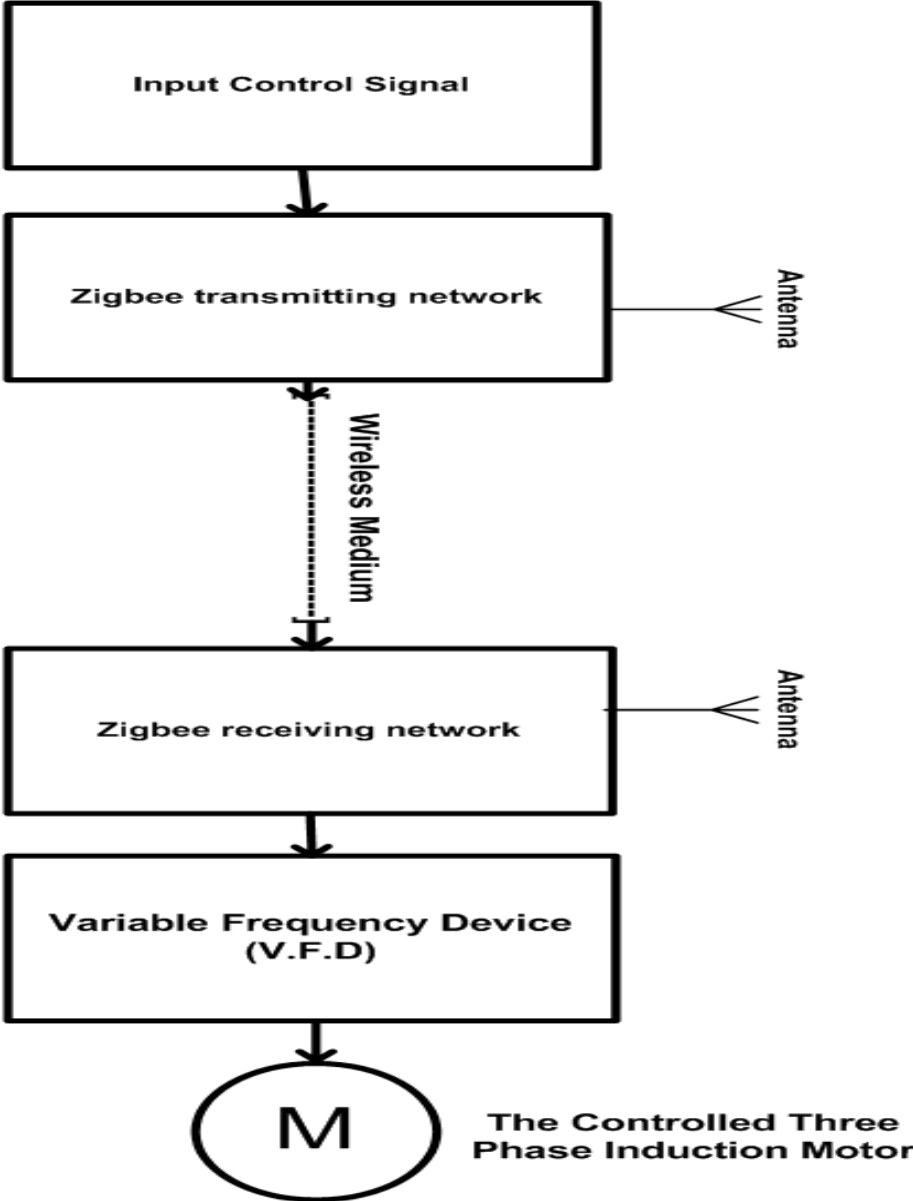


**Design and implementation
of
a remote control system
on
the speed of an induction motor**

The block diagram of the remote control system

The block diagram of the designed remote control system

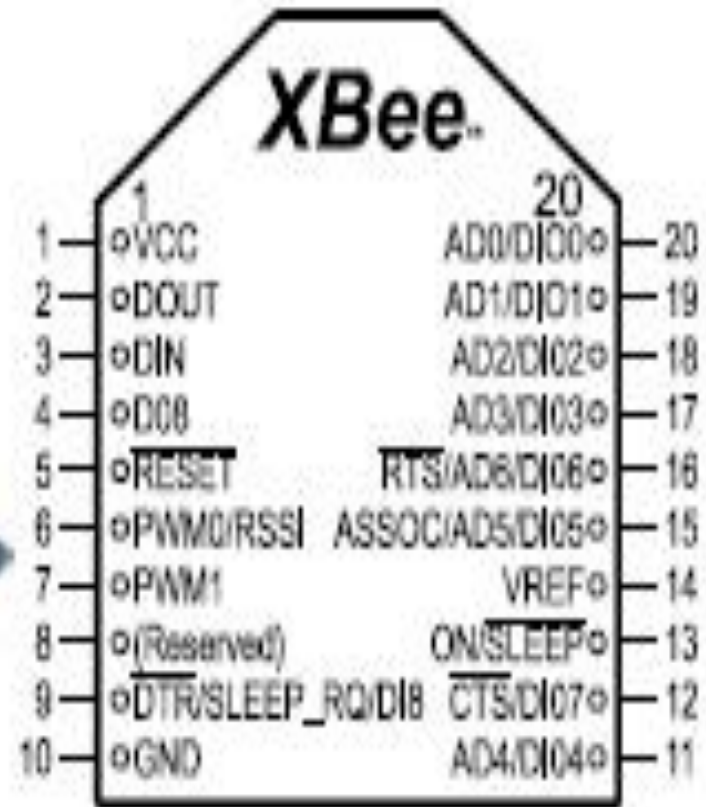


- **Description of the designed system**
- **1- The input control signal may be manual or automatic .**
- **2- Zigbee transmitting network is a communication circuit that responsible for transmitting the control signal (may be an analog or digital) ,this Zigbee may be called as a router .**
- **3- Zigbee Receiving network is a communication circuit that responsible for receiving the control signal (may be an analog or digital) ,this Zigbee may be called as a coordinator .**
- **4- The Variable Frequency Device (V.F.D), the function of this device is to change the frequency of the output voltage of the device as required .**
- **5- The controlled three phase induction motor (slip ring or squirrel cage types) .**

How to vary the speed of an induction motor

1. By changing the applied frequency •
2. Changing the number of Stator poles •
3. By changing the applied voltage: •

The Zigbee shape



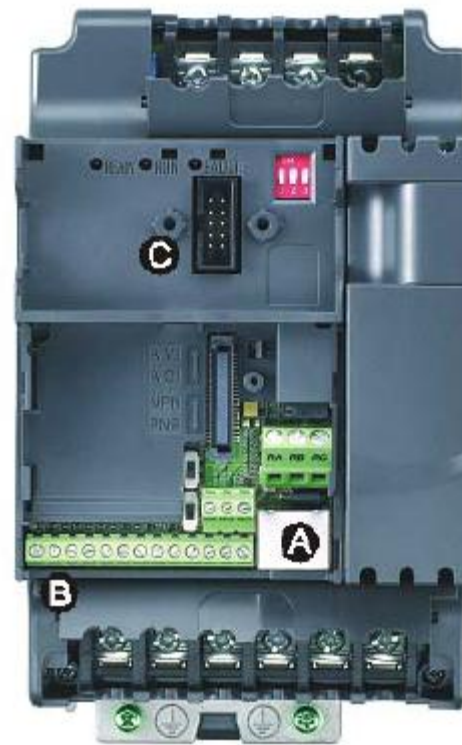
The Zigbee features

Specification	XBee ZNet 2.5	XBee PRO ZNet 2.5
Performance		
Indoor/Urban Range	up to 133 ft. (40 m)	up to 300 ft. (100 m)
Outdoor RF line-of-sight Range	up to 400 ft. (120 m)	up to 1 mile (1.6 km)
Transmit Power Output	2mW (+3 dBm), boost mode enabled 1.25mW (+1 dBm), boost mode disabled	63mW (+18 dBm) 10mW (+10 dBm) for International variant
RF Data Rate	250,000 bps	250,000 bps
Serial Interface Data Rate (software selectable)	1200 - 230400 bps (non-standard baud rates also supported)	1200 - 230400 bps (non-standard baud rates also supported)
Receiver Sensitivity	-96 dBm, boost mode enabled -95 dBm, boost mode disabled	-102 dBm

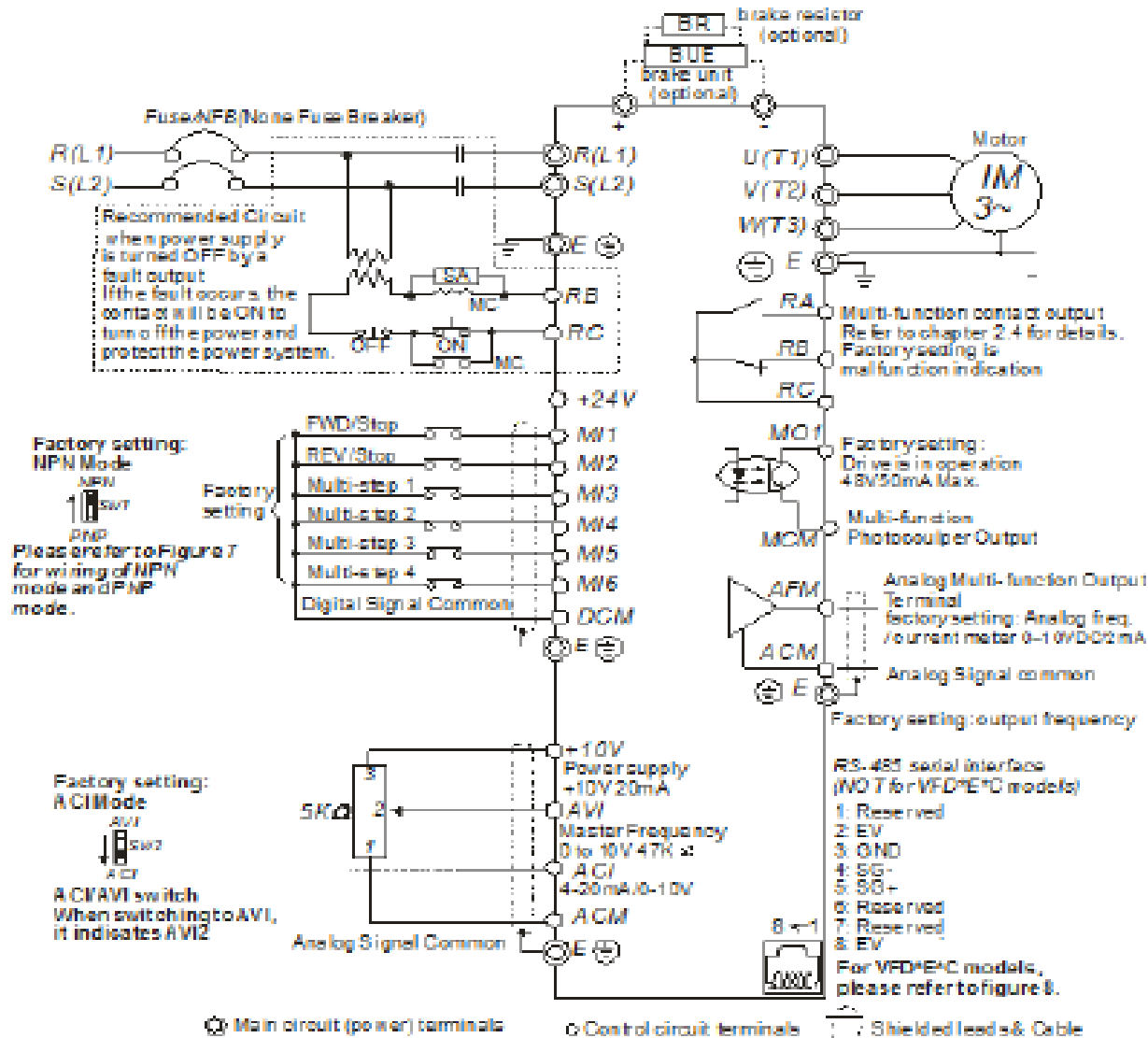
Pin configuration for the Zigbee cell

Pin #	Name	Direction	Description
1	VCC	-	Power supply
2	DOUT	Output	UART Data Out
3	DIN / CONFIG	Input	UART Data In
4	DIO12	Either	Digital I/O 12
5	RESET	Input	Module Reset (reset pulse must be at least 200 ns)
6	PWM0 / RSSI / DIO10	Either	PWM Output 0 / RX Signal Strength Indicator / Digital IO
7	PWM / DIO11	Either	Digital I/O 11
8	[reserved]	-	Do not connect
9	DTR / SLEEP_RQ / DIO8	Either	Pin Sleep Control Line or Digital IO 8
10	GND	-	Ground
11	DIO4	Either	Digital I/O 4
12	CTS / DIO7	Either	Clear-to-Send Flow Control or Digital I/O 7
13	ON / SLEEP / DIO9	Output	Module Status Indicator or Digital I/O 9
14	[reserved]	-	Do not connect
15	Associate / DIO5	Either	Associated Indicator, Digital I/O 5
16	RTS / DIO6	Either	Request-to-Send Flow Control, Digital I/O 6
17	AD3 / DIO3	Either	Analog Input 3 or Digital I/O 3
18	AD2 / DIO2	Either	Analog Input 2 or Digital I/O 2
19	AD1 / DIO1	Either	Analog Input 1 or Digital I/O 1
20	AD0 / DIO0 / Commissioning Button	Either	Analog Input 0, Digital IO 0, or Commissioning Button

The shape of the Variable Frequency Device (VFD)



The wiring diagram of the VFD



The induction motor types

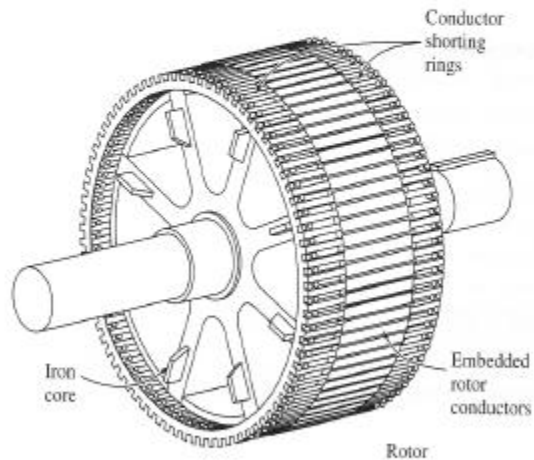
Two types of rotors for induction machine:

- Cage Rotor
- Wound Rotor

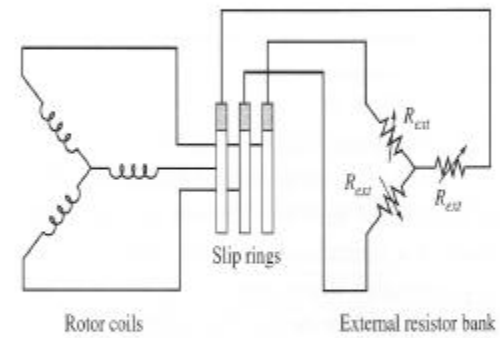
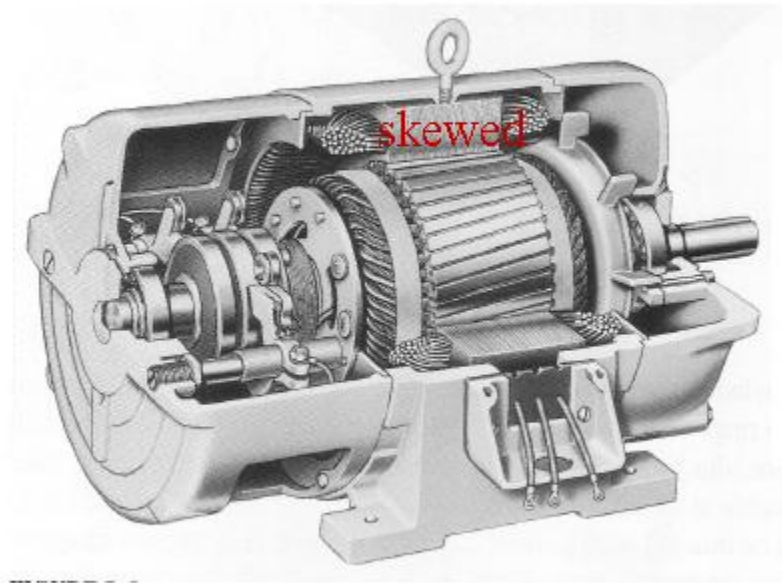


Squirrel Cage Induction motor

A cage (or squirrel-cage) rotor consists of a series of conducting bars laid into slots carved in the face of the rotor and shorted at either end by large shorting rings.



Slip ring induction motor



Programming the Zigbee (Router and Coordinator) using XCTU Software

**The following examples show us how
to program The router and the
coordinator using the XCTU software**