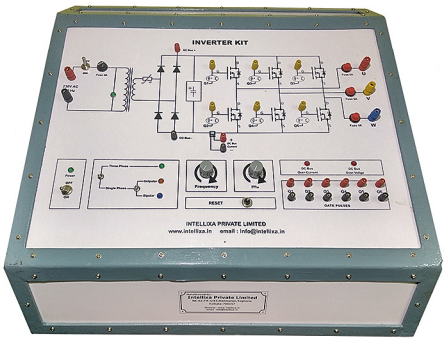
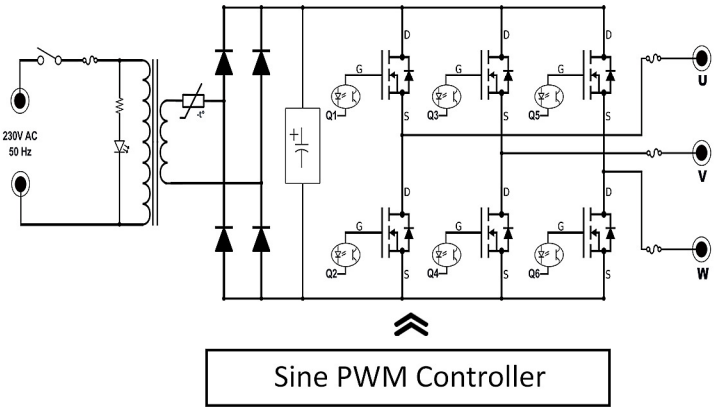
INVERTER KIT





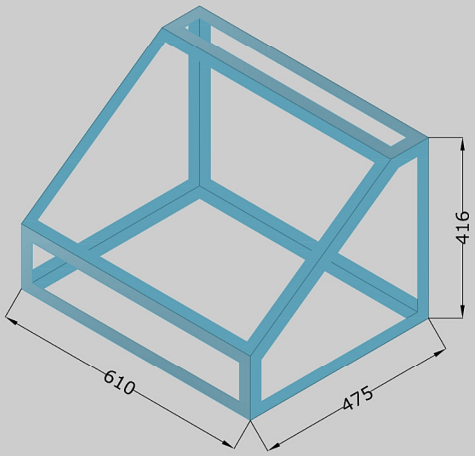
Inverter Kit

A three leg MOSFET based H-Bridge inverter

Fearures:

- 3-phase bridge inverter
- Sinusoidal pulse width modulation (undermodulation/overmodulation) and square wave mode (180° conduction)
- Single phase H-bridge configuration support both unipolar sine PWM and bipolar sine PWM operation
- Soft start feature
- Short-circuit and under-voltage protection
- Built in isolated Mosfet driver
- Rugged enclosure with transparent side face to allow visualisation of internal circuit

General dimensions:



Specification:

Electrical Charecteristics:

Symbol	Description	min	typ	max	Unit
V_{IN}	Rated Supply Voltage		230		V_{RMS}
V_{DCBUS}	DC BUS Voltage		62	69	V_{DC}
V_{LINE}	RMS Output Voltage (3 Phase)		36		V_{AC}
P_{OUT}	Rated Output Power		300		VA
f_{SW}	Inverter switching frequency		5.0		kHz
f_{OUT}	Output frequency (Step of 5 Hz)	30	50	70	Hz
$I_{DC\ BUS}$	DC BUS Current			5.0	A_{DC}

List of Experiments which can be performed with the 3-phase / 1-phase Inverter-kit

A. Single and Three-Phase Sine-PWM Mode:

1. The standard waveforms for Sine-PWM inverters (e.g. pulses for a single MOSFET, line and phase voltages and output and DC bus current etc.) for resistive and inductive loads can be observed both for linear and over-modulation zone.
2. Keeping frequency and DC bus voltage fixed at some standard value (e.g. 50 Hz and 48 V), the duty cycle pot can be changed to vary the line voltage. The command analog value of amplitude modulation index can be read off from the terminal provided. The line voltage can be measured for a balanced load and a plot for M_a (x-axis) and V_{line} (y-axis) can be made for the linear zone and over modulation zone as well.
4. Using the single phase (unipolar/bipolar modes), keeping the DC bus voltage fixed, the output frequency can be varied by using the frequency control pot and characteristic waveforms can be observed at various output frequencies. This feature may also be used to draw the experimental current locus diagram for series R-L and R-C type loads in the laboratory.
5. Speed control experiments on suitable voltage rated single phase and three phase motors can be done. Ma and frequency setting Potentiometers may be adjusted to achieve V/f, constant V- variable f and constant f – variable V control.
6. Using a suitable external L-C low-pass filter and a properly chosen inductive load, the effect of dead-time distortion can be demonstrated to the students .
7. Harmonic analysis of voltage and current may be carried out with various loads (R, R-L, motor etc.). Harmonic analysis in over-modulation zones and its effect on suitable rated motor.
8. Unbalanced loading can be done on this inverter (three phase mode) and the effect of such loading may be studied.

B. Square Wave Mode – Single and Three Phase (both):

1. General characteristic-waveforms for 180^0 conduction mode inverters: star and delta connected loads can be attached and relevant waveforms (e.g. line and phase voltages, currents etc.) for resistive and inductive loads can be observed.
2. Harmonic analysis of various types of static and motor loads.
3. Motor speed control by using DC bus voltage and output frequency variation.

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