

NOS DRIVER ND-100



INSTRUCTION MANUAL

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This Sakura Motorsports product is designed to be used on off-road vehicles only and should never be used on public roads. This product is not emissions exempt, and does not carry a CARB E.O. number.

All engine tuning is done at the user's risk. Any engine damage that may result from improper tuning or electrical failure will not be covered by Sakura Motorsports. Any tuning recommendations or procedures that are outlined in this manual are strictly for informative purposes. Engine damage caused by misinterpretation of these recommendations is not covered by Sakura Motorsports.

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WARRANTY CONDITIONS

Sakura Motorsports warrants this product to be free from defects in material and workmanship under normal use and if properly installed for a period of one year from date of purchase.

If found to be defective as mentioned above, it will be replaced or repaired if returned prepaid along with proof of date of purchase. This shall constitute the sole remedy of the purchaser and the sole liability of Sakura Motorsports. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations whether expressed or implied, including any implied warranty of merchantability or fitness.

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In case of malfunction, this Sakura Motorsports product will be repaired free of charge according to the terms of the warranty. After the warranty period has expired, repair service is charged based on a minimum and maximum charge quoted by the dealer. The repaired unit will be returned as soon as possible after receipt.

INTRODUCTION

The ND-100 NOS DRIVER expands the Sakura Motorsports range of high performance Fuel Management systems into the most powerful Nitrous Oxide delivery systems in the world.

In the past, Nitrous Oxide control has often worked independently to the main fuel delivery system. Engagement of the Nitrous Oxide System (NOS) was complicated and often resulted in aggressive power enhancement levels at undesirable times. Changes in the vehicles chassis setup, or track conditions on the day would alter the traction available and hence require changes in the NOS delivery to suit. These changes were accomplished by trialing alternate 'jets' (if available), which was time consuming and complicated.

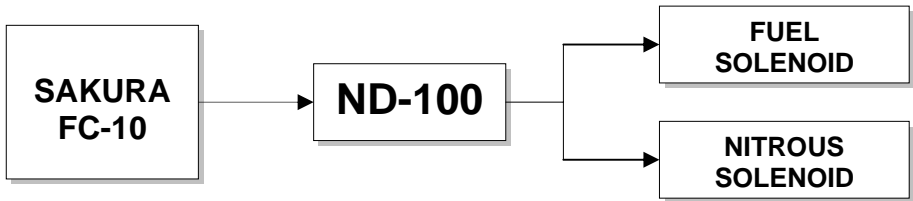
The combination of a Fuel Management System and NOS driver removes these short comings and adds many advantages including:

- ❑ Nitrous Oxide delivery is progressive and relative to engine RPM , elapsed time or both.
- ❑ Nitrous Oxide delivery is fully programmable , complex delivery strategies can be developed to suit a given track condition, chassis or tire combination.
- ❑ Built in safety features reduce additional wiring of micro-switches. Nitrous delivery is only activated if all the programmable conditions are met including throttle position and engine RPM.
- ❑ Nitrous delivery can be programmed to add power during a complete run or only part of the run. Nitrous Oxide can be delivered prior to launch by configuring the system to provide 'turbo anti lag'.
- ❑ Combined with the data logging features of Sakura Motorsports Fuel Management Systems, parameters such as Nitrous boosted HP, engine RPM, Exhaust Gas Temperatures (EGT) and boost pressures can be recorded during each run. These results can be analysed and modifications to the nitrous delivery can be made to suit.
- ❑ Warning indicators can be configured to indicate excessive exhaust gas temperatures or over boosting from incorrect Nitrous Oxide delivery.

HARDWARE INSTALLATION

Installation of the ND-100 assumes that a Sakura Motorsports Fuel Management System such as a FC-10 has previously been installed and is operational. Installation of the ND-100 should only be attempted on engines that at least have been tuned to operate during idle and light load conditions.

The ND-100 controls the signals from the Fuel Management System, such as the FC-10, to the Nitrous and Fuel solenoids installed on the engine.



The ND-100 has 4 types of connections, these are summarised below:

+12v : This connection supplies +12V from a power source. The power source should be connected through a fuse and a relay. This power connection should also power the positive of the NOS solenoids.

GND : The ND-100 has two (2) GND pins, these should be connected to the engine / chassis ground. Due to the large currents involved it is recommended that the ground wire be as short as possible and as close as possible to the battery negative terminal.

SOLENOID 1 / 2 : Connect the ground wire of the Fuel or Nitrous solenoid to these connections. Connect the other solenoid wire to the +12v mentioned above.

ONLY CONNECT ONE (1) SOLENOID TO EACH CONNECTION. Sakura Motorsports only recommends the use of Nitrous Oxide Systems (NOS) solenoids with its products.

ECU CONTROL : Connect this to the appropriate output signal from the Fuel Management Computer. The FC-10 has four programmable outputs which must be selected as NOS OUTPUTS for the unit to function. See the FC-10 User Manual on identifying the suitable pins on the unit.

ND-100 CONNECTIONS

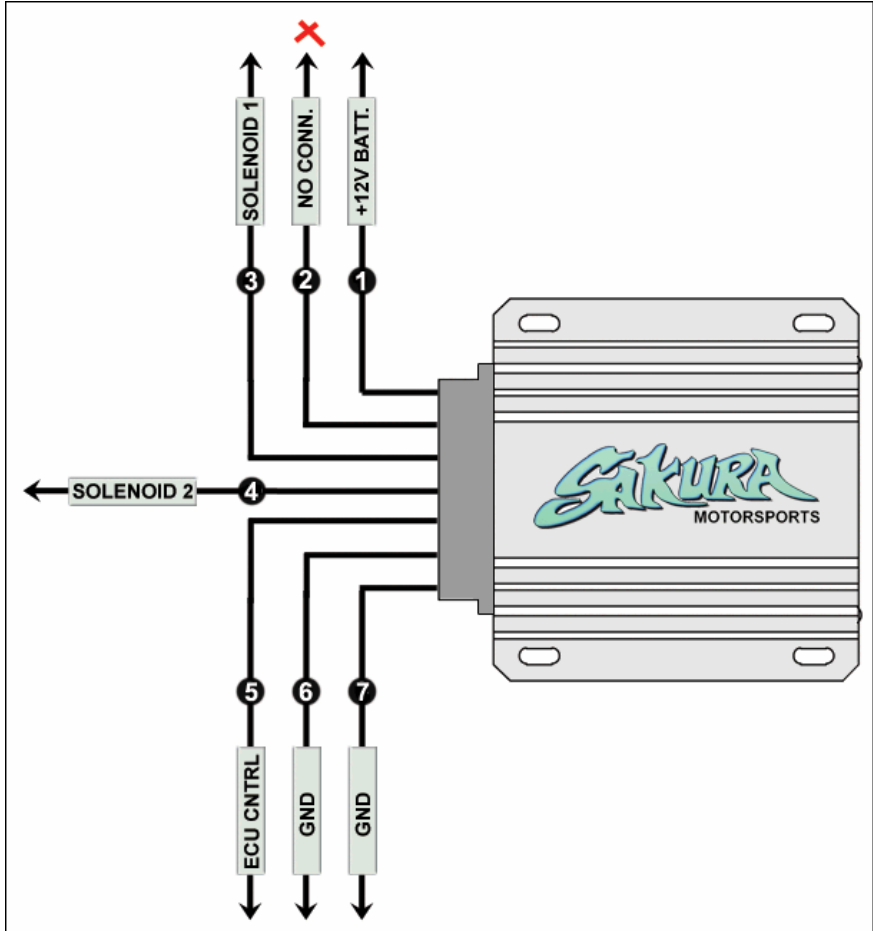


Figure 1. ND-100 PIN OUT DIAGRAM

| PIN | COLOR | FUNCTION |
|-----|----------|--------------------------|
| 1 | RED | TO +12V POWER SUPPLY |
| 2 | N/A | NOT CONNECTED |
| 3 | ORG/YEL | FUEL OR NITROUS SOLENOID |
| 4 | ORG/BLUE | FUEL OR NITROUS SOLENOID |
| 5 | YEL/GRN | TO FC-10 NOS OUTPUT PIN |
| 6 | BLACK | TO VEHICLE GROUND (GND) |
| 7 | BLACK | TO VEHICLE GROUND (GND) |

Figure 2. ND-100 PIN DESCRIPTIONS

Figure 3 illustrates a typical installation of the ND-100 .

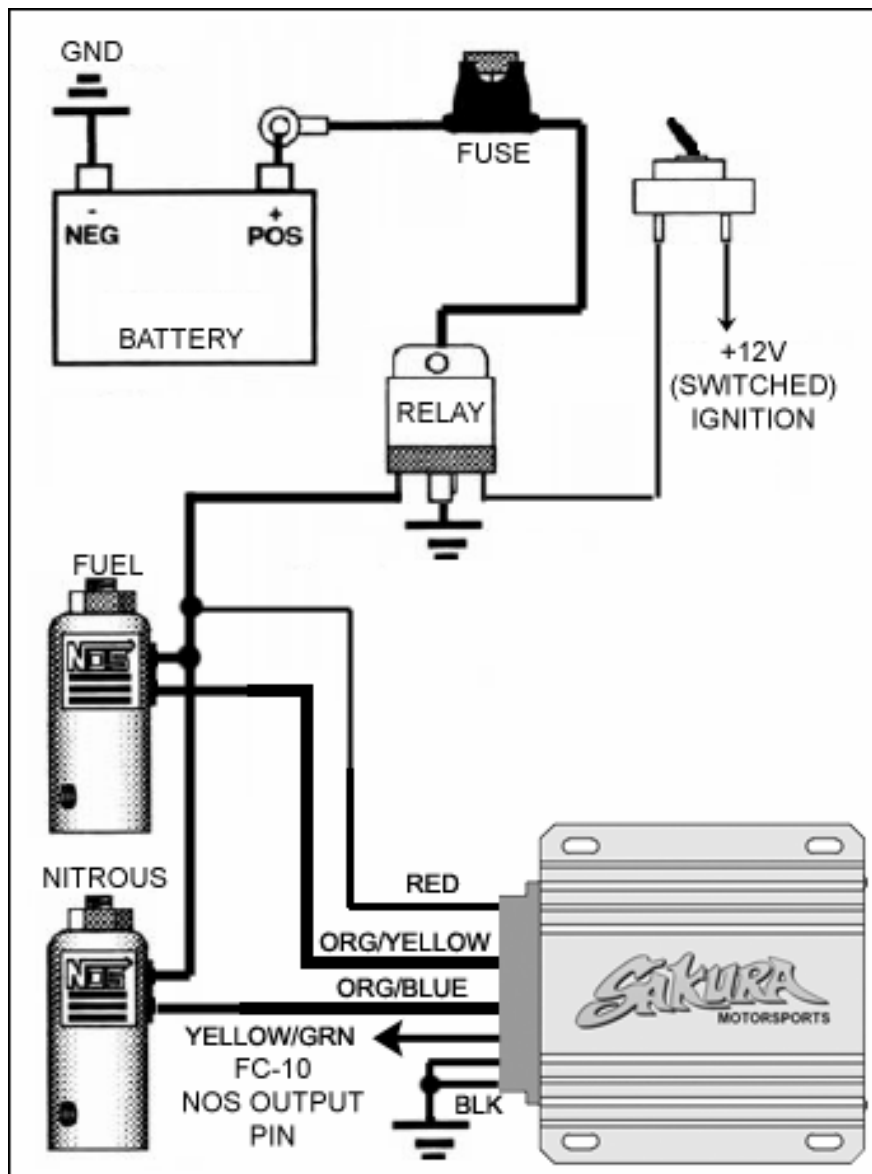


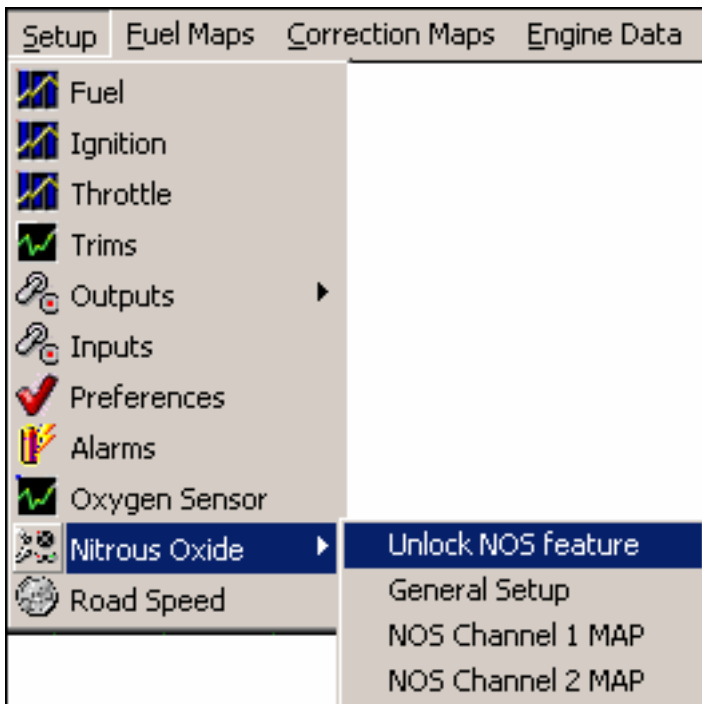
Figure 3. ND-100 Connections

SOFTWARE CONFIGURATION

To use the NOS output control feature of the FC-10 , the feature must first be enabled. This is a once only operation , and once activated , the NOS output feature will work for the life of the unit.

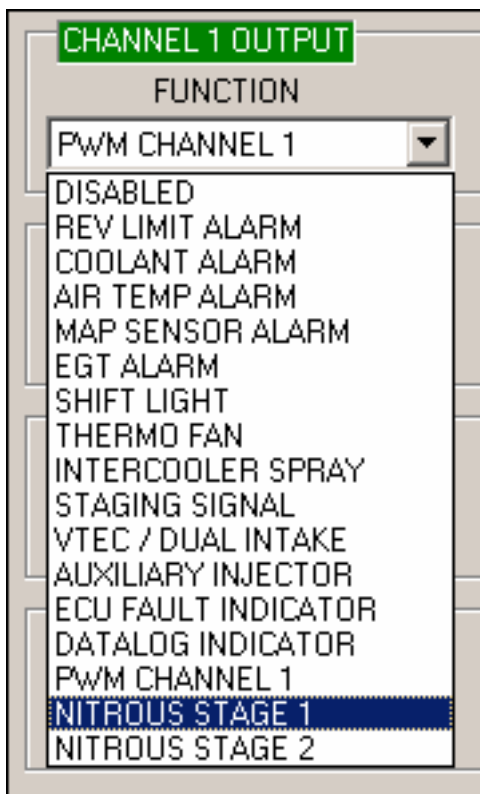
Your Sakura Motorsports dealer will need to supply you with an upgrade code . To obtain an upgrade code, simply supply your dealer with the serial number of your FC-10, and an upgrade code will be sent to you.

Enter the upgrade code into the FC-10 using the interface software as shown below. The FC-10 should be connected and on-line for this feature to work.



Select the '**Unlock NOS feature**' under the Setup menu. An input box will appear in which you should enter the upgrade code exactly as it appears. Once the NOS feature is unlocked, you will have access to the other three menu items, namely , General Setup, NOS Channel 1 MAP and NOS Channel 2 MAP.

Once the Nitrous Oxide output feature is enabled in the FC-10 , determine which of the four outputs of the FC-10 will be used for the Nitrous Oxide control. Generally only one output should be selected , but advanced applications may use two ND-100's with two different outputs.



The FC-10 has two 'MAPS' for nitrous control. Most applications will only require one map or STAGE. If you are using only one NITROUS OXIDE solenoid and one FUEL solenoid, you have a single stage system, and need only configure one output for **NITROUS STAGE 1**.

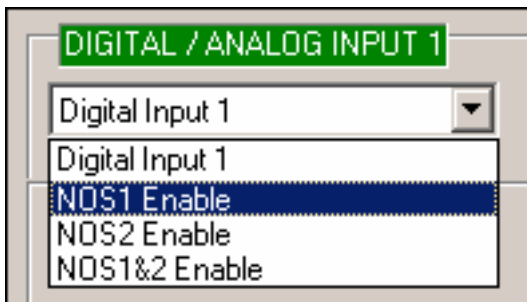
Applications which use more than one FUEL or NITROUS OXIDE that are activated at different stages, have a multi-stage system , and should configure one output for **NITROUS STAGE 1** and a second for **NITROUS STAGE 2**.

Each stage uses a separate map, NITROUS STAGE 1 uses the NOS Channel 1 MAP and NITROUS STAGE 2 uses the NOS Channel 2 MAP.

Each map controls the Nitrous Oxide and Fuel delivery separately, for example, one map may control a 100HP NOS system for the first four seconds of a run, and then a second 200HP NOS system can be activated for the rest of the run. The rate of NOS delivery is fully programmable to suit any situation.

The FC-10 also uses an INPUT to activate the NOS delivery. Even if all the conditions of the Nitrous Oxide->General Setup page is met, the NOS will not activate unless the INPUT is ON.

To configure this input, select the SETUP->INPUTS menu item on the FC-10 interface software and configure digital input 1 or 2 to a NOS enable function. For single stage applications, select NOS1 Enable. Selecting this will use the information from the NOS Channel 1 MAP on the output configured to NITROUS STAGE 1.



Wire a toggle switch as shown in the FC-10 user manual, and check it's operation in the Engine Data Page (Text mode) with the ND-100 disconnected. If a second stage is used, both stages may be activated at once using the NOS1&2 Enable function. This allows both stages to activate (under the condition set in the Nitrous Oxide->General Setup screen) using only one switch. To operate the stages on separate switches, set Digital Input 1 to NOS1 Enable, and Digital Input 2 to NOS2 Enable.

The General Setup screen under the Nitrous Oxide menu allows the user to set the conditions under which the Nitrous Oxide and Fuel solenoids operate.

NITROUS OUTPUT 1 SETUP

| | | |
|------------------------------|-------------------------------|-------------------------------|
| NITROUS ON CONDITIONS | NITROUS OFF CONDITIONS | NITROUS OUTPUT 1 SETUP |
| ENGINE RPM ABOVE: 3000 RPM | ENGINE RPM ABOVE: 7500 RPM | NITROUS MAX HP: 200 HP |
| ENGINE LOAD ABOVE: 2 PSI | ENGINE LOAD ABOVE: 15 PSI | DELIVERY MODE: TIME |
| THROTTLE ABOVE: 90 % | | DELIVERY TIME: 10 S |

NITROUS OUTPUT 2 SETUP

| | | |
|------------------------------|-------------------------------|-------------------------------|
| NITROUS ON CONDITIONS | NITROUS OFF CONDITIONS | NITROUS OUTPUT 2 SETUP |
| ENGINE RPM ABOVE: 3000 RPM | ENGINE RPM ABOVE: 7500 RPM | NITROUS MAX HP: 100 HP |
| ENGINE LOAD ABOVE: 2 PSI | ENGINE LOAD ABOVE: 15 PSI | DELIVERY MODE: TIME |
| THROTTLE ABOVE: 90 % | | DELIVERY TIME: 10 S |

| TIME | RPM | NOS1% | NOS2% | TOT HP |
|------|-----|-------|-------|--------|
| 0.0 | | 44 % | 0 % | 80 HP |
| 0.7 | | 49 % | 0 % | 90 HP |
| 1.2 | | 55 % | 0 % | 100 HP |
| 2.0 | | 60 % | 0 % | 110 HP |
| 2.7 | | 65 % | 0 % | 120 HP |
| 3.3 | | 70 % | 26 % | 150 HP |
| 4.0 | | 75 % | 40 % | 190 HP |
| 4.7 | | 80 % | 60 % | 220 HP |
| 5.3 | | 86 % | 75 % | 247 HP |
| 6.0 | | 91 % | 84 % | 268 HP |
| 6.7 | | 96 % | 92 % | 294 HP |
| 7.3 | | 100 % | 96 % | 295 HP |
| 8.0 | | 100 % | 100 % | 299 HP |
| 8.7 | | 100 % | 100 % | 299 HP |

For single stage nitrous oxide configurations , only the NOS OUTPUT 1 SETUP section needs to be completed.

The following parameters should be set before an attempt to tune the Nitrous Oxide delivery is made.

NITROUS ON CONDITIONS:

ENGINE RPM ABOVE : The NOS will only activate if the engine is above this value. This value should be set to a value much higher than idle, preferably just below the minimum RPM the engine runs during a pass.

ENGINE LOAD ABOVE : The NOS will only if the engine load is greater than this value. This should be set much higher than the load at idle.

THROTTLE ABOVE : The throttle must be open greater than this value for the NOS to activate. This should be set to full throttle , that is 95-100%

NITROUS OFF CONDITIONS:

ENGINE RPM ABOVE : The NOS de-activate if the engine is above this value. This value should be set to a value just above the maximum RPM expected during a run.

ENGINE LOAD ABOVE : The NOS will de-activate if engine loads greater then this value are experienced. This value should be just above the maximum engine load expected.

NITROUS OUTPUT 1/2 SETUP:

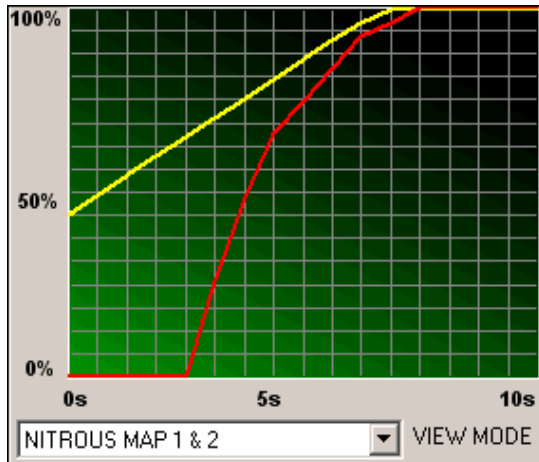
Nitrous Max HP : Set this value to the rated HP of the Nitrous Oxide kit installed. This value is used purely during simulation and has no effect on expected engine HP.

Delivery Mode : Two modes of delivery are available, TIME and RPM. The Nitrous Oxide and Fuel delivery configured to operate over a set amount of time or to the current value of engine RPM.

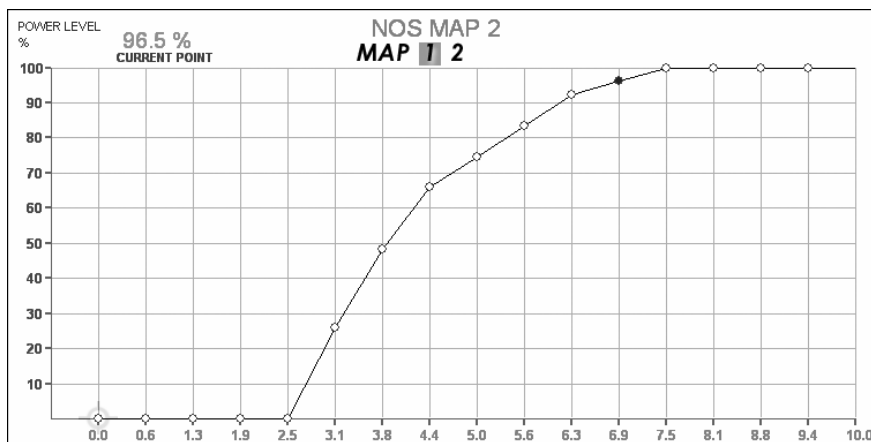
When configuring the **NOS Channel1/2 Maps** , the bottom 'X-axis' is set the mode selected here.

Delivery Time : When operating in delivery mode : TIME , this value sets the duration on the NOS delivery. Any NOS delivered after this time will remain the same as the amount delivered at this set time.

The graph at the bottom of the page graphically illustrates the relationship of the two NOS output channels. If a single stage NOS system is installed, select the VIEW MODE at the bottom of the screen and set it NITROUS MAP 1.



To configure the rate of delivery, select the appropriate map under the SETUP->Nitrous Oxide -> NOS CHANNEL x MAP menu item.



Refer to the FC-10 User Manual on which keys are used to adjust the maps. Generally, the left and right arrows move the selected load point left and right respectively. Use the up and down arrows to adjust the power levels of the NOS. The example above does not start adding Nitrous Oxide until 2.5 after all the conditions in the general setup have been met and the NOS input switch is activated. The Nitrous Oxide is gradually increased until it is at 100% power levels at approximately 7.5s. Although the map only displays 10 seconds, the amount of Nitrous Oxide delivery will remain the same (100% in this example) for as long as the conditions set in the General Setup are met.