CSI SERIES GRID-TIED PV Inverter
CSI-4KTL1P-GI-FL & CSI-5KTL1P-GI-FL
INSTALLATION AND OPERATION MANUAL
VERSION 1.1

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Canadian Solar 4G single phase inverters integrate DRM and backflow power control function, that could suitable for smart grid requirement. Single phase 4G series inverter contain 2 models which are listed below: CSI-4KTL1P-GI-FL, CSI-5KTL1P-GI-FL

1.1 Product Description

1. Introduction

Figure 1.1
Front side view

Figure 1.2
Bottom side view
1. Introduction

1.2 Packaging

When you receive the inverter, ensure that all the parts listed below are included:

![Image of inverter and parts]

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PV grid tie inverter</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Wall/pole bracket</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Locking screws</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>DC connector</td>
<td>2 pairs</td>
</tr>
<tr>
<td>5</td>
<td>AC connector</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>RJ45 connector (Only for UK)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>WiFi/GPRS Stick (Optional)</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Manual</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 1.1 Parts list

2. Safety Instructions

2.1 Safety Symbols

Safety symbols used in this manual, which highlight potential safety risks and important safety information, are listed as follows:

- **WARNING:**
  - WARNING symbol indicates important safety instructions, which if not correctly followed, could result in serious injury or death.
  - Only devices in compliance with SELV (EN 69050) may be connected to the RS485 and USB interfaces.
  - Please don’t connect PV array positive(+) or negative(-) to ground, it could cause serious damage to the inverter.
  - Electrical installations must be done in accordance with the local and national electrical safety standards.
  - Do not touch any inner live parts until 5 minutes after disconnection from the utility grid and the PV input.

- **CAUTION:**
  - CAUTION, RISK OF ELECTRIC SHOCK symbol indicates important safety instructions, which if not correctly followed, could result in electric shock.
  - CAUTION, HOT SURFACE symbol indicates safety instructions, which if not correctly followed, could result in burns.

2.2 General Safety Instructions

Improper use may result in potential electric shock hazards or burns. This manual contains important instructions that should be followed during installation and maintenance. Please read these instructions carefully before use and keep them for future reference.
2. Safety Instructions

3. Overview

3.1 Front Panel Display

3.2 LED Status Indicator Lights

There are three LED status indicator lights in the front panel of the inverter. Left LED: POWER LED (red) indicates the power status of the inverter. Middle LED: OPERATION LED (green) indicates the operation status. Right LED: ALARM LED (yellow) indicates the alarm status. Please see Table 3.1 for details.

<table>
<thead>
<tr>
<th>Light</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>ON</td>
<td>The inverter can detect DC power</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>No DC power or low DC power</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>The inverter is operating properly.</td>
</tr>
<tr>
<td></td>
<td>FLASHING</td>
<td>The inverter has stopped to supply power.</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Alarm or fault condition is detected.</td>
</tr>
<tr>
<td>ALARM</td>
<td>OFF</td>
<td>The inverter is operating without fault or alarm.</td>
</tr>
</tbody>
</table>

2.3 Notice For Use

The inverter has been constructed according to the applicable safety and technical guidelines. Use the inverter in installations that meet the following specifications ONLY:

1. Permanent installation is required.
2. The electrical installation must meet all the applicable regulations and standards.
3. The inverter must be installed according to the instructions stated in this manual.
4. The inverter must be installed according to the correct technical specifications.
5. To startup the inverter, the Grid Supply Main Switch (AC) must be switched on, before the solar panel’s DC isolator shall be switched on. To stop the inverter, the Grid Supply Main Switch (AC) must be switched off before the solar panel’s DC isolator shall be switched off.
3. Overview

3.3 Keypad

There are four keys in the front panel of the Inverter (from left to right): ESC, UP, DOWN and ENTER keys. The keypad is used for:

- Scrolling through the displayed options (the UP and DOWN keys);
- Access to modify the adjustable settings (the ESC and ENTER keys).

3.4 LCD

The two-line Liquid Crystal Display (LCD) is located on the front panel of the Inverter, which shows the following information:

- Inverter operation status and data;
- Service messages for operator;
- Alarm messages and fault indications.

4. Installation

4.1 Select a Location for the Inverter

To select a location for the inverter, the following criteria should be considered:

- Do not install in small closed spaces where air cannot circulate freely. To avoid overheating, always make sure the flow of air around the inverter is not blocked.
- Exposure to direct sunlight will increase the operational temperature of the inverter and may cause output power limiting. Canadian Solar recommends inverter installed to avoid direct sunlight or raining.
- To avoid overheating ambient air temperature must be considered when choosing the inverter installation location. Canadian Solar recommends using a sun shade minimizing direct sunlight when the ambient air temperature around the unit exceeds 104°F/40°C.

▲ Figure 4.1 Recommended Installation locations
4. Installation

- Install on a wall or strong structure capable of bearing the weight.
- Install vertically with a maximum incline of +/- 5°. If the mounted inverter is tilted to an angle greater than the maximum noted, heat dissipation can be inhibited, and may result in less than expected output power.
- When 1 or more inverters are installed in one location, a minimum 12 inches clearance should be kept between each inverter or other object. The bottom of the inverter should be 20 inches clearance to the ground.

Visibility of the LED status indicator lights and the LCD located at the front panel of the inverter should be considered.

Adequate ventilation must be provided if the inverter is to be installed in a confined space.

NOTE:
Nothing should be stored on or placed against the inverter.

4.2 Mounting the Inverter

Dimensions of wall bracket:

Please see Figure 4.4 and Figure 4.5 for instruction on mounting the inverter. The inverter shall be mounted vertically. The steps to mount the inverter are listed below:

1. According to the figure 4.2, select the mounting height of the bracket and mark the mounting holes. For brick walls, the position of the holes should be suitable for the expansion bolts.

\[ \text{Figure 4.2 Inverter Mounting clearance} \]

\[ \text{Figure 4.3 Inverter wall mounting} \]

\[ \text{Figure 4.4 Inverter wall mounting} \]

\[ \text{Figure 4.5 Inverter wall mounting} \]
4. Installation

2. Make sure the bracket is horizontal and the mounting holes (in Figure 4.4) are marked correctly. Drill the holes into the wall or pillar at your marks.

3. Use the suitable screws to fix the bracket to the wall.

**WARNING:**
The inverter must be mounted vertically.

4. Lift up the inverter (be careful to avoid body strain), and align the back bracket on the inverter with the convex section of the mounting bracket. Hang the inverter on the mounting bracket and make sure the inverter is secure (see Figure 4.5).

4.3 Electrical Connections

4.3.1 Connect PV side of inverter

The electrical connection of the inverter must follow the steps listed below:

1. Switch the Grid Supply Main Switch (AC) OFF.
2. Switch the DC Isolator OFF.
3. Assemble PV input connector to the Inverter.

Before connecting inverter, please make sure the PV array open circuit voltage is within the limit of the inverter.

5. Use M4*9 screws in accessory to lock the inverter to the mount bracket.

Maximum 600Voc for

CSI-4KTL1P-GI-FL  CSI-5KTL1P-GI-FL

Please don’t connect PV array positive or negative pole to the ground, it could cause serious damages to the inverter.

Before connection, please make sure the polarity of the output voltage of PV array matches the “DC+” and “DC-” symbols.

▲ Figure 4.5 Wall Mount Bracket

▲ Figure 4.6 DC+ Connector

▲ Figure 4.7 DC- Connector
4. Installation

Please use approved DC cable for PV system.

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Cross section Range</th>
<th>Recommended value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry generic PV cable (model: PV1-F)</td>
<td>4.0<del>6.0 (12</del>10AWG)</td>
<td>4.0 (12AWG)</td>
</tr>
</tbody>
</table>

Table 4.1 DC cable

The steps to assemble the DC connectors are listed as follows:

I) Strip off the DC wire for about 7mm, Disassemble the connector cap nut.

![Figure 4.8 Disassemble the Connector Cap nut](image)

ii) Insert the wire into the connector cap nut and contact pin.

![Figure 4.9 Insert the Wire into the Connector Cap nut and contact pin](image)

iii) Crimp the contact pin to the wire using a proper wire crimper.

![Figure 4.10 Crimp the contact pin to the wire](image)

iv) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector.

![Figure 4.11 Connector with Cap nut Screwed on](image)

v) Then connect the DC connectors to the inverter. Small click will confirm connection.

![Figure 4.12 Connect the DC Connectors to the Inverter](image)
4. Installation

4.3.2 Connect grid side of inverter

For all AC connections, 2.5-6mm² 105 °C cable is required to be used. Please make sure the resistance of cable is lower than 1 ohm. If the wire is longer than 20m, it's recommended to use 6mm² cable.

WARNING:
There are “L” “N” “PE” symbols marked inside the connector, the Line wire of grid must be connected to “L” terminal; the Neutral wire of grid must be connected to “N” terminal; the Earth of grid must be connected to “PE” (see Figure 4.13).

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Cross section</th>
<th>Range</th>
<th>Recommended value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry generic grid cable</td>
<td>2.5-6.0mm²</td>
<td>6mm²</td>
<td></td>
</tr>
</tbody>
</table>

The steps to assemble the AC grid terminal connectors are listed as follows:

a) Disassemble the AC connector. Strip the AC wires about 6mm.

b) Fix the green and yellow wire to the ground terminal. Fix the red (or brown) wire to L (line) terminal. Fix the blue wire to N (Neutral). Tight the screws on the connector. Please try to pull out the wire to make sure it’s well connected.

c) Tighten up the cap on the terminal (see Figure 4.17).

Each Canadian Solar Single Phase Inverter is supplied with an AC grid terminal connector.
4. Installation

d) Connect the AC grid terminal connector to the inverter. Small click will confirm connection.

![Figure 4.18 Connect the AC Connector to the Inverter]

**Note:** Connection for Split phase grid.
When connect to 208/220/240V split phase, please connect L1 to “L” terminal, L2 to “N” terminal. Also connect earth to ground terminal.

### 4.3.3 External ground connection

An external ground connection is provided at the right side of inverter. Prepare OT terminals: M4. Use proper tooling to crimp the lug to the terminal. Connect the OT terminal with ground cable to the right side of inverter. The torque is 20 in-lbs (2Nm).

![Figure 4.19 Connect the external grounding conductor]

### 4.3.4 Max. over current protection device (OCPD)

To protect the inverter’s AC grid connection conductors, Canadian Solar recommends installing breakers that will protect against overcurrent. The following table defines OCPD ratings for the Canadian Solar 4-5kW single phase inverters.

<table>
<thead>
<tr>
<th>Inverter</th>
<th>Rated output voltage (V)</th>
<th>Rated output current (A)</th>
<th>Current for protection device (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSI-4KTL1P-GI-FL</td>
<td>220/230</td>
<td>18.2/17.4</td>
<td>25</td>
</tr>
<tr>
<td>CSI-5KTL1P-GI-FL</td>
<td>220/230</td>
<td>22.7/21.7</td>
<td>30</td>
</tr>
</tbody>
</table>

![Table 4.3 Rating of grid OCPD]

### 4.3.5 Inverter monitoring connection

The inverter can be monitored via Wi-Fi or GPRS. All Canadian Solar communication devices are optional (Figure 4.20). For connection instructions, please refer to the Canadian Solar Monitoring Device installation manuals.

- Wi-Fi monitoring
- GPRS monitoring
- Smart phone monitoring
- PC monitoring
- Web server

![Figure 4.20 Wi-Fi or GPRS communication function]
4. Installation

4.3.6 Electrical connection diagram
Refer to figure 4.21, which is a simple guidance for installing a solar system with PV inverter. A DC isolator is required to be installed in the system between PV panels with inverter.

Figure 4.21 Guidance for a Simple Installation of an Inverter Solar Energy System
1. The RCD should be in parallel connection between the consumers mains and the solar supply.
2. More than one RCD may be used. Each RCD can protect one or more circuits.

4.3.7 Meter Connection(optional)
The inverter has integrated export limitation functionality. To use this function, a power meter or a CT must be installed if use the power meter it should be installed in the load side or in the grid side. Because the meter used in the single-phase inverter is divided into two types: single-direction meter, and dual-direction meter. Therefore, the wiring method is divided into two cases. The dual-direction meter corresponds to the meter in grid connection mode; the single-direction meter corresponds to the meter in load connection mode. see Figure 4.22 and 4.23. After the inverter power on, please set the corresponding configuration as sections 6.5.11.1.2 and 6.5.11.1.3.

4.3.8 CT connections(optional)
This inverter has integrated export limitation functionality. To use this function, a power meter or a CT must be installed, if use the CT, please reference below picture. The CT should be fitted around the live conductor on the grid side of the main incoming consumer unit. Use the directional flow indication arrow on the CT to ensure it is fitted in the correct orientation. The arrow should be pointing towards the grid, not the load. When the inverter power on, please set the corresponding configuration as sections 6.5.11.1.4.1 and 6.5.11.1.4.2.
4. Installation

4.3.9 Logic interface connection (Only for UK)
Logic interface is required by G98 and G99 standard that can be operated by a simple switch or contactor. When the switch is closed the inverter can operated normally. When the switch is opened, the inverter will reduce it’s output power to zero within 5s.
Pin5 and Pin6 of RJ45 terminal is used for the logic interface connection.
Please follow below steps to assemble RJ45 connector.
1. Insert the network cable into the communication connection terminal of RJ45. (As shown in figure 4.25)

![Figure 4.25 RJ45 communication connection terminals]

2. Use the network wire stripper to strip the insulation layer of the communication cable. According to the standard line sequence of figure 4.26 connect the wire to the plug of RJ45, and then use a network cable crimping tool to make it tight.

![Figure 4.26 Strip the insulation layer and connect to RJ45 plug]

3. Connect R45 to DRM (logic interface).

After wire connection, please refer chapter 6.5.8.1 to enable the logic interface function.

5. Start & Stop

5.1 Start the Inverter
To start up the Inverter, it is important that the following steps are strictly followed:
1. Switch the grid supply main Switch (AC) ON first.
2. Switch the DC switch ON. If the voltage of PV arrays are higher than start up voltage, the inverter will turn on. The red LED power will light.
3. When both the DC and the AC sides supply to the inverter, it will be ready to generate power. Initially, the inverter will check both its internal parameters and the parameters of the AC grid, to ensure that they are within the acceptable limits. At the same time, the green LED will flash and the LCD displays the information of INITIALIZING.
4. After 30-300 seconds (depending on local requirement), the inverter will start to generate power. The green LED will be on continually and the LCD displays GENERATING.

WARNING:
Do not touch the surface when the inverter is operating. It may be hot and cause burns.

5.1.1 Inverter working status
When inverter working normally, there would be 5 status:
- Generating: Inverter is working normally
- LimByTemp: Inverter power limited by over ambient temperature
- LimByFreq: Inverter power limited by over grid frequency
- LimByVg: Inverter power limited by over grid voltage
- LimByVar: Inverter power limited by generating reactive power.

5.2 Stop the Inverter
To stop the Inverter, the following steps must be strictly followed:
1. Switch the Supply Main Switch (AC) OFF.
2. Wait 30 seconds. Switch the DC Switch OFF. All the LEDs of the inverter will be off in one minute.
6. Operation

During normal operation, the display alternately shows the power and the operation status with each screen lasting for 10 seconds (see Figure 6.1). Screens can also be scrolled manually by pressing the UP and DOWN keys. Press the ENTER key to access to the Main Menu.

6.1 Main Menu

There are four submenus in the Main Menu (see Figure 6.1):
1. Information
2. Settings
3. Advanced Info.
4. Advanced Settings

6.2 Information

The Canadian Solar Single Phase 4G Inverter main menu provides access to operational data and information. The information is displayed by selecting "Information" from the menu and then by scrolling up or down.

---

Table 6.1 Information list

<table>
<thead>
<tr>
<th>Display</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_DC1</td>
<td>10 sec</td>
<td>V_DC1: Shows input 01 voltage value.</td>
</tr>
<tr>
<td>I_DC1</td>
<td>10 sec</td>
<td>I_DC1: Shows input 01 current value.</td>
</tr>
<tr>
<td>V_DC2</td>
<td>10 sec</td>
<td>V_DC2: Shows input 02 voltage value.</td>
</tr>
<tr>
<td>I_DC2</td>
<td>10 sec</td>
<td>I_DC2: Shows input 02 current value.</td>
</tr>
<tr>
<td>V_Grid</td>
<td>10 sec</td>
<td>V_Grid: Shows the grid’s voltage value</td>
</tr>
<tr>
<td>I_Grid</td>
<td>10 sec</td>
<td>I_Grid: Shows the grid’s current value.</td>
</tr>
<tr>
<td>F_Grid</td>
<td>10 sec</td>
<td>F_Grid: Shows the grid’s frequency value.</td>
</tr>
<tr>
<td>Total Energy 025458 kwh</td>
<td>10 sec</td>
<td>Total generated energy value.</td>
</tr>
<tr>
<td>This Month: 0123kwh Last Month: 0123kwh</td>
<td>10 sec</td>
<td>This Month: Total energy generated this month. Last Month: Total energy generated last month.</td>
</tr>
<tr>
<td>Today: 15.1kwh Yesterday: 13.5kwh</td>
<td>10 sec</td>
<td>Today: Total energy generated today. Yesterday: Total energy generated yesterday.</td>
</tr>
<tr>
<td>Inverter SN 00000000000000</td>
<td>10 sec</td>
<td>Display series number of the inverter.</td>
</tr>
<tr>
<td>Export_P: +0000W Export_I: 00.0A</td>
<td>10 sec</td>
<td>Power of ERM. Current of EPM.</td>
</tr>
<tr>
<td>Work Mode: NULL DRM Number: 08</td>
<td>10 sec</td>
<td>Work Mode: The work mode of inverter. DRM Number: Show the number 01-08.</td>
</tr>
<tr>
<td>Meter EnergyP 000000. 00Wh</td>
<td>10 sec</td>
<td>Meter EnergyP: The active power.</td>
</tr>
</tbody>
</table>
6. Operation

6.2.1 Lock screen
Pressing the ESC key returns to the Main Menu. Pressing the ENTER key locks
(Figure 6.2(a)) or unlocks (Figure 6.2 (b)) the screen.

6.3 Settings
The following submenus are displayed when the Settings menu is selected:
1. Set Time
2. Set Address

6.3.1 Set Time
This function allows time and date setting. When this function is selected, the LCD will
display a screen as shown in Figure 6.3.

![Figure 6.3 Set Time](image)

Press the UP/DOWN keys to set time and date. Press the ENTER key to move from one
digit to the next (from left to right). Press the ESC key to save the settings and return to
the previous menu.

6.3.2 Set Address
This function is used to set the address when multi inverters are connected to single monitor.
The address number can be assigned from “01” to “99” (see Figure 6.4). The default address
number of Canadian Solar Single Phase Inverter is “01”.

6.4 Advanced Info - Technicians Only

NOTE:
To access to this area is for fully qualified and accredited technicians only.
Enter menu “Advanced Info.” and “Advanced settings” (need password).

Select “Advanced Info.” from the Main Menu. The screen will require the password as below

![Figure 6.5 Enter password](image)

The default password is “0010”. Please press “down” to move the cursor, press “up” to
select the number.

After enter the correct password the Main Menu will display a screen and be able to access
to the following information.

The screen can be scrolled manually by pressing the UP/DOWN keys. Pressing the ENTER
key gives access to a submenu. Press the ESC key to return to the Main Menu.

6.4.1 Alarm Message
The display shows the 100 latest alarm messages (see Figure 6.6). Screens can be scrolled
manually by pressing the UP/DOWN keys. Press the ESC key to return to the previous menu.
6. Operation

6.4.2 Running Message
This function is for maintenance person to get running message such as internal temperature, Standard NO. etc. Screens can be scrolled manually by pressing the UP/DOWN keys.

6.4.3 Version
The screen shows the model version and the software version of the Inverter (see Figure 6.7).

![Figure 6.7 Model Version and Software Version](image)

6.4.4 Daily Energy
The function is for checking the energy generation for selected day.

![Figure 6.8 Select date for daily energy](image)

6.4.5 Monthly Energy and Yearly Energy
The two functions are for checking the energy generation for selected month and Year

![Figure 6.10 Select month for monthly energy](image)  
![Figure 6.11 Select year for yearly energy](image)

6.4.6 Daily record
The screen shows history of changing settings. Only for maintenance personnel.

6.4.7 Communication Data
The screen shows the internal data of the Inverter (see Figure 6.14), which is for service technicians only.

![Figure 6.14 Communication Data](image)

6.4.8 Warning Message
The display shows the latest warning messages (see Figure 6.15). Screens can be scrolled manually by pressing the UP/DOWN keys. Press the ESC key to return to the previous menu.

![Figure 6.15 Warning Message](image)

6.5 Advanced Settings - Technicians Only

**NOTE:**
To access to this area is for fully qualified and accredited technicians only. Please follow 6.4 to enter password to access this menu.

Select Advanced Settings from the Main Menu to access the following options:
1. Select Standard  
2. Grid ON/OFF  
3. Clear Energy  
4. Reset Password  
5. Power Control  
6. Calibrate Energy  
7. Special Settings  
8. STD. Mode Settings  
9. Restore Settings  
10. HMI Update  
11. Export Power Set  
12. Restart HMI  
13. Debug Parameter  
14. DSP Update  
15. Power Parameter

![Figure 6.12 Month energy](image)  
![Figure 6.13 Yearly energy](image)
6. Operation

6.5.1 Selecting Standard
This function is used to select the grid’s reference standard (see Figure 6.16).

Press the UP/DOWN keys to select the standard (AS4777-02, AS4777-15, VDE4105, VDE0126, UL-240V-A, UL-208V-A, UL-240V, UL-208V, MEX-CFE, G83/2 (for 1-3.6kW models), G59/3 (for 4-5kW models), EN50438 DK, EN50438 IE, EN50438 NL and “User-Def” function). Press the ENTER key to confirm the setting. Press the ESC key to cancel changes and returns to previous menu.

**NOTE:**
This function is for technicians use only.

Selecting the “User-Def” menu will access to the following submenu (see Figure 6.17).

**NOTE:**
The "User-Def" function can be only used by the service engineer and must be allowed by the local energy supplier.

Below is the setting range for “User-Def”. Using this function, the limits can be changed manually.

- **OV-G-V1**: 240---270V
- **OV-G-V1-1**: 0.1---9S
- **OV-G-V2**: 240---300V
- **OV-G-V2-1**: 0.1---1S
- **UN-G-V1**: 170---210V
- **UN-G-V1-1**: 0.1---9S
- **UN-G-V2**: 110---210V
- **UN-G-V2-1**: 0.1---1S
- **Startup-T**: 10-600S
- **OV-G-V1**: 260V
- **OV-G-V1-1**: 1S

6.5.2 Grid ON/OFF
This function is used to start up or stop the power generation of Canadian Solar Single Phase Inverter (see Figure 6.18).

Screen can be scrolled manually by pressing the UP/DOWN keys. Press the ENTER key to save the setting. Press the ESC key to return to the previous menu.

**NOTE:**
This inverter including two level protections for voltage and frequency under user-def mode; please set the same value both level one and level two if the grid only have one level requirement, eg. Brazil...etc.

Press the UP/DOWN keys to scroll through items. Press the ENTER key to edit the highlighted item. Press the UP/DOWN keys again to change the setting. Press the ENTER key to save the setting. Press the ESC key to cancel changes and returns to the previous menu.

6.5.3 Clear Energy
Clear Energy can reset the history yield of inverter

These two functions are applicable by maintenance personnel only, wrong operation will prevent the inverter from working properly.

6.5.4 Reset Password
This function is used to set the new password for menu “Advanced info.” and “Advanced information” (see Figure 6.19).

Enter the right password before set new password. Press the DOWN key to move the cursor, Press the UP key to revise the value. Press the ENTER key to execute the setting. Press the ESC key to return to the previous menu.
6. Operation

6.5.5 Power Control
Active and reactive power can be set through power setting button.
There are 5 item for this sub menu:
4. Rea_P With Restore  5. Select PF Curve

This function is applicable by maintenance personnel only, wrong operation will prevent the inverter from reaching maximum power.

6.5.6 Calibrate Energy
Maintenance or replacement could clear or cause a different value of total energy. Use this function could allow user to revise the value of total energy to the same value as before. If the monitoring website is used the data will be synchronous with this setting automatically. (see Figure 6.20).

Press the DOWN key to move the cursor, Press the UP key to revise the value. Press the ENTER key to execute the setting. Press the ESC key to return to the previous menu.

6.5.7 Special Settings

This function is applicable by maintenance personnel only, wrong operation will prevent the inverter from working properly.

6.5.8 STD. Mode Settings
There are 5 setting under STD. Mode settings.
5. Initial Settings

This function is applicable by maintenance personnel only, wrong operation will prevent the inverter from working properly.

6.5.8.1 Enable logic interface settings
When select G98 or G99 standard to use the logic interface function, please follow below settings to enable the DRM. DRM default setting is "OFF", if DRM set "ON", but the logic interface un-connected to the switch or the switch is open, the inverter HMI will display "Limit by DRM" and the inverter output power will be limited to zero.
1. Select Initial Settings
2. Select DRM and set it “ON”

6.5.9 Restore Settings
Restore setting could set all item in 6.5.7 special setting to default. The screen shows as below:

Are you sure?
YES=<ENT> NO=<ESC>

Press the Enter key to save the setting after setting grid off.
Press the ESC key to return the previous mean.

6.5.10 HMI Update
This function is used for update the LCD program.

These two functions are applicable by maintenance personnel only, wrong operation will prevent the inverter from working properly.

6.5.11 Export Power Set

NOTE:
To access to this area is for fully qualified and accredited technicians only. Please follow 6.4 to enter password to access this menu.

The default password is “0010”. Please press “down” to move the cursor, press “up” to select the number.
Select EPM Settings from the Main Menu to access the following options:
1. Model Select  2.Set Backflow Power  3.Fail safe ON/OFF
6. Operation

### 6.5.11.1 Model Select
There are 4 settings in this menu as below:

### 6.5.11.1.1 OFF
This function is used to shut down the Export Power Set.

Press the ENTER key to set done.
Press the ESC key to the previous menu.

### 6.5.11.1.2 Meter in Load
The submenu is used to set meter in Load as shown as 4.3.7 Meter connection(optional).

Press Enter key to save the setting.

### 6.5.11.1.3 Meter in Grid
The submenu is used to set meter in Grid as shown as 4.3.7 Meter connection(optional).

Press Enter key to save the setting.

### 6.5.11.1.4 Current sensor
The submenu is used to set current sensor as shown as 4.3.8 CT connection(optional).

There are 2 modes shown as below: 1. CT Sampling Ratio 2. CT Link test

### 6.5.11.1.4.1 CT Sampling Ratio
This function is used for change CT Sampling Ratio if customer select different CT.
The default radio is 3000:1.

Press the UP/DOWN keys to set data. Press the ENTER key to set CT Para.
Press the ESC key to save the settings and return to the previous menu.

### 6.5.11.1.4.2 CT Link Test
Before pressing the CT Link Test menu, please check as follow:
1. Load power ≥ 500W
2. Inverter should be set Grid Off
3. CT should be connected
4. EPM should be set ON

Press the ENTER key to show the screen of CT Link Test. It will show as below when the EPM was set ON:

Press the ESC key to the previous menu.

**NOTE:**
- “Error” means CT reverse connection. Please change CT direction
- “Can not judge” means load power is not enough, it should be more than 500W.
- “Correct” means CT has been connected correctly.
6. Operation

6.36. See figure 6.29. If CT test pass but inverter still can’t achieve export power (power is not controllable or always 0 power output). Please check installation location of the CT.

6.5.11.2 Backflow Power

This submenu is used for set allowed power that inverter can generate to grid.

- Set Backflow Power
  - YES=<ENT> NO=<ESC>
  - P_Backflow:-0001W

▲ Figure 6.30 Set the backflow power

▲ Figure 6.31

Press the UP/DOWN keys to set data. Press the ENTER key to set backflow power. Then press DOWN keys to move the cursor, press UP to change the number. Press the ESC key to save the settings and return to the previous menu.

6.5.11.3 Fail safe ON/OFF

This function is used to remind whether the fail safe function is ON or not. The default setting is ON.

- YES=<ENT> NO=<ESC>
  - Fail Safe Set:ON

▲ Figure 6.32 Set the Fail Safe ON/OFF

Press the UP/DOWN keys to set ON/OFF. Press the ENTER key to set done. Press the ESC key to the previous menu.

ON: When CT is disconnected, the inverter will stop generate power and LCD show "Fail Safe"
OFF: When CT is disconnected, the inverter will be limited to the power at the time CT is disconnected. If restart, inverter will not limit output power.

6.5.12 Restart HMI

The function is used for restart the HMI.

- This function is applicable by maintenance personnel only, wrong operation will prevent the inverter from reaching maximum power.

6.5.13 Debug Parameter

This function is used for manufacturer maintenance personnel only.

6.5.14 DSP Update

The function is used for update the DSP.

- This function is applicable by maintenance personnel only, wrong operation will prevent the inverter from reaching maximum power.

6.5.15 Power Parameter

This function is used for calibrate inverter output energy. It will not impact the energy count for inverter with RGM.

The screen shows:

- YES=<ENT> NO=<ESC>
  - Power para: 1.000

▲ Figure 6.33 Power Rate Limit

Press the Down key to move the cursor. Press the Up key to change the digit. Please press the Enter to save the setting and press the ESC key to return to the previous menu.

- This setting is used for grid operator, don’t change setting under this manual.
## 7. Maintenance

**Canadian Solar Single Phase 4G Inverter** does not require any regular maintenance. However, cleaning the dust on the heat-sink will help the inverter to dissipate the heat and increase its life time. The dust can be removed with a soft brush.

**CAUTION:**
Do not touch the inverter’s surface when it is operating. Some parts of the inverter may be hot and cause burns. Turn off the inverter (refer to Section 5.2) and wait for a cool-down period before any maintenance or cleaning operation.

The LCD and the LED status indicator lights can be cleaned with a damp cloth if they are too dirty to be read.

**NOTE:**
Never use any solvents, abrasives or corrosive materials to clean the inverter.

## 8. Troubleshooting

The inverter is designed in accordance with the most important international grid-tied standards and safety and electromagnetic compatibility requirements. Before delivering to the customer, the inverter has been subjected to several tests to ensure its optimal operation and reliability.

In case of failure, the LCD screen will display an alarm message. In this case, the inverter may stop feeding into the grid. The failure descriptions and their corresponding alarm messages are listed in Table 8.1:

<table>
<thead>
<tr>
<th>Alarm Message</th>
<th>Failure description</th>
<th>Solution</th>
</tr>
</thead>
</table>
| No power        | Inverter no power on LCD                    | 1. Check PV input connections  
2. Check DC input voltage (single phase >120V, three phase >350V)  
3. Check if PV+/- is reversed |
| LCD show initializing all the time | can not start-up                           | 1. Check if the connector on main board or power board are fixed.  
2. Check if the DSP connector to power board are fixed. |
| OV-G-V01/02/03/04 | Over grid voltage                        | 1. Resistant of AC cable is too high.  
2. Adjust the protection limit if it’s allowed by electrical company. |
| UN-G-V01/02     | Under grid voltage                         | 1. Use user define function to adjust the protection limit if it’s allowed by electrical company. |
| OV-G-F01/02     | Over grid frequency                        | 1. Check PV input connections  
2. Check driver connection |
| UN-G-F01/02     | Under grid frequency                       | 1. Restart inverter  
2. Change power board |
| G-IMP           | High grid impedance                        | 1. Check inverter inductor connection  
2. Check driver connection |
| NO-GRID         | No grid voltage                            | 1. Check connections and grid switch.  
2. Check the grid voltage inside inverter terminal. |
| OV-DC01/02/03/04 | Over DC voltage                          | 1. Reduce the module number in series |
| OV-BUS          | Over DC bus voltage                        | 1. Check inverter inductor connection  
2. Check driver connection |
| UN-BUS01/02     | Under DC bus voltage                       | 1. Restart inverter  
2. Change power board |
| GRID-INTF01/02  | Grid interference                          | 1. Restart inverter  
2. Identify and remove the string to the fault MPPT  
3. Change power board |
| OV-G-I          | Over grid current                          | 1. Check inverter surrounding ventilation.  
2. Check if there’s sunshine direct on inverter in hot weather. |
| IGBT-OV-I       | Over IGBT current                          | 1. Restart inverter  
2. Identify which string cause the fault and check the isolation of the string. |
| DC-INTF         | DC input overcurrent                       | 1. Restart inverter  
2. Identify and remove the string to the fault MPPT  
3. Change power board |
| OV-DCA-I        | Grid current tracking fail                 | 1. Restart inverter  
2. Identify and remove the string to the fault MPPT  
3. Change power board |
| IGFOL-F         | Grid current sampling fail                 | 1. Restart inverter  
2. Identify and remove the string to the fault MPPT  
3. Change power board |
| IG-AD           | Grid current sampling fail                 | 1. Restart inverter  
2. Identify and remove the string to the fault MPPT  
3. Change power board |
| OV-TEM          | Over Temperature                           | 1. Restart inverter  
2. Identify which string cause the fault and check the isolation of the string. |
| INI-FAULT       | Initialization system fault                | 1. Restart inverter  
2. Identify which string cause the fault and check the isolation of the string. |
| DSP-B-FAULT     | Comm. failure between main and slave DSP   | 1. Restart inverter  
2. Identify which string cause the fault and check the isolation of the string. |
| 12Power-FAULT  | 12V power supply fault                     | 1. Restart inverter  
2. Identify which string cause the fault and check the isolation of the string. |
| PV ISO-PRO 01/02 | PV isolation protection                    | 1. Remove all DC input, reconnect and restart inverter one by one.  
2. Identify which string cause the fault and check the isolation of the string. |
8. Trouble Shooting

NOTE:
If the inverter displays any alarm message as listed in Table 8.1; please turn off the inverter (refer to Section 5.2 to stop your inverter) and wait for 5 minutes before restarting it (refer to Section 5.1 to start your inverter). If the failure persists, please contact your local distributor or the service center.

Please keep ready with you the following information before contacting us.

1. Serial number of Canadian Solar Single Phase Inverter;
2. The distributor/dealer of Canadian Solar Single Phase Inverter (if available);
3. Installation date.
4. The description of problem (i.e. the alarm message displayed on the LCD and the status of the LED status indicator lights. Other readings obtained from the Information submenu (refer to Section 6.2) will also be helpful.;
5. The PV array configuration (e.g. number of panels, capacity of panels, number of strings, etc.);
6. Your contact details.

<table>
<thead>
<tr>
<th>Alarm Message</th>
<th>Failure description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILeak-PRO 01/02/03/04</td>
<td>Leakage current protection</td>
<td>1. Check AC and DC connection 2. Check inverter inside cable connection.</td>
</tr>
<tr>
<td>RelayChk-FAIL</td>
<td>Relay check fail</td>
<td>1. Restart inverter or contact installer.</td>
</tr>
<tr>
<td>DCinj-FAULT</td>
<td>High DC injection current</td>
<td>1. Restart inverter or contact installer.</td>
</tr>
</tbody>
</table>

▲ Table 8.1 Fault message and description

9. Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>CSI-4KT1P-GI-FL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. DC input power (Watts)</td>
<td>4600</td>
</tr>
<tr>
<td>Max. DC input voltage (Volts)</td>
<td>600</td>
</tr>
<tr>
<td>Rated DC voltage (Volts)</td>
<td>330</td>
</tr>
<tr>
<td>Startup voltage (Volts)</td>
<td>120</td>
</tr>
<tr>
<td>MPPT voltage range (Volts)</td>
<td>90...520</td>
</tr>
<tr>
<td>Max. input current (Amps)</td>
<td>11+11</td>
</tr>
<tr>
<td>Max short circuit input current (Amps)</td>
<td>17.2+17.2</td>
</tr>
<tr>
<td>MPPT number/Max input strings number</td>
<td>2/2</td>
</tr>
<tr>
<td>Rated output power (Watts)</td>
<td>4000</td>
</tr>
<tr>
<td>Max. output power (Watts)</td>
<td>4400</td>
</tr>
<tr>
<td>Max. apparent output power (VA)</td>
<td>4400</td>
</tr>
<tr>
<td>Rated grid voltage (Volts)</td>
<td>220/230</td>
</tr>
<tr>
<td>Grid voltage range (Volts)</td>
<td>160...285</td>
</tr>
<tr>
<td>Rated output current (Amps)</td>
<td>18.2/17.4</td>
</tr>
<tr>
<td>Power Factor (at rated output power)</td>
<td>0.8 leading~0.8 lagging</td>
</tr>
<tr>
<td>THDI (at rated output power)</td>
<td>&lt;1.5%</td>
</tr>
<tr>
<td>Rated grid frequency (Hertz)</td>
<td>50/60</td>
</tr>
<tr>
<td>Operating frequency range (Hertz)</td>
<td>47...52 or 57...62</td>
</tr>
<tr>
<td>Max. efficiency</td>
<td>98.1%</td>
</tr>
<tr>
<td>EU efficiency</td>
<td>97.3%</td>
</tr>
<tr>
<td>MPPT efficiency</td>
<td>&gt;99.5%</td>
</tr>
<tr>
<td>Dimensions</td>
<td>310W<em>543H</em>160D (mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>11.5kg</td>
</tr>
<tr>
<td>Topology</td>
<td>Transformerless</td>
</tr>
<tr>
<td>Operating ambient temperature range</td>
<td>-25℃...+60℃</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP65</td>
</tr>
<tr>
<td>Noise emission (typical)</td>
<td>&lt;20 dBA</td>
</tr>
<tr>
<td>Cooling concept</td>
<td>Natural convection</td>
</tr>
<tr>
<td>Max. operation altitude</td>
<td>4000m</td>
</tr>
<tr>
<td>Designed lifetime</td>
<td>&gt;20 years</td>
</tr>
<tr>
<td>Grid connection standard</td>
<td>En50438, G83/2, G98, G99, AS4777.2:2015, VDE0126-1-1, IEC61727, VDE N4105</td>
</tr>
<tr>
<td>Operating surroundings humidity</td>
<td>0...100% Condensing</td>
</tr>
<tr>
<td>Connection</td>
<td>Mc4 connector and Ip67 rated plug</td>
</tr>
<tr>
<td>Display</td>
<td>LCD, 2x20 Z.</td>
</tr>
<tr>
<td>Communication connections</td>
<td>4 pins RS485 connector</td>
</tr>
<tr>
<td>Monitoring</td>
<td>WiFi or GPRS</td>
</tr>
<tr>
<td>Warranty Terms</td>
<td>5 Years STD (Extendable to 20 Years)</td>
</tr>
<tr>
<td>Maximum inverter Backfeed Current to Array</td>
<td>0 A</td>
</tr>
<tr>
<td>Inrush Current (peak and duration)</td>
<td>8.8A@5ms</td>
</tr>
<tr>
<td>Maximum Output Fault Current</td>
<td>51.3A</td>
</tr>
<tr>
<td>Maximum Output Over Current Protection</td>
<td>51.3A</td>
</tr>
</tbody>
</table>
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</tr>
</tbody>
</table>
### 3 PHASE STRING INVERTERS (KTL SERIES)

Warning: This checklist is not a replacement for the user manual. Please read the user manual prior to inverter site selection and installation.

<table>
<thead>
<tr>
<th>Step</th>
<th>No.</th>
<th>Content</th>
<th>Details</th>
<th>Values / Notes</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Installation environment</td>
<td>Ensure installation site meets environmental and physical constraints.</td>
<td></td>
<td>[ ] Good [ ] Poor</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Unpacking</td>
<td>Check inverter condition after unpacking.</td>
<td></td>
<td>[ ] Good [ ] Poor</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Mounting bracket installation</td>
<td>Install inverter mounting bracket according to installation instructions in user manual. For allowable tilt angle refer to the installation manual.</td>
<td></td>
<td>[ ] Completed Record Tilt Angle in Notes</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Inverter installation</td>
<td>Carefully install the inverter to the mounting bracket and ensure it is firmly attached. Ensure the inverter has proper clearances and are properly ventilated.</td>
<td></td>
<td>[ ] Completed</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Serial number</td>
<td>Record the product serial numbers located on the side label.</td>
<td>Serial Numbers; attached list</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Solar modules</td>
<td>Confirm PV module installation completion. Record the total power of the PV modules.</td>
<td>[ ] Completed Record kWp in Notes</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>DC input and AC output connection</td>
<td>Switch off the DC and AC distribution unit, connect DC to PV terminals of inverter, and connect AC to AC terminals of inverter. Ensure proper polarity and cable size. Torque to specifications.</td>
<td>[ ] Completed Record Torque in Notes</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>PV voltage</td>
<td>Measure and record DC voltage. Ensure voltage and polarities are correct. Confirm the voltages are within 5% tolerance to what was tested.</td>
<td>[ ] Completed Record V_{DC} in Notes</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>AC grid</td>
<td>Measure and record AC voltage and frequency. Confirm the V_{AC} voltages are within 5% tolerance to what was tested.</td>
<td>[ ] Completed Record V_{AC} in Notes</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>Grounding cable</td>
<td>Ensure ground cable is firmly attached to grounding lug.</td>
<td>[ ] Good [ ] Poor</td>
<td></td>
</tr>
</tbody>
</table>

Please return completed form to inverter.register@canadiansolar.com
### INSTALLATION AND COMMISSIONING CHECKLIST

**3 PHASE STRING INVERTERS (KTL SERIES)**

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<table>
<thead>
<tr>
<th>Step No.</th>
<th>Content</th>
<th>Details</th>
<th>Values / Notes</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Communication cable (if function is used)</td>
<td>Connect the RS485 cable to the communication port.</td>
<td>[ ] Completed</td>
<td></td>
</tr>
</tbody>
</table>
| 2        | Supply DC / AC power | **CSI-xx-KTL-Gi:**
1. Switch the grid supply main Switch (AC) ON first.
2. Switch the DC switch ON. If the voltages of PV arrays are higher than start up voltage, the inverter will turn on. The red LED power will be continuously lit.
3. When both the DC and the AC sides supply to the inverter, it will be ready to generate power. Initially, the inverter will check both its internal parameters and the parameters of the AC grid, to ensure that they are within the acceptable limits. At the same time, the green LED will flash and the LCD displays the information of INITIALIZING. | [ ] Completed Record LEDs status in Notes | |
# INSTALLATION AND COMMISSIONING CHECKLIST

**3 PHASE STRING INVERTERS (KTL SERIES)**

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<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>Waiting time</td>
<td>CSI-xx-KTL-GI: After 60-300 seconds (depending on local requirement), the inverter will start to generate power. The green LED will be on continuously and the LCD displays the information of GENERATING.</td>
<td>[ ] Completed</td>
<td>Record LEDs status in Notes</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Power generation</td>
<td>After grid connection, record power output of inverter.</td>
<td>[ ] Completed</td>
<td>Record power in Notes</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Date &amp; Time setting</td>
<td>Set the current date and time using the front panel interface.</td>
<td>[ ] Completed</td>
<td>Record current date/time in Notes</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Communication setting (if avail.)</td>
<td>Set communication with a unique address for each inverter.</td>
<td>[ ] Completed</td>
<td>Record address in Notes</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Machine version</td>
<td>For maintenance and reference, please record the firmware revisions if applicable.</td>
<td>[ ] Completed</td>
<td>Record with serial numbers</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Operating parameter</td>
<td>Record operating parameters of the inverter. Verify IEC62109 or the corresponding On-grid setting is selected. De-rate inverter and attach de-rate sticker as required.</td>
<td>[ ] Completed</td>
<td>Record operating parameters in Notes</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>Testing</td>
<td>Open and close the DC breaker to confirm whether the inverter reboots and shuts down automatically.</td>
<td>[ ] Reboot successful [ ] Not rebooting</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>Completion</td>
<td>Installation and commissioning is complete if no abnormality.</td>
<td>[ ] Good [ ] Issues detected</td>
<td></td>
</tr>
</tbody>
</table>
INSTALLATION AND COMMISSIONING CHECKLIST

3 PHASE STRING INVERTERS (KTL SERIES)

Warning: This checklist is not a replacement for the user manual. Please read the user manual prior to inverter site selection and installation.

System Owner: ________________________________

Address / Location: ________________________________

Inverter model: ________________________________

Inverter firmware revision: DSP: __________ LCD:______________________________

Number of inverters: ______________ Inverter mounting tilt: ______________

Output power*: ______________ Input DC voltage: ______________

Grid: V Max: __________ V Min: __________ Frequency Max: __________ Min: __________

Configuration: MPPT Individual ______ MPPT Parallel ____________________________

Monitoring: RS485: ______________ Ethernet: ________________________________

PV module manufacturer: ______________ PV model: ____________________________

DC cable size: ______________ AC cable size: ________________________________

Transformer ratings, supplier: ________________________________

Number of series connected modules in PV strings: ________________________________

Number of PV strings in parallel per MPPT: ________________________________

Total System size (DC Watts): ________________________________

*Specify de-rated power and add nameplate power in parenthesis

GENERAL COMMENTS / OBSERVATIONS:

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Note site typical arrangements and variances

Please return completed form to inverter.register@canadiansolar.com
3 PHASE STRING INVERTERS
(KTL SERIES)

Warning: This checklist is not a replacement for the user manual. Please read the user manual prior to inverter site selection and installation.

Inverter serial numbers:

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INSTALLER’S NAME ____________________________

INSTALLER’S SIGNATURE ____________________________

COMPANY ____________________________

DATE ____________________________

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