Frequently Asked Questions

General

Q: I did not receive an Instruction Manual with my ASD. How can I get one?

A: The *S11 ASD Instruction Manual* can be downloaded from our website at www.toshiba.com/ind. To request a hard-copy of either document contact the Toshiba Customer Support Center or your local Toshiba distributor.

Q: Does Toshiba offer training courses?

A: Yes. Training courses are offered at TIC headquarters in Houston, Texas. There are two types of training — maintenance and repair (nominal fee), and applications (free). Our instructors have years of hands-on experience in their respective fields and are continually being trained on new products. Students will gain valuable experience on the equipment and troubleshoot real faults that may be incurred during normal ASD setup, operation, and maintenance. For a listing of upcoming training courses or to register, visit our website at www.toshiba.com/ind and click on the training tab.

Q: Where can I find additional information about Toshiba International Corporation (TIC) and TIC products?

A: Additional information can be found on our website, www.toshiba.com/ind. You may also contact TIC for additional information by writing to 13131 West Little York Rd., Houston, Texas, 77041, via telephone at (713) 466-0277, or via fax at (713) 937-9349.

Application Specific

Q: Who is considered qualified personnel?

A: A qualified person is one who has the skills and knowledge about the construction, installation, operation, and maintenance of the equipment and has received safety training on the hazards involved. Qualified personnel are able to recognize and properly address hazards associated with the application of motor-driven equipment, and are trained to safely energize, de-energize and ground said equipment, to safely lockout/tagout circuits and equipment, and clear faults in accordance with established safety practices.

Q: What do I do if my motor is rotating in the wrong direction?

A: Qualified personnel should reverse any two of the three ASD output power leads (U/T1, V/T2, or W/T3) connected to the motor.

Q: I followed all of the instructions but my motor will not run. What now?

A: Ensure that the input power to the ASD is connected and that the voltage at R/L1, S/L2, and T/L3 are as specified for your unit. Ensure that the terminals of the terminal board are configured correctly for your application. Perform a Reset (to factory default settings). If further assistance is required, consult the *S11 ASD Instruction Manual* or contact the Toshiba Customer Support Center for assistance.

Q: During system operation I receive error messages that I do not understand. Where can I find information about trips/faults/alarms and troubleshooting?

A: A complete list of LED screen displays, trip/fault/alarm descriptions and a list of possible causes of all trips/faults/alarms can be found in the *S11 ASD Instruction Manual*. For additional information or assistance, contact the Toshiba Customer Support Center.

S11 ASD Simple Start Guide

The S11 ASD Simple Start Guide provides instructions on installation and operating procedures only. For additional information regarding your new S11 ASD, consult the *S11 ASD Instruction Manual*.

DO NOT attempt to install or operate the S11 ASD until you have read and understood all of the user directions contained in this guide, and the product safety information and product labels contained in the *S11 ASD Instruction Manual*. Equipment warning labels provide useful information and indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or loss of life if safe procedures are not followed. Installation and operation shall be performed by qualified personnel only.

TOSHIBA
Leading Innovation

S11 ASD

TOSHIBA

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Simple Start Guide

S11 ASD Simple Start Guide

1. Receipt & Identification

S11 ASD Nameplate

TRANSISTOR INVERTER VFS11S-2004PL-WN		
	INPUT	OUTPUT
U (V)	1PH 200/240	3PH 200/240
F (Hz)	50/60	0.5/500
I (A)	5.3/4.5	3.3

Inspect the equipment for damage that may have occurred during shipping.

DO NOT install or energize equipment that has been damaged.

Ensure that the rated capacity and model number on the nameplate conform to order specifications.

Use proper lifting techniques when moving the S11 ASD.

Contact your Toshiba Sales Representative to report discrepancies or for assistance if required.

2. Mounting

Only qualified personnel should install this equipment.

The installation of the equipment should conform to the 2008 National Electrical Code (NEC) Article 110, OSHA, as well as any other applicable national, regional, or industry codes and standards.

Installation practices shall conform to the latest revision of the NFPA 70E Electrical Safety Requirements for Employee Workplace.

It is the responsibility of the S11 ASD installer/maintenance personnel to ensure that the unit is installed in an enclosure that will protect personnel against electric shock.

Location

Select a mounting location that is easily accessible and has adequate working space. Proper illumination is required for making inspections, adjustments, and performing equipment maintenance.

DO NOT mount the S11 ASD in a location that would produce catastrophic results if it were to fall from its mounting location (equipment damage and/or injury to personnel).

Avoid installation in direct sunlight or in areas where vibration, heat, humidity, dust, fibers, metal particles, explosive/corrosive mists or gases, sources of electrical noise are present, or where it would be exposed to harmful liquids, solvents, or other fluids.

Temperature

The ambient operating temperature rating is 14° to 122° F (-10° to 50° C).

Ventilation

Install the unit in an upright position and in a well-ventilated area.

When installing adjacent ASDs horizontally, Toshiba recommends at least 5 cm of space between units. However, if the top cover is removed from each ASD then horizontally mounted ASDs may be installed side-by-side with no space in-between the adjacent ASDs.

For all S11 ASDs, a minimum of 10 cm of space is required above and below adjacent units.

Lead Length

The table below lists the recommended maximum lead lengths for the listed motor voltages. Lead lengths from the ASD to the motor in excess of those listed below may require filters to be added to the output of the ASD. Excessive lead lengths may adversely affect the performance of the motor. Exceeding the peak voltage rating or the allowable thermal rise time of the motor insulation will reduce the life expectancy of the motor.

Contact your Toshiba Sales Representative for application assistance when using lead lengths in excess of those listed.

Lead Length Specifications

Model	PWM Carrier Frequency	NEMA MG-1-1998 Section IV Part 31 Compliant Motors[2]
230-Volt	All	1000 feet
460-Volt	< 5 kHz	600 feet
	≥ 5 kHz	300 feet
600-Volt	< 5 kHz	200 feet
	≥ 5 kHz	100 feet

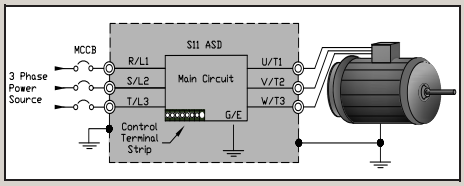
For enclosure and mounting hole dimensions consult the *S11 ASD Instruction Manual*.

3. Connectivity

DANGER Contact With Energized Wiring Will Cause Severe Injury Or Loss Of Life.

When using an ASD output disconnect, the ASD and the motor **MUST** be stopped before the disconnect is either opened or closed. Closing the output disconnect while the 3-phase output of the ASD is active may result in equipment damage or injury to personnel.

3-Phase Input/Output Connections



De-energize and lockout/tagout the main power, control power, and instrumentation connections before connecting or disconnecting the power wiring to the equipment or opening the enclosure door.

Connect the 3-phase input power to the ASD to terminals **R/L1**, **S/L2**, and **T/L3**. Connect the 3-phase output power from terminals **U/T1**, **V/T2**, and **W/T3** to the motor. Ensure that all wiring is performed in accordance with national, state, and local electrical codes.

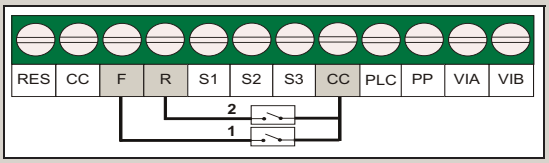
Install a circuit disconnecting device and branch circuit protection in accordance with the fault current settings of the ASD and the 2008 NEC Article 430.

For **2-Wire Control** and **3-Wire Control** open the enclosure door to gain access to the **Terminal Board** and continue below.

2-Wire Control

Install a switch as described below from the **F** and/or **R** terminals to the **CC** terminals. Close or reattach the enclosure door.

2-Wire Start/Stop Control Connections

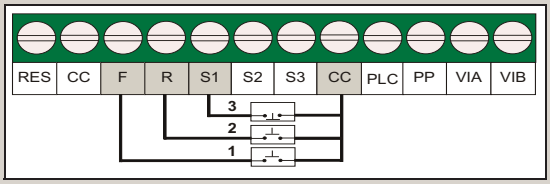


1 — Normally open switch that will be used to provide the forward run command (Set to Forward).
2 — Normally open switch that will be used to provide the reverse run command (Set to Reverse).

3-Wire Control

Install momentary push buttons as described below from the **F** and/or **R** terminals to the **CC** terminal. Close or reattach the enclosure door.

3-Wire Start/Stop Control Connections



1 — Normally open momentary push button that will be used to provide the forward run command (Set to Forward).
2 — Normally open momentary push button that will be used to provide the reverse run command (Set to Reverse).
3 — Normally closed momentary push button that will be used to hold the output frequency upon termination of the run command (Set to Hold: **F116** = 49 (Hold, N.O.).

Before turning on the ASD ensure that:

The enclosure door is closed or reattached, and secure. Terminals **R/L1**, **S/L2**, and **T/L3** are connected to the input power and terminals **U/T1**, **V/T2**, and **W/T3** are connected to the motor. The 3-phase input voltage is as specified and there are no shorts and all grounds are secure.

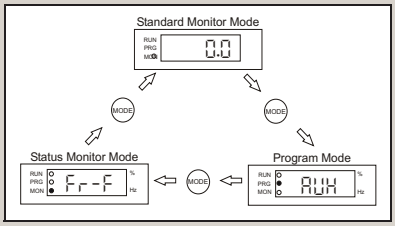
4. Programming

Menu Options

The **MODE** key accesses the three primary modes of the S11 ASD; the **Standard Monitor Mode**, the **Program Mode**, and the **Status Monitor Mode**. From any mode, press the **MODE** key to loop through to the other two modes.

The **Standard Monitor Mode** is used to set and monitor the output frequency of the ASD. Any active Alarms or Faults will also be displayed here. The **Program Mode** is used to set the ASD operating parameters. The **Status Monitor Mode** allows the user to monitor system performance variables (i.e., output frequency, output current, terminal information, etc.).

Menu Navigation



Initial Parameter Programming

The operating parameters may be selected, viewed, or changed using the **Operation Panel**. To change a setting press the **MODE** key to until the **Program Mode** menu is displayed. Use the Up/Down arrow keys to scroll through the parameter listing. Select the item to be changed and press the **ENT** key to enter the **Edit** mode. Set the parameter to the new value using the Up/Down arrow keys. Press the **ENT** key to accept the change.

Press the **MODE** key while in the **Edit** mode to exit without saving the new value.

After setting the parameter, press the **ENT** key to display the programmed parameter or press the **MODE** key to switch to the **Status Monitor Mode**.

For normal system operation the following parameters must be set by the user.

Basic Parameter Programming

LED Screen	Function	Selections
CMOd	Command Mode	0: Terminal Board 1: Operation Panel
FMOd	Frequency Command	0: Built-In Potentiometer 1: VIA 2: VIB 3: Operation Panel 4: Serial Communication 5: Up/Down from External Contact 6: VIA + VIB (Override)
ACC	Acceleration Time	0.0 – 3200 Seconds
dEC	Deceleration Time	0.0 – 3200 Seconds
UL	Upper Limit Frequency	0.5 – FH Hz (Set at parameter FH)
LL	Lower Limit Frequency	0.5 – UL Hz (Set at parameter UL)
PE	V/f Pattern	0: V/f Constant 1: Variable Torque 2: Automatic Torque Boost Control 3: Vector Control 4: Energy Saving 5: Dynamic Energy-Saving 6: PM Motor Control
tHr	Motor Thermal Protection	10 – 100%

Extended Parameters

Extended Parameters provide quick access to ASD settings and can be selected, viewed, or changed by performing the following:

1. Press the **MODE** key until the **Program Mode** screen is displayed.
2. Use the Up/Down arrow keys to scroll until the LED screen displays **F---**.
3. Press the **ENT** key to select.
4. Use the Up/Down arrow keys to scroll until the desired **Extended Parameter** has been reached.
5. Press the **ENT** key to accept the change or press the **MODE** key while in the **Edit** mode to exit without saving the new value.

Additional Programming Information

Command Mode (Run Command)

The **Command Mode** selection establishes the primary source of the command input for the ASD. The source of the **Command** control signal must be established for normal operation.

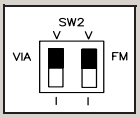
Commands are provided via the **Terminal Board** or the **Operation Panel**.

- The **Terminal Board** allows for **Command** control to be carried out via the **Remote** mode.
- The **Operation Panel** allows for **Command** control to be carried out via the **Local** mode.

For more information on the **Local** and **Remote** modes, see the **Run** section (section 5).

Frequency Command

VIA Dip-Switch



Frequency Command controls the output speed of the ASD. The source of the frequency control signal must be established for normal operation.

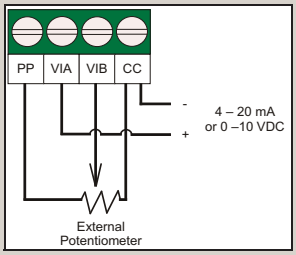
The primary selections for the **Frequency Command** function are the **Built-In Potentiometer**, **VIA**, **VIB**, or the **Operation Panel**.

The **Built-In Potentiometer** is the knob on the outside of the Operation Panel.

The **VIA** selection is an analog input terminal that accepts a 4-20 mA or 0–10 VDC signal (configuration dependant). For a 4–20 mA signal place the **VIA** dip-switch in the **I** position. For a 0–10 VDC signal place the **VIA** dip-switch in the **V** position. To scale the **VIA** input terminal, program the following parameters as described.

4 – 20 mA Signal

F201 — 20%
F202 — 0 Hz
F203 — 100%
F204 — 60 Hz



The **VIB** selection is an analog input terminal that accepts an external potentiometer signal and is scaled by default.

The **Operation Panel** uses the Up/Down arrow keys to provide the **Frequency Command**.

Default Terminal Settings

The default terminal settings may be changed by accessing the parameter via the **Program Mode**.

Control Circuit Input Terminals

Terminal	Default Function
RES	Reset
F	Forward Run
R	Reverse Run
S1	Preset Speed 1
S2	Preset Speed 2
S3	Preset Speed 3
PLC	Common
VIA	Frequency
VIB	Frequency
CC	Control Common

Control Circuit Output Terminals

Terminal	Default Function
PP	Power Supply
FM	Output Frequency
P24	24 VDC Power Output
OUT	Speed Reach Signal (Open Collector Output)
NO	
FLA	Fault Relay Contact (N.O.)
FLB	Fault Relay Contact (N.C.)
FLC	Fault Relay Contact Common
RY	Low-Speed Signal
RC	

Factory Default

Parameter settings may be returned to factory default values by performing the following:

1. Press the **MODE** key until the **Program Mode** screen is displayed.
2. Use the Up/Down arrow keys to scroll until the LED screen displays **tYP**.
3. Press the **ENT** key to select.
4. Use the Up/Down arrow keys to scroll until the LED screen displays the number **3** on the right side of the screen.
5. Press the **ENT** key to accept the change or press the **MODE** key while in the **Edit** mode to exit without saving the new value. The LED screen will momentarily display **In it** while processing the reset. The LED screen will display the value **0.0** upon completion.

S11 ASD Simple Start Guide

5. Run

Local

The **Local** mode allows the **Command** and **Frequency** control functions to be carried out via the **Operation Panel**.

To run the motor perform the following:

1. Program the basic parameters listed in the table in the **Programming** section (section 4).
2. Press the **MODE** key until the **Program Mode** screen is displayed.
3. Use the Up/Down arrow keys to scroll until the LED screen displays **CMOd**.
4. Press the **ENT** key to select.
5. Use the Up/Down arrow keys to scroll until the LED screen displays the number **1**.
6. Press the **ENT** key to accept the change. Press the **RUN** key to start the motor.

Remote

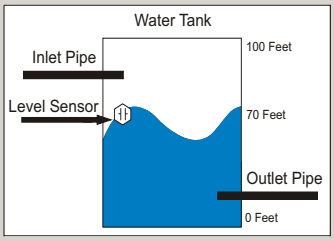
The **Remote** mode allows the **Command** and **Frequency** control functions to be carried out via the **Terminal Board**.

To run the motor perform the following:

1. Program the basic parameters listed in the table in **Programming** section (see section 4).
2. Press the **MODE** key until the **Program Mode** screen is displayed.
3. Use the Up/Down arrow keys to scroll until the LED screen displays **CMOd**.
4. Press the **ENT** key to select.
5. Use the Up/Down arrow keys to scroll until the LED screen displays the number **0**.
6. Press the **ENT** key to accept the change. Press the **RUN** key to begin motor operation.

To switch between **Forward** Run and **Reverse** Run press the **MODE** key to enter the **Program Mode**. Use the Up/Down arrow keys to scroll until the LED screen displays **Fr**. Use the Up/Down arrow keys to scroll until the LED screen displays the desired value. Press the **ENT** key to accept the change or press the **MODE** key while in the **Edit** mode to exit without saving the new value.

6. PID Control



PID Control is used to correct for differences between the measured variable and the **Desired Set Point**.

For instance, if the desired depth in a water tank is 80 feet, but the water is currently only 70 feet deep, the Inlet Pipe will pump additional water into the tank.

While the inlet pipe is pumping water into the tank, the level sensor monitors the water level. When the **Desired Set Point** is reached, the inlet pipe discontinues pumping.

PID Setup

In the example below, the transducer providing the system feedback is powered by the 24 VDC power supply of the ASD.

To set up a PID loop perform the following:

1. Program a **RUN** command as described in section 5.
2. Connect the 2-wire transducer to terminals **P24** and **VIA**. For a 4–20 mA signal place the **VIA** dip-switch in the **I** position. For a 0–10 VDC signal place the **VIA** dip-switch in the **V** position.
3. Use **F201**–**F204** to scale the **VIA** analog input. Ensure that for a 4–20 mA signal **F201** is set to 20%, and for a 0–10 VDC signal **F201** is set to 0. All other scaling parameters should be set to the default values.
4. Ensure that **F360** is enabled (setting 1). This enables PID.
5. Ensure that the **Frequency Command** is set to **Operation Panel** (setting 3).
6. Calculate the desired set point using the formula below.

Formula: $\frac{\text{Desired Set Point Tank Level}}{(\text{Tank Level at 20 mA}) - (\text{Tank Level at 4 mA})} \times (\text{F204}) - (\text{F202}) = \text{Set Point}$

Example: $\frac{80'\ \text{Ft.}}{(100\ \text{Ft.}) - (0\ \text{Ft.})} \times (60) - (0) = 48$ A Set Point of 48 will maintain a depth of 80 Ft.

7. Press the **MODE** key until the **Standard Monitor Mode** screen is displayed.
8. Use the Up/Down arrow keys to scroll until the LED screen displays the desired set point.
9. Press the **ENT** key to accept the change or press the **MODE** key while in the **Edit** mode to exit without saving the new value.

7. Alarms, Trips, and Troubleshooting

If a user setting or a S11 ASD parameter has been exceeded, or if a data transfer function produces an unexpected result, an **Alarm** is displayed on the LED. An **Alarm** will cause an alarm code to appear on the Operation Panel. In the event that the condition that caused the **Alarm** does not return to its normal operating level within a specified time, the ASD **Faults** and a **Trip** is incurred.

In the event that the source of the malfunction cannot be determined, contact your Toshiba Sales Representative for further information and for the appropriate course of action.

Alarm Codes

LED Screen	Description
C	Over-Current
P	Over-Voltage
L	Overload
H	Over-Heat

Alarms

The alarm codes are listed in the top-down order that they are checked for activation. If two or more **Alarms** arise simultaneously, the LED screen will display the codes in this order.

Trips/Faults

For a complete listing of Trips/Faults/Alarms, consult the *S11 ASD Instruction Manual*.

LED Screen	Description	Possible Cause(s)
E-18	Break in Analog Signal	• **F633** setting is too high.
EF2	(Earth) Ground Fault	• Ground fault at the motor. • Ground fault at the output of the ASD. • Current leakage to earth ground.
EOFF	Emergency Off	• Emergency Off command received.
Err1	Frequency Setting Error	• Frequency setting signals are too close.
nOFF	Main Under-Voltage	• Low commercial voltage.
OC1	Over-Current During Acceleration	• Acceleration time is too short. • Improper V/f setting. • Restart from a momentary power outage. • ASD is starting into a rotating motor.
OC2	Over-Current During Deceleration	• Deceleration time is too short. • Cooling fan is inoperative. • Ventilation openings are obstructed.
OC3	Over-Current During Run	• Load fluctuations. • ASD is operating at an elevated temperature.
OCL	Motor Over-Current	• Motor insulation malfunction.
OFF	ST Terminal is Off	• Parameter **F110** is improperly programmed.
OH	Over-Heat	• Cooling fan is inoperative. • Ventilations openings are obstructed. • Ambient operating temperature is set too high. • ASD is too close to heat-generating device.
OL1	ASD Overload	• Acceleration time is too short. • Improper V/f setting. • Restart from a momentary power outage. • ASD is starting into a rotating motor. • Excessive load.
OL2	Motor Overload	• Improper V/f setting. • Motor is locked. • Continuous operation at low-speed. • Excessive load.
OP2	Over-Voltage During Deceleration	• Deceleration time is too short. • DBR is off at **F304**. • Over-voltage limit operation is off at **F305**. • Input voltage is out of specification. • Power supply exceeds 200 kVA.
OP3	Over-Voltage During Run	• Load fluctuations. • Input voltage is out of specification. • Power supply exceeds 200 kVA. • DBR required (DBR setup required).
UP1	Under-Voltage	• Input voltage is too low.