tend to overfill and the system automatically selects the CTR TK PUMP off when the inner tank is full. The wing tank pumps will feed until the engine have used approximately 500 kg (1100 lb) of fuel when the fuel level reaches the underfull sensors. The logic circuits then restart the center tank pumps.
With MODE SEL in the MAN position, the center tank pumps will run. In manual mode, the CTR TK PUMP pushbuttons must be selected off, when the center tank is empty.

**FUEL TRANSFER FROM OUTER TO INNER TANKS**

The transfer valves automatically open, when the inner tank fuel reaches the low level (about 750 kg/1650 lb), thus enabling the fuel to drain from the outer to inner tanks. When open, the valves are latched open. They will automatically close at the next refueling operation.

*Note:* 1. *Two level sensors are installed in each inner tank. Each sensor controls two transfer valves, one in each wing, ensuring simultaneous transfer to both wings.*

2. The 750 kg/1650 lb value is based on a level aircraft attitude, with no acceleration. During steep descent or acceleration/deceleration, the transfer valves may open with more than 750 kg/1650 lb of fuel in each inner tank, and the low level warning may be triggered.

**ECAM INDICATION**

![Diagram](image)
APU FEED

A special fuel pump supplies fuel for APU startup when fuel feed pressure is low (due to loss of tank pumps or loss of normal AC electrical supply). This pump normally runs off the AC ESS SHED, but runs off the AC STAT INV BUS if the AC ESS SHED fails.

FUEL RECIRCULATION SYSTEM

See also 1.70.40 “IDG COOLING SYSTEM”.

Some of the fuel supplied to each engine goes from the high-pressure fuel line in that engine, through the integrated drive generator (IDG) heat exchanger (where it absorbs heat), to the fuel return valve, and to the outer fuel tank.

This operation ensures the IDG cooling when the oil temperature is high or when at low engine power.

The FADEC controls the fuel return valve.

If the outer tank is already full, the fuel overflows to the inner tank through a spill pipe. If center tank is feeding, the wing tank will tend to overfill and the system automatically selects the CTR TK PUMP off when the inner tank is full. The wing tank pumps will feed until the engine have used approximately 500 kg (1100 lb) of fuel when the fuel level reaches the underfull sensors. The logic circuits then restart the center tank pumps.
With MODE SEL in the MAN position, the center tank pumps will run. In manual mode, the CTR TK PUMP pushbuttons must be selected off, when the center tank is empty.

**FUEL TRANSFER FROM OUTER TO INNER TANKS**

The transfer valves automatically open, when the inner tank fuel reaches the low level (about 750 kg/1650 lb), thus enabling the fuel to drain from the outer to inner tanks. When open, the valves are latched open. They will automatically close at the next refueling operation.

*Note*: 1. *Two level sensors are installed in each inner tank. Each sensor controls two transfer valves, one in each wing, ensuring simultaneous transfer to both wings.*  
2. *The 750 kg/1650 lb value is based on a level aircraft attitude, with no acceleration. During steep descent or acceleration/deceleration, the transfer valves may open with more than 750 kg/1650 lb of fuel in each inner tank, and the low level warning may be triggered.*

**ECAM INDICATION**
APU FEED

A special fuel pump supplies fuel for APU startup when fuel feed pressure is low (due to loss of tank pumps or loss of normal AC electrical supply). This pump normally runs off the AC ESS SHED, but runs off the AC STAT INV BUS if the AC ESS SHED fails.

FUEL RECIRCULATION SYSTEM

See also 1.70.45 “IDG COOLING SYSTEM”.
Some of the fuel supplied to each engine goes from the high-pressure fuel line in that engine, through the integrated drive generator (IDG) heat exchanger (where it absorbs heat), to the fuel return valve, and to the outer fuel tank. This operation ensures the IDG cooling when the oil temperature is high or when at low engine power.
The FADEC controls the fuel return valve.
If the outer tank is already full, the fuel overflows to the inner tank through a spill pipe. If center tank is feeding, the wing tank will tend to overfill and the system automatically selects the CTR TK PUMP off when the inner tank is full. The wing tank pumps will feed until the engine have used approximately 500 kg (1100 lb) of fuel when the fuel level reaches the underfull sensors. The logic circuits then restart the center tank pumps.
With the MODE SEL in MAN position, the center tank transfer valves will open. Wing tank overflow must be prevented by selecting the CTR TK XFR pushbuttons off when the wing tanks are full. They must also be selected off when the center tank is empty.

**ECAM INDICATION**

**TRANSFER FROM CENTER TANK**
APU FEED

A special fuel pump supplies fuel for APU startup when fuel feed pressure is low (due to loss of tank pumps or loss of normal AC electrical supply). This pump normally runs off the AC ESS SHED, but runs off the AC STAT INV BUS if the AC ESS SHED fails.

FUEL RECIRCULATION SYSTEM

See also 1.70.45 “IDG COOLING SYSTEM”.
Some of the fuel supplied to each engine goes from the high-pressure fuel line in that engine, through the integrated drive generator (IDG) heat exchanger (where it absorbs heat), to the fuel return valve, and back to the wing tank.
This operation ensures the IDG cooling when the oil temperature is high or when at low engine power.
The FADEC controls the fuel return valve.
REFUELING – DEFUELING

— One (two) refueling point(s) is (are) installed under the wings allowing the refueling from either the right or left side of the aircraft.
— A refuel panel is located on the fuselage side beneath the right wing or under the right or left wing adjacent to the refuel coupling.

A gallery connects the refuel coupling to the refuel valve of each tank. Refueling is normally automatic, the required fuel load being set on the preselector. Manual control is also available. Automatic refueling starts by the outer cells. If the selected fuel load exceeds the wing tank capacity, the center tank is refuelled simultaneously. When an outer cell is full the fuel overflows into the inner cell through a spill pipe. Refuel valves close automatically when the tanks contain the preselected load or when sensors detect a high fuel level. The aircraft can be refueled when only battery power is available. The wing tanks can be refueled by gravity through refueling points on top of the wings. A transfer valve between the engine feed system and the refueling gallery permits:
— tank pumps to transfer fuel from one tank to another.
— defueling through the refuel coupling.
Approximate refueling time at nominal pressure is:
— 17 minutes for wing tanks.
— 20 minutes for all tanks.
FUEL QUANTITY INDICATION AND LEVEL SENSING

FUEL QUANTITY INDICATION (FQI) SYSTEM

The FQI is a computerized system that:
- transmits the actual total fuel mass, as well as the quantity and temperature of fuel in the tanks, to the ECAM.
- controls automatic refueling.
Two channels perform fuel computations: channel 2 activates automatically if channel 1 fails.
The FQI system comprises:
- an FQI computer.
- a set of capacitance probes in each tank to measure fuel level and temperature.
- one densitometer (cadensicon) sensor in each wing inner tank permitting the calculation of the fuel quantity.
- one Capacitance Index Compensator (CIC) in each inner tank giving the dielectric constant of the fuel in case of cadensicon failure.
- a quantity indicator for each tank installed on the refuel/defuel panel.
- a preselector on the refuel/defuel panel that shows the preselected and actual total fuel quantity.

FUEL LEVEL SENSING CONTROL UNIT (FLSCU)

The fuel level system generates fuel-level and fuel-temperature signals in order to operate the appropriate switching functions for refueling and defueling and control the IDG cooling recirculation system and the center-tank-to-wing-tank fuel transfer system.
The FLSCU comprises:
- fuel level sensors in the tanks to sense high, low, and overflow levels.
- a fuel temperature sensor to control the IDG cooling recirculation.
When fuel quantity in one wing tank goes below 750 kg (1650 lb), the low-level sensor triggers the LO LVL warning on ECAM.
REFUELING – DEFUELING

One (two) refueling point(s) is (are) installed under the wings allowing the refueling from either the right or left (L) side of the aircraft.

- A refuel panel is located either on the fuselage side beneath the right wing or under the right wing adjacent to the refuel coupling.

A gallery connects the refuel coupling to the refuel valve of each tank. Refueling is normally automatic, the required fuel load being set on the preselector. Manual control is also available.

Automatic refueling starts with the wing tanks. If the preselected fuel load exceeds the capacity of the wing tanks, the center tank receives fuel simultaneously.

Refuel valves close automatically when the tanks contain the preselected load or when sensors detect a high fuel level.

The aircraft can be refueled when only battery power is available.

The wing tanks can be refueled by gravity through refueling points on top of the wings. A transfer valve between the engine feed system and the refueling gallery permits:

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R – a set of capacitance probes in each tank to measure fuel level.
R – sensors in each wing tank to measure fuel temperature.
R – devices for measuring fuel characteristics such as density
R – a multi tank indicator allowing the quantity for each tank to be displayed on the refuel/defuel panel.

FUEL LEVEL SENSING CONTROL UNIT (FLSCU)

The fuel level system generates fuel-level and fuel-temperature signals in order to operate the appropriate switching functions for refueling and defueling and control the IDG cooling recirculation system and the center-tank-to-wing-tank fuel transfer system and ACT (<3) to center tank fuel transfer system.
The FLSCU comprises:
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– a fuel temperature sensor to control the IDG cooling recirculation.
When fuel quantity in one wing tank goes below 750 kg (1650 lb), the low-level sensor triggers the LO LVL warning on ECAM.
**REFUELING – DEFUELING**

One (two) refueling point(s) is (are) installed under the wings allowing the refueling from either the right or left (>) side of the aircraft.

- A refuel panel is located either on the fuselage side beneath the right wing or under the right or left wing adjacent to the refuel coupling.
- Another refuel panel is located on the cockpit overhead maintenance panel.
- A “READY FOR FUELING” green light is installed adjacent to the refuel coupling.

A gallery connects the refuel coupling to the refuel valve of each tank. Refueling is normally automatic, the required fuel load being set on the preselector. Manual control is also available.

Automatic refueling starts by the outer cells. If the selected fuel load exceeds the wing tank capacity, the center tank is refuelled simultaneously.

When an outer cell is full the fuel overflows into the inner cell through a spill pipe. Refuel valves close automatically when the tanks contain the preselected load or when sensors detect a high fuel level.

The aircraft can be refueled when only battery power is available.

The wing tanks can be refueled by gravity through refueling points on top of the wings.

A transfer valve between the engine feed system and the refueling gallery permits:
- tank pumps to transfer fuel from one tank to another.
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FUEL QUANTITY INDICATION AND LEVEL SENSING

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FUEL LEVEL SENSING CONTROL UNIT (FLSCU)

The fuel level system generates fuel-level and fuel-temperature signals in order to operate the appropriate switching functions for refueling and defueling and control the IDG cooling recirculation system and the center-tank-to-wing-tank fuel transfer system.
The FLSCU comprises:
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When fuel quantity in one wing tank goes below 750 kg (1650 lb), the low-level sensor triggers the LO LVL warning on ECAM.
FUEL SYSTEM ARCHITECTURE

- FMGS
- ADIRS
- A/C ATTITUDE
- FQI COMPUTER
- ECAM UPPER DISPLAY
- ECAM FUEL PAGE
- REFUELLING CONTROL PANEL
- FUEL LEVEL SENSOR CONTROL UNIT
- REFUEL VALVES
- FUEL PROBES
- FUEL SENSORS
OVERHEAD PANEL

1. **L (R) TK PUMPS 1(2) pb sw**
   - **On**: Pump is on but fuel feeds only when center tank pumps delivery pressure drops below threshold.
   - **OFF**: Pump is OFF and OFF button lights up white.
   - **FAULT light**: Amber light comes on, and ECAM caution comes on, when the delivery pressure drops. It does not come on when OFF is selected.

2. **MODE SEL pb sw**
   - **AUTO**: Control of center tank pumps is automatic.
     - They run at engine start for 2 minutes.
     - Before or after engine start sequence, the pumps run if the slats are retracted.
     - They stop automatically 5 minutes after center tank low level is reached.
   - **MAN**: Flight crew controls the center tank pumps manually with center tank pumps pushbutton switches.
   - **FAULT light**: Amber light comes on, and ECAM caution comes on when center tank has more than 250 kg (550 lb) of fuel and the left or right wing tank has less than 5000 kg (11000 lb).

3. **CTR TK PUMP 1(2) pb sw**
   - **On**: Pump runs if MAN mode is selected on MODE SEL pushbutton switch.
     - Pump is automatically controlled when AUTO mode is selected.
   - **OFF**: Pump is OFF and OFF button lights up white.
   - **FAULT light**: Amber light comes on, associated with ECAM caution, when the pump is in operation and the delivery pressure drops.
4 X FEED pb sw

- Off: Valve closes and button does not light up.
- ON: Valve opens and ON button lights up white.
- OPEN light: This green light comes on when the valve is fully open.
1. **L (R) TK PUMPS pb sw**
   - On: Pump is on.
   - OFF: Pump is OFF and OFF button lights up white.
   - FAULT light: Amber light comes on, and ECAM caution comes on, when the delivery pressure drops. It does not come on when OFF is selected.

2. **MODE SEL pb sw**
   - AUTO: Control of center tank transfer valves is automatic.
     - They open if the associated wing tank is not full.
     - They close automatically five minutes after the center tank reaches its low level.
   - MAN: Flight crew controls the center tank transfer valves manually with CTR TK XFR pushbutton switches.
   - FAULT light: Amber light comes on, and ECAM caution comes on, when:
     - The center tank has more than 250 kg (550 lb) of fuel and the left or right wing tank has less than 5000 kg (11000 lb) and
     - the MODE SEL pushbutton switch is at AUTO.

3. **CTR TK L(R) XFR pb sw**
   - On: The transfer valve opens if MAN mode is selected with the MODE SEL pushbutton switch.
     - The transfer valve is controlled automatically when the flight crew selects AUTO mode.
   - OFF: The transfer valve is closed.
   - FAULT light: Amber light comes on, as does the ECAM caution, if the associated wing tank overflows.
<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Valve closes and button does not light up.</td>
</tr>
<tr>
<td>ON</td>
<td>Valve opens and ON button lights up white.</td>
</tr>
<tr>
<td>OPEN light</td>
<td>This green light comes on when the valve is fully open.</td>
</tr>
</tbody>
</table>
1 FUEL QUANTITY indicator

The number shows the quantity of fuel in each tank.

2 HI LVL It

This blue light comes on when the system detects a high fuel level. The corresponding refuel valve closes automatically.

3 REFUEL VALVES sel (guarded in NORM)

NORM : Automatic refueling logic controls the refuel valves.
OPEN : Valves open when the MODE SELECT switch is set to REFUEL or DEFUEL position. When the MODE SELECT switch is in the REFUEL position, each refuel/defuel valve closes when the system detects a high level in the associated tank.
SHUT : Valves close.
4 MODE SELECT sw (guarded at OFF)

OFF : Refuel system is de-energized. Refuel valves are closed.
REFUEL : Refuel valves operate in automatic or in manual mode depending on the position of REFUEL/DEFUEL VALVES switches.
DEFUEL : Refuel/Defuel transfer valve opens.
Refuel valve opens if the associated REFUEL VALVE selector is at OPEN.

5 OPEN It

This amber light comes on when the transfer valve is open.

6 TEST sw

When this switch is pressed, the HI LVL lights come on if high level sensors and associated circuits are serviceable.

*Note*: If tanks are full (HI LVL lights on) during this test, the HI LVL lights go out if high level sensors and associated circuits are serviceable.

LTS : Lights on panel and all 8’s on FQI and preselector come on.

7 PRESELECTED display

This display shows the preselected total fuel quantity in kg (lb) × 1000 (multiply by 1000 to get actual amount).

8 Preselector rocker switch

Pressing the left or right side of the switch decreases or increases the preselected quantity.

9 ACTUAL display

This display shows the total fuel on board.

10 END It

— This green light comes on steady when automatic refueling is completed.
— It flashes green if refueling is aborted.

11 CKPT It

Not used.
1 **FUEL QUANTITY indicator**

The number shows the quantity of fuel in each tank.

2 **HI LVL Lt**

This blue light comes on when the system detects a high fuel level. The corresponding refuel valve closes automatically.

3 **REFUEL VALVES** sel (guarded in NORM)

- **NORM**: Automatic refueling logic controls the refuel valves.
- **OPEN**: Valves open when the MODE SELECT switch is set to REFUEL or DEFUEL position. When the MODE SELECT switch is in the REFUEL position, each refuel/defuel valve closes when the system detects a high level in the associated tank.
- **SHUT**: Valves close.
4 Mode select sw (guarded at OFF)

OFF: Refuel system is de-energized. Refuel valves are closed.
REFUEL: Refuel valves operate in automatic or in manual mode depending on the position of REFUEL VALVES switches.
DEFUEL XFR: Refuel/Defuel transfer valve opens. Refuel valve opens if the associated REFUEL VALVE switch is at OPEN.

5 OPEN It

This amber light comes on when the defuel transfer valve is open.

6 TEST sw

When this switch is pressed, the HI LVL lights come on if high level sensors and associated circuits are serviceable.

Note: If tanks are full (HI LVL lights on) during this test, the HI LVL lights go out if high level sensors and associated circuits are serviceable.

LTS: Lights on panel and all 8’s on FQI and preselector come on.

7 Preselected display

This display shows the preselected total fuel quantity in kg (lb) \times 1000 (multiply by 1000 to get actual amount).

8 Preselector rocker switch

Pressing the left or right side of the switch decreases or increases the preselected quantity.

9 Actual display

This display shows the total fuel on board.

10 END It

- This green light comes on steady when automatic refueling is completed.
- It flashes green if refueling is aborted.

11 CKPT It

Indicates that cockpit refuel panel has priority. Illuminates when electrical PWR pushbutton switch on cockpit refuel is pressed.
⑫ BATT POWER toggle sw

ON : When flight crew switches this switch ON momentarily and releases it, HOT BUS 1 supplies the FQI. After completion of the FQI tests (about 40 seconds), the fuel quantity indications appear and the refuel operation can be selected.
   The electrical supply is cut off automatically :
   – after 10 minutes, if no refuel operation is selected
   – or, at the end of refueling
NORM : The FQI is not supplied by batteries
12 BATT POWER toggle sw

ON: When flight crew switches this switch ON momentarily and releases it, HOT BUS 1 supplies the FQI. After completion of the FQI tests (about 40 seconds), the fuel quantity indications appear and the refuel operation can be selected.

The electrical supply is cut off automatically:
- after 10 minutes, if no refuel operation is selected
- or, at the end of refueling

NORM: The FQI is not supplied by batteries
1. **PRESELECTED display**

   This display shows the preselected total fuel quantity in kg $\times$ 1000 (multiply by 1000 to get actual amount).

2. **ACTUAL display**

   This display shows the total fuel on board.

3. **Preselector rocker switch**

   Pressing the left or the right side of the switch decreases or increases the preselected quantity.

4. **END light**

   - This green light comes on steady when automatic refueling is achieved (associated with the green refuel light on wing extinguishing ⬅).
   - It flashes green if refueling is aborted.

5. **PWR pb sw**

   **ON**
   - Refuel system is energized.
   - Cockpit refuel control/preselector panels takes priority (cockpit lights illuminate on cockpit and external refuel control panels).
   - Automatic high level test.
   - REFUEL caption is displayed on ECAM.

   **Off**
   - Refuel system is deenergized.
   - ECAM “REFUEL” caption is cleared.
   - Priority is cleared.

   **FAULT**
   - This amber light comes on when auto high level test not satisfied.
**1. Wing pumps indications**

- In line: Green: pump pressure is normal (pump contactor on).
- "LO": Amber: pump pressure is low (pump contactor on).
- Cross line: Amber: pump contactor is off.

**2. CTR tank pumps indications**

- In line: Green: pump pressure is normal (pump contactor on).
- "LO": Amber: pump pressure is low (pump contactor on).
- Cross line: Green: pump contactor is off and auto shut off is required.
- Cross line: Amber: pump contactor is off and auto shut off is not required.
1 Wing pump indications

- Inline — Green: Pump pressure is normal (pump contactor on).
- “LO” — Amber: Pump pressure is low (pump contactor on).
- Crossline — Amber: Pump contactor is off.

2 CTR tank pump indications

- Inline — Green: Pump pressure is normal (pump contactor on).
- “LO” — Amber: Pump pressure is low (pump contactor on).
- Crossline — Green: Pump contactor is off, and auto shut-off is required.
- Crossline — Amber: Pump contactor is off, and auto shut-off is not required.
1. Wing pump indications

- **Inline** — Green: Pump pressure is normal (pump contactor on).
- **“LO”** — Amber: Pump pressure is low (pump contactor on).
- **Crossline** — Amber: Pump contactor is off.

2. CTR tank pump indications

- **Inline** — Green: Pump pressure is normal (pump contactor on).
- **“LO”** — Amber: Pump pressure is low (pump contactor on).
- **Crossline** — Green: Pump contactor is off, and auto shut-off is required.
- **Crossline** — Amber: Pump contactor is off, and auto shut-off is not required.
ECAM FUEL PAGE

1. Wing pumps indications
   - Inline: Green: Pump pressure is normal (pump contactor is on).
   - "LO": Amber: Pump pressure is low (pump contactor is on).
   - Crossline: Amber: Pump contactor is off.

2. CTR tanks valves indications
   - Inline: Green: Transfer valve is open.
   - Inline: Amber: Transfer valve is open, although commanded closed in automatic or manual mode.
   - Crossline: Green: Transfer valve is closed.
   - Crossline: Amber: Transfer valve is closed, although commanded open in automatic or manual mode.
1. Wing pumps indications

   - Green: Pump pressure is normal (pump contactor on).
   - Amber: Pump pressure is low (pump contactor on).
   - Off: Pump contactor is off.

2. CTR tanks-valve indications

   - Green: Transfer valve is open.
   - Amber: Transfer valve is open, whereas commanded closed in automatic or manual mode.
   - Green: Transfer valve is closed.
   - Amber: Transfer valve is closed, whereas commanded open in automatic or manual mode.
6 CTL pb sw

ON:
- Start of refuel, (associated with refuel green light illumination on wing <i>).</i>
- Auto shut off occurs when the selected load is reached or in case of HI level detection.
- VALVE light comes amber if REFUEL VALVE CTL switch are not at NORM position (on refueling control panel).

Off:
- Refuel stops. The selected load can be reset.

7 CKPT It

Comes on when PWR pushbutton switch is ON associated with the CKPT light on the external refuel control panel.
**ECAM FUEL PAGE**

1. **Wing pumps indications**
   
   In line  — Green : pump pressure is normal (pump contactor on).
   “LO”    — Amber : pump pressure is low (pump contactor on).
   Cross line — Amber : pump contactor is off.

2. **CTR tank pumps indications**
   
   In line  — Green : pump pressure is normal (pump contactor on).
   “LO”    — Amber : pump pressure is low (pump contactor on).
   Cross line — Green : pump contactor is off and auto shut off is required.
   Cross line — Amber : pump contactor is off and auto shut off is not required.
CTL pb sw

ON
- Start of refuel, (associated with refuel green light illumination on wing \(\text{\textlangle\rangle}\)).
- Auto shut off occurs when the selected load is reached or in case of HI level detection.
- VALVE light comes amber if REFUEL VALVE CTL switch are not at NORM position (on refueling control panel).

Off
- Refuel stops. The selected load can be reset.

CKPT It

Comes on when PWR pushbutton switch is ON associated with the CKPT light on the external refuel control panel.
Wing pump indications

- Inline — Green: Pump pressure is normal (pump contactor on).
- "LO" — Amber: Pump pressure is low (pump contactor on).
- Crossline — Amber: Pump contactor is off.

CTR tank pump indications

- Inline — Green: Pump pressure is normal (pump contactor on).
- "LO" — Amber: Pump pressure is low (pump contactor on).
- Crossline — Green: Pump contactor is off, and auto shut-off is required.
- Crossline — Amber: Pump contactor is off, and auto shut-off is not required.
3 LP valve (eng-apu) indications

In line — Green: valve is open.
In line — Amber: valve is open with ENG (APU) MASTER switch OFF or FIRE pushbutton out.
Cross line — Green: APU valve is closed.
Cross line — Amber: ENG valve is closed or APU valve is closed with master switch ON.
Transit — Amber: Valve is in transit.

4 X feed indications

In line — Green: valve is open.
In line — Amber: valve is open with pushbutton switch off.
Cross line — Green: valve is closed.
Cross line — Amber: valve is closed with pushbutton switch ON.
Transit — Amber: valve is in transit.

5 Transfer valves indications

One transfer valve is open:
Green: LH or RH inner cell tank is at low level.
Amber: LH and RH inner cells tanks are not at low level
(associated with ECAM caution).

One transfer valve is in transit.

Both transfer valves are closed
Green: LH or RH inner cells tanks are not at low level.
Amber: LH and RH inner cell tank is at low level
(associated with ECAM caution).
Fuel temperature indication

This appears when its associated temperature sensor is wet.
It is normally green.
Advisory in phases 2 and 6 only, when fuel temperature is:
- above 45° C for inner cell or 55° C for outer cell.
- below – 40° C.
It becomes amber, and ECAM displays a caution, if the temperature goes above the high limit or below the low limit.

Fuel quantity indication

- Normally green
- An amber line appears across the last two digits when FQI is inaccurate (Refer to 3.04.28). The outer indication is boxed amber if both transfer valves fail to open when inner at low level.
- The center tank indication is boxed amber if both center tank pumps are failed or switched OFF.
- Advisory in flight phases 2 and 6, when difference between fuel quantities in the two wings is greater than 1500 kg (3300 lb). The indications of the wing inner and outer tanks with the highest fuel level pulses.

Fuel on board (FOB) indication

It is normally green.
An amber line appears across the last two digits when the FQI is inaccurate (Refer to 3.04.28).
The indication is boxed amber if:
- Center tank pumps failed or switched OFF
- Both transfer valves fail to open when inner cell at low level.

Fuel used indication

FUSED 1
3100
- The engine identification number is amber when the engine is below idle, and it is white when it is at or above idle.
- The fuel used indication is green from flight phase 2 until electrical power is cut off at the end of the flight. It is automatically reset when the engine is started on ground.
3 LP valve (ENG) indications

- **Inline**: Green : The valve is open.
- **Inline**: Amber : The valve is open, with the ENG MASTER switch OFF.
- **Crossline**: Amber : The ENG valve is fully closed.
- **Transit**: Amber : The valve is in transit.

4 X feed indications

- **Inline**: Green : The valve is open.
- **Inline**: Amber : The valve is open, with the X Feed pushbutton off.
- **Crossline**: Green : The valve is closed.
- **Crossline**: Amber : The valve is closed with X feed pushbutton ON.
- **Transit**: Amber : The valve is in transit.

5 Transfer valve indications

**Outer to Inner Transfer**

- ▶️ : The triangle is green, during a transfer to inner.
- ▶️ : The triangle is in solid amber, when the valves are open, while commanded closed.
- ▶️ : The triangle is in amber, when a valve is in transit.

6 APU indications

- **APU**: "APU" is in white and the triangle is in green : APU valve is open.
- **APU**: "APU" and the triangle are in amber : APU valve is open, with APU Fire pushbutton out, or APU MASTER switch OFF.
- **APU**: "APU" is in amber : APU valve is closed and the APU Fire pushbutton is out, or APU MASTER Switch ON.
- **APU**: "APU" and the triangle are in white, the APU valves is closed.
7 Fuel temperature indication

This appears, when its associated temperature sensor is wet. It is normally green. Advisory only in phases 2 and 6, when fuel temperature is:
- Above 45°C for the inner cell, or 55°C for the outer cell.
- Below – 40°C.

It becomes amber, and the ECAM displays a caution, if the temperature goes above the high limit or below the low limit.

8 Fuel quantity indication

- It is normally in green.
- An amber line appears across the last two digits, when the FQI is inaccurate (Refer to 3.04.28). The outer indication is boxed amber, if both transfer valves fail to open when the inner is at low level.
- The center tank indication is boxed amber, if both center tank pumps are failed, or are switched OFF.
- Advisory in flight phases 2 and 6, when the difference between the fuel quantities in the two wings is greater than 1500 kg (3300 lb). The wing inner and outer tank indications pulse with the highest fuel level.

9 Fuel on Board (FOB) indication

It is normally in green.
An amber line appears across the last two digits when the FQI is inaccurate (Refer to 3.04.28).
The indication is half-boxed in amber, if:
- Center tank pumps fail, or are switched OFF.
- Both transfer valves fail to open, when the inner cell is at low level.

10 Fuel Used indication

FUSED 1
3100
- The engine identification number is in amber, when the engine is below idle. It is in white, when it is at, or above, idle.
- The fuel used indication is in green from flight phase 2, until electrical power is cut off at the end of the flight. It is automatically reset, when the engine is started on ground.
3 **LP valve (ENG) indications**

- **Inline**  
  - Green: The valve is open.
  - Amber: The valve is open with ENG MASTER switch OFF.
- **Cross line**  
  - Amber: The ENG valve is fully closed.
- **Transit**  
  - Amber: The valve is in transit.

4 **X-feed indications**

- **In line**  
  - Green: The valve is open.
- **Cross line**  
  - Amber: The valve is open with the X-feed pushbutton off.
  - Green: The valve is closed.
- **Cross line**  
  - Amber: The valve is closed with the X-feed pushbutton ON.
- **Transit**  
  - Amber: The valve is in transit.

5 **TRANSFER Valve indications:**

- **Center to inner transfer**

![Diagram](image)

- Displayed in Green, when there is a center to inner tank transfer.
- Displayed in amber, when the transfer valve is open, whereas commanded closed in automatic or manual mode.

6 **APU Indications**

- **APU**
  - White: APU valve is closed.
  - Solid triangle: APU valve is open, with the APU Fire pushbutton out or the APU MASTER switch OFF.
  - Open / triangle: APU valve is closed and APU Fire pushbutton is out / or APU MASTER switch ON.
  - Solid triangle: APU valve is closed.
  - Open / triangle: APU valve is open.
7 Fuel temperature indication

- It is normally in green.
- It is advisory in phases 2 and 6 only, if the fuel temperature is above 45° C, or below 40° C.
- It becomes amber, and the ECAM displays an associated caution, if the temperature goes above the high limit, or below the low limit.

8 Fuel quantity indication

It is normally in green.
- The wing tank indication turns amber, if a wing tank overflows.
- An amber line appears across the last two digits, when the FQL is inaccurate (See 3.04.28).
- The center tank indication is boxed amber, if both transfer valves fail in the closed position.
- It is advisory in phases 2 and 6, when the difference between the fuel quantities in the two wings is greater than 1500 kg (3300 lb). The indication for the wing with the higher fuel level pulses.

9 Fuel On Board (FOB) indication

It is normally in green.
An amber line appears across the last two digits, when the FQL is inaccurate (Refer to 3.04.28).
It is half boxed amber, when both center tank transfer valves fail in the closed position.

10 Fuel Used indication

- The engine identification number is in amber, when the engine is below idle. It is in white when it is at, or above, idle.
- The fuel used indication is green from flight phase 2, until electrical power is cut off at the end of the flight. It is automatically reset, when the engine is started on ground.
11 Fuel Flow indication

The Total Fuel Flow is displayed in kg/mn.
- It is normally in green.
- It is replaced by an amber “XX”, if there is no valid data.
1 Total fuel indication

An amber half box appears around FOB when the quantity shown is not all usable (intercell transfer valve failure or loss of center tank pumps).
In case of degraded data, the last two significant digits have dashes across them (refer to 3.04.28).

2 Memo indications: (green)
## WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E / WD : FAILURE TITLE conditions</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
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</tr>
</thead>
<tbody>
<tr>
<td>L(R) TK PUMP 1 + 2 LO PR</td>
<td></td>
<td></td>
<td></td>
<td>L(R) TK PUMP 1 + 2 FAULT Its</td>
<td></td>
</tr>
<tr>
<td>CTR TK PUMP 1(2) LO PR</td>
<td></td>
<td></td>
<td></td>
<td>CTR TK PUMP 1(2) FAULT Its</td>
<td>3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>CTR TK PUMPS LO PR</td>
<td></td>
<td></td>
<td></td>
<td>CTR TK PUMP FAULT Its</td>
<td></td>
</tr>
<tr>
<td>CTR TK PUMPS OFF</td>
<td></td>
<td></td>
<td></td>
<td>OFF it on CTR TK PUMP pb</td>
<td>1, 3, 4, 5, 7, 8, 9, 10</td>
</tr>
<tr>
<td>AUTO FEED FAULT</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>FUEL</td>
<td>MODE SEL FAULT Its</td>
<td>3, 4, 5, 8</td>
</tr>
<tr>
<td>(CTR TK &gt; 250 kg (550 lb) and</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
<td></td>
</tr>
<tr>
<td>L or R WING TK &lt; 5000 kg (11000 lb)</td>
<td>OR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(CTR TK pumps do not stop after slat extension or CTR TK low level)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L(R) WING TK LO LVL (750 kg - 1650 lb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L + R WING TK LO LVL</td>
<td></td>
<td></td>
<td></td>
<td>3, 4, 5, 7, 8, 9</td>
<td></td>
</tr>
<tr>
<td>Low level detected in both wing inner cells (remaining flight time is about 30 min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L(R) OUTER TK HI TEMP or</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
<td>3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>L(R) INNER TK HI TEMP</td>
<td></td>
<td></td>
<td></td>
<td>4, 5, 7, 8</td>
<td></td>
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<tr>
<td>Fuel temp above :</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in outer cell above 55° on ground</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>in outer cell above 60° in flight</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>in inner cell above 45° on ground</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>in inner cell above 54° in flight</td>
<td></td>
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<tr>
<td>L(R) XFR VALVE CLOSED</td>
<td></td>
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<td></td>
<td>3, 4, 5, 7, 8</td>
<td></td>
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<tr>
<td>both transfer valves fail to open after inner cell low level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG 1(2) LP VALVE OPEN</td>
<td></td>
<td></td>
<td></td>
<td>4, 5, 7, 8</td>
<td></td>
</tr>
<tr>
<td>valve disagree in open position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* inhibited if pump selected OFF
1. **Total fuel indication**

   An amber half box appears around FOB when the quantity shown is not all usable (intercell transfer valve failure or loss of center tank pumps). In case of degraded data, the last two significant digits have dashes across them (refer to 3.04.28).

2. **Memo indications (green)**
## WARNINGS AND CAUTIONS

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<tr>
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<td></td>
<td>SINGLE CHIME</td>
<td></td>
<td>OFF it on CTR TK PUMP pb</td>
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</tr>
<tr>
<td>CTR TK pb at OFF with no FAULT</td>
<td></td>
<td>MASTER CAUT</td>
<td></td>
<td></td>
<td></td>
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<td>L(R) WING TK LO LVL (750 kg - 1650 lb)</td>
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<td>L + R WING TK LO LVL</td>
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<td></td>
<td>3, 4, 5, 7, 8, 9</td>
</tr>
<tr>
<td>Low level detected in both wing inner cells (remaining flight time is about 30 minutes)</td>
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<tr>
<td>L(R) OUTER TK HI TEMP or</td>
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<td>3, 4, 5, 7, 8</td>
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<td>L(R) INNER TK HI TEMP</td>
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<tr>
<td>Fuel temp above :</td>
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<tr>
<td>in outer cell above 60°</td>
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<tr>
<td>in inner cell above 54°</td>
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<tr>
<td>L(R) XFR VALVE CLOSED</td>
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<td>3, 4, 5, 7, 8</td>
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<tr>
<td>both transfer valves fail to open after inner cell low level</td>
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<tr>
<td>ENG 1(2) LP VALVE OPEN</td>
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<td>4, 5, 7, 8</td>
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<tr>
<td>valve disagree in open position</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* inhibited if pump selected OFF
1 Total fuel indication

A half amber box appears around FOB, when the displayed quantity is not all usable (intercell transfer valve failure, or loss of center tank pumps). In case of degraded data, the last two significant digits are dashed (refer to 3.04.28).

2 Memo indications: (green)
<table>
<thead>
<tr>
<th>E / WD : FAILURE TITLE conditions</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>L(R) TK PUMP 1 + 2 LO PR</td>
<td></td>
<td></td>
<td>L(R) TK PUMP 1 + 2 FAULT Its</td>
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<td></td>
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<tr>
<td>CTR TK PUMP 1(2) LO PR</td>
<td></td>
<td></td>
<td>CTR TK PUMP 1(2) FAULT Its</td>
<td>3, 4, 5, 7, 8</td>
<td></td>
</tr>
<tr>
<td>CTR TK PUMPS LO PR</td>
<td></td>
<td></td>
<td>CTR TK PUMP FAULT Its</td>
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<tr>
<td>CTR TK PUMPS OFF</td>
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<td></td>
<td>Off it on CTR TK PUMP pb</td>
<td>1, 3, 4, 5, 7, 8, 9, 10</td>
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<tr>
<td>AUTO FEED FAULT</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>FUEL MODE SEL FAULT Its</td>
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<tr>
<td>(CTR TK &gt; 250 kg (550 lb) and</td>
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<td>NIL</td>
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<tr>
<td>L or R WING TK &lt; 5000 kg (11000 lb)</td>
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<tr>
<td>(CTR TK pumps do not stop after slat extension or CTR TK low level)</td>
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<tr>
<td>L(R) WING TK LO_LVL (750 kg - 1650 lb)</td>
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<td>L + R WING TK LO_LVL</td>
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<td>3, 4, 5, 7, 8, 9</td>
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</tr>
<tr>
<td>Low level detected in both wing inner cells (remaining flight time is about 30 min)</td>
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<td></td>
</tr>
<tr>
<td>L(R) OUTER TK HI TEMP or</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>L(R) INNER TK HI TEMP</td>
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<tr>
<td>Fuel temp above:</td>
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<tr>
<td>in outer cell above 55° on ground</td>
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<tr>
<td>in outer cell above 60° in flight</td>
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<td>in inner cell above 45° on ground</td>
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<tr>
<td>in inner cell above 54° in flight</td>
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<tr>
<td>L(R) XFR VALVE CLOSED</td>
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<tr>
<td>both transfer valves fail to open after inner cell low level</td>
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<tr>
<td>ENG 1(2) LP VALVE OPEN</td>
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<tr>
<td>valve disagree in open position</td>
<td></td>
<td></td>
<td></td>
<td>4, 5, 7, 8</td>
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</tr>
</tbody>
</table>

* inhibited if pump selected OFF
1. Total fuel indication

A half amber box appears around FOB, when the displayed quantity is not all usable (intercell transfer valve failure, or loss of center tank pumps). In case of degraded data, the last two significant digits are dashed (refer to 3.04.28).

2. Memo indications: (green)
### WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E / WD : FAILURE TITLE</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
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</thead>
<tbody>
<tr>
<td>L(R) TK PUMP 1 + 2 LO PR</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>FUEL</td>
<td>L(R) TK PUMP 1 + 2 FAULT Its</td>
<td>3, 4, 5, 7, 8</td>
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<tr>
<td>CTR TK PUMP 1(2) LO PR</td>
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<td></td>
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<td>CTR TK PUMP 1(2) FAULT Its</td>
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<tr>
<td>CTR TK PUMPS LO PR</td>
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<td></td>
<td></td>
<td>CTR TK PUMP FAULT Its</td>
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</tr>
<tr>
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<td></td>
<td>OFF it on CTR TK PUMP pb</td>
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</tr>
<tr>
<td>AUTO FEED FAULT (CTR TK &gt; 250 kg (550 lb) and L or R WING TK &lt; 5000 kg (11000 lb))</td>
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<td>FUEL</td>
<td>MODE SEL FAULT Its</td>
<td>3, 4, 5, 8</td>
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<tr>
<td>(CTR TK pumps do not stop after slat extension or CTR TK low level)</td>
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<tr>
<td>L(R) WING TK LO LVL (750 kg - 1650 lb)</td>
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<tr>
<td>L + R WING TK LO LVL</td>
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<tr>
<td>Low level detected in both wing inner cells (remaining flight time is about 30 minutes)</td>
<td></td>
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</tr>
<tr>
<td>L(R) OUTER TK HI TEMP or L(R) INNER TK HI TEMP</td>
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<tr>
<td>Fuel temp above : in outer cell above 60° in inner cell above 54°</td>
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<tr>
<td>L(R) XFR VALVE CLOSED both transfer valves fail to open after inner cell low level</td>
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<tr>
<td>ENG 1(2) LP VALVE OPEN valve disagree in open position</td>
<td></td>
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</tbody>
</table>

* inhibited if pump selected OFF

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Page 62
1. Total fuel indication

An half amber box appears around FOB, when the displayed quantity is not all usable (both center tank transfer valves fail in the closed position).
In case of degraded data, the last two significant digits are dashed (Refer to 3.04.28).

2. Memo indications : (green)
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<th>FLT PHASE INHIB</th>
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<td>L(R) TK PUMP 1 + 2 FAULT It</td>
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<td>L(R)XFR FAULT It</td>
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<td>MODE SEL FAULT It</td>
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<td>XFR VALVES FAULT</td>
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<td>MASTER CAUT</td>
<td>FUEL</td>
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<td>XFR VALVES FAULT</td>
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<td>. valves failed closed</td>
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<tr>
<td>L(R) WING TK OVERFLOW</td>
<td></td>
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<td>L(R) WING TK LO LVL (750 kg - 1650 lb)</td>
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<tr>
<td>AUTO TRANSFER FAULT</td>
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<td>L or R WING TK &lt; 5000 kg (11000 lb)</td>
<td>2, 3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>(CTR TK &gt; 250 kg (550 lb) and</td>
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<tr>
<td>L or R WING TK &lt; 5000 kg (11000 lb)</td>
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<tr>
<td>CTR TK XFR OFF</td>
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<td>L(R) WING TK HI TEMP</td>
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<tr>
<td>Both CTR TK XFR pb sw at OFF when in AUTO mode</td>
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<td>L(R) WING TK LO LVL</td>
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<td>L(R) WING TK LO LVL</td>
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<tr>
<td>Low level detected in both wing inner cells</td>
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<tr>
<td>L(R) WING TK HI TEMP</td>
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<td>ENG 1(2) LP VALVE OPEN</td>
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<tr>
<td>Fuel temp above 54°</td>
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<td></td>
<td></td>
<td>valve disagree in open position</td>
<td>3, 4, 5, 7, 8</td>
</tr>
</tbody>
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* inhibited if pump selected OFF
① **Total fuel indication**

An half amber box appears around FOB, when the displayed quantity is not all usable (both center tank transfer valves fail in the closed position). In case of degraded data, the last two significant digits are dashed (Refer to 3.04.28).

② **Memo indications : (green)**
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<tbody>
<tr>
<td>F. USED /FOB DISAGREE</td>
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<td>L(R) TK PUMP 1 + 2 FAULT It</td>
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<td>3, 4, 5,</td>
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<td>L(R) XFR VALVE FAULT</td>
<td>L(R)XFR FAULT It</td>
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<td>3, 4, 5,</td>
<td>7, 8</td>
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<tr>
<td>Valve failed open.</td>
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<tr>
<td>L(R) XFR VALVE FAULT</td>
<td>MODE SEL FAULT It</td>
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<td>4, 5,</td>
<td>7, 8</td>
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<td>Valve failed closed.</td>
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<td>4, 5,</td>
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<td>Valve failed closed.</td>
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<td>L(R) CTRK TK XFR FAULT It</td>
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<td>5, 7, 8</td>
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<td>AUTO TRANSFER FAULT</td>
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<td>(CTR TK &gt; 250 kg (550 lb) and L or R WING TK &lt; 5000 kg (11000 lb))</td>
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<td>1,3,4,5,</td>
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<tr>
<td>Both CTR TK XFR pb sw at OFF when in AUTO mode</td>
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<td>L(R) WING TK LO LVL (750 kg - 1650 lb)</td>
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<td>7, 8</td>
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<tr>
<td>L + R WING TK LO LVL</td>
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<td>3, 4, 5,</td>
<td>7, 8</td>
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<tr>
<td>Low level detected in both wing inner cells</td>
<td></td>
<td></td>
<td>4, 5,</td>
<td>7, 8</td>
<td></td>
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<tr>
<td>L(R) WING TK HI TEMP</td>
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</tr>
<tr>
<td>Fuel temp above 54°</td>
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<tr>
<td>ENG 1(2) LP VALVE OPEN</td>
<td></td>
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<tr>
<td>Valve disagree in open position.</td>
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</tbody>
</table>

* Inhibited, if the pump is selected OFF.
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<td>NIL</td>
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<td>L(R) TK PUMP 1(2) FAULT</td>
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<tr>
<td>L(R) OUTER TK LO TEMP, or</td>
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<tr>
<td>L(R) INNER TK LO TEMP</td>
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<tr>
<td>Fuel temperature &lt; approx. – 43°C</td>
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<td>L(R) XFR VALVE OPEN</td>
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<tr>
<td>Either transfer valve opens before inner tank reaches low level</td>
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<tr>
<td>X FEED VALVE FAULT</td>
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<td>Valve position disagree</td>
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<td>FQI CH 1 (2) FAULT</td>
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</tbody>
</table>

* PUMP LO PR is inhibited, if the pump is selected OFF in phases 1 and 10.

**MEMO DISPLAY**

- OUTR TK FUEL XFRD appears in green, if at least one transfer valve is open in one wing tank.
- CTR TK FEEDG appears in green, if at least one center tank pump is energized.
- FUEL X FEED appears in green, if the fuel X FEED valve pushbutton is ON, and the X FEED valve is not fully closed. It appears in amber in flight phases 3, 4, or 5.
- REFUELG appears in green, when the door of the refuel control panel on the fuselage is open.
### E / WD : FAILURE TITLE conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
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</thead>
<tbody>
<tr>
<td>APU LP VALVE FAULT</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
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<tr>
<td>Valve position disagree</td>
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<tr>
<td>L(R) WING TK LO TEMP</td>
<td>NIL</td>
<td>NIL</td>
<td>FUEL</td>
<td>L(R) TK PUMP 1(2) FAULT</td>
<td>3, 4, 5, 7, 8 *</td>
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<tr>
<td>Fuel temperature &lt; -44°C</td>
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<tr>
<td>L(R) TK PUMP 1(2) LO PR</td>
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<tr>
<td>X FEED VALVE FAULT</td>
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<tr>
<td>Valve position disagree</td>
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<tr>
<td>FQI CH 1 (2) FAULT</td>
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</tbody>
</table>

* PUMP LO PR is inhibited, if the pump is selected OFF in phases 1 and 10.

### MEMO DISPLAY

- FUEL X FEED appears in green, if the fuel X FEED valve pushbutton is ON, and the X FEED valve is not fully closed. It appears in amber in flight phases 3, 4, or 5.
- REFUELG appears in green, when the door of the refuel control panel on the fuselage is open.
- FOB BELOW 3 T appears in green, when the fuel quantity in either wing is below 1500 kilograms.
### Airbus A319-320-321 [Fuel System]

<table>
<thead>
<tr>
<th>E / WD : FAILURE TITLE conditions</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
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<tbody>
<tr>
<td>APU LP VALVE FAULT</td>
<td>NIL</td>
<td>NIL</td>
<td>FUEL</td>
<td>NIL</td>
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<tr>
<td>Valve position disagree</td>
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<tr>
<td>L(R) OUTER TK LO TEMP, or</td>
<td></td>
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<td>L(R) TK</td>
<td>3, 4, 5,</td>
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<td>L(R) INNER TK LO TEMP</td>
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<td></td>
<td></td>
<td>PUMP 1(2)</td>
<td>7, 8</td>
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<tr>
<td>Fuel temperature &lt; approx. – 43°C</td>
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<tr>
<td>L(R) XFR VALVE OPEN</td>
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<tr>
<td>Either transfer valve opens before inner tank reaches low level</td>
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<tr>
<td>X FEED VALVE FAULT</td>
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<tr>
<td>FQI CH 1 (2) FAULT</td>
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</table>

* PUMP LO PR is inhibited, if the pump is selected OFF in phases 1 and 10.

### MEMO DISPLAY

- OUTR TK FUEL XFRD appears in green, if at least one transfer valve is open in one wing tank.
- CTR TK FEEDG appears in green, if at least one center tank pump is energized.
- FUEL X FEED appears in green, if the fuel X FEED valve pushbutton is ON, and the X FEED valve is not fully closed. It appears in amber in flight phases 3, 4, or 5.
- REFUELG appears in green, when:
  - The door of the refuel control panel on the fuselage is open, or
  - The PWR pushbutton of the refuel control panel in the cockpit is ON.
<table>
<thead>
<tr>
<th></th>
<th>NORM</th>
<th>EMER ELEC</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>INNER TANK PUMPS</td>
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<tr>
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<tr>
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<td>CTR TK PUMPS (&lt;3)</td>
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</tr>
<tr>
<td>1</td>
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<td>DC1</td>
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<tr>
<td>2</td>
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<td>MOT 2</td>
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<tr>
<td>ENGINE LP VALVES</td>
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<tr>
<td>ENG 1 MOT 1</td>
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<tr>
<td>ENG 1 MOT 2</td>
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<td>DC2</td>
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<tr>
<td>ENG 2 MOT 1</td>
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<td>ENG 2 MOT 2</td>
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<tr>
<td>L 1</td>
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</table>

(1) HOT BUS supplies power during refueling on battery.
(2) This occurs if DC BUS 1 is lost.
(3) In smoke configuration (GEN 1 LINE pushbutton OFF), inner tank pumps 1 are supplied directly by IDG (instead of AC 1) and pump relays by DC ESS (instead of DC 1).
### BUS EQUIPMENT LIST

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<td>CH 2</td>
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<tr>
<td>WING TANK PUMPS</td>
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<tr>
<td>L 1</td>
<td>AC1 (3)</td>
<td>DC1</td>
</tr>
<tr>
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<td>AC2</td>
<td>DC2</td>
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<tr>
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<td>DC1</td>
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<td>R 2</td>
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<td>DC2</td>
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1. HOT BUS supplies power during refueling on battery.
2. This occurs if DC BUS 1 is lost.
3. In smoke configuration (GEN 1 LINE pushbutton OFF), wing tank pumps 1 are supplied directly by IDG (instead of AC 1) and pump relays by DC ESS (instead of DC 1).