

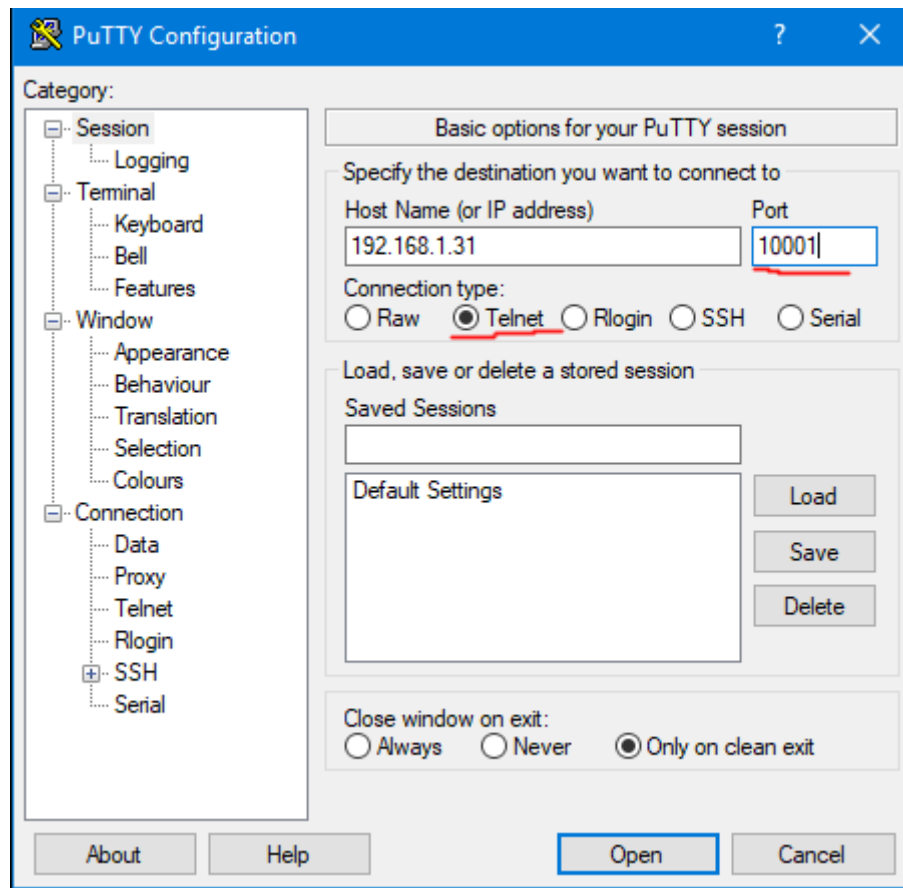


Ethernet Remote Operation Programming Guide V1.2



Remote Automated / Script Control:

Many of our products have optional Ethernet ports and come with free windows control software. These devices can also be controlled from any TCP/IP/Socket capable programming language or environment. We use Visual Studio 2015 and C# for our standard GUI. Telnet programs like “PuTTY” can also be used to connect from your local intranet network.



Our standard remote TCP/IP port is **10001** for making new connections. Our devices use DHCP to acquire an IP address; to determine the address assigned to your RF device, our GUI can be used, the router DHCP lease information page can be used, or you can send a **UDP search packet** to the network broadcast address.

Once connected you can send all of the normal supported commands. Shown here are some common commands for a digital attenuator beginning with the response to “*IDN?”:

```

192.168.1.31 - PuTTY
*IDN?
DS Instruments, DAT64FE, 301, V9.00
ATT?
23.5
*UNITNAME?
R3-LanX1
ATT 23

```

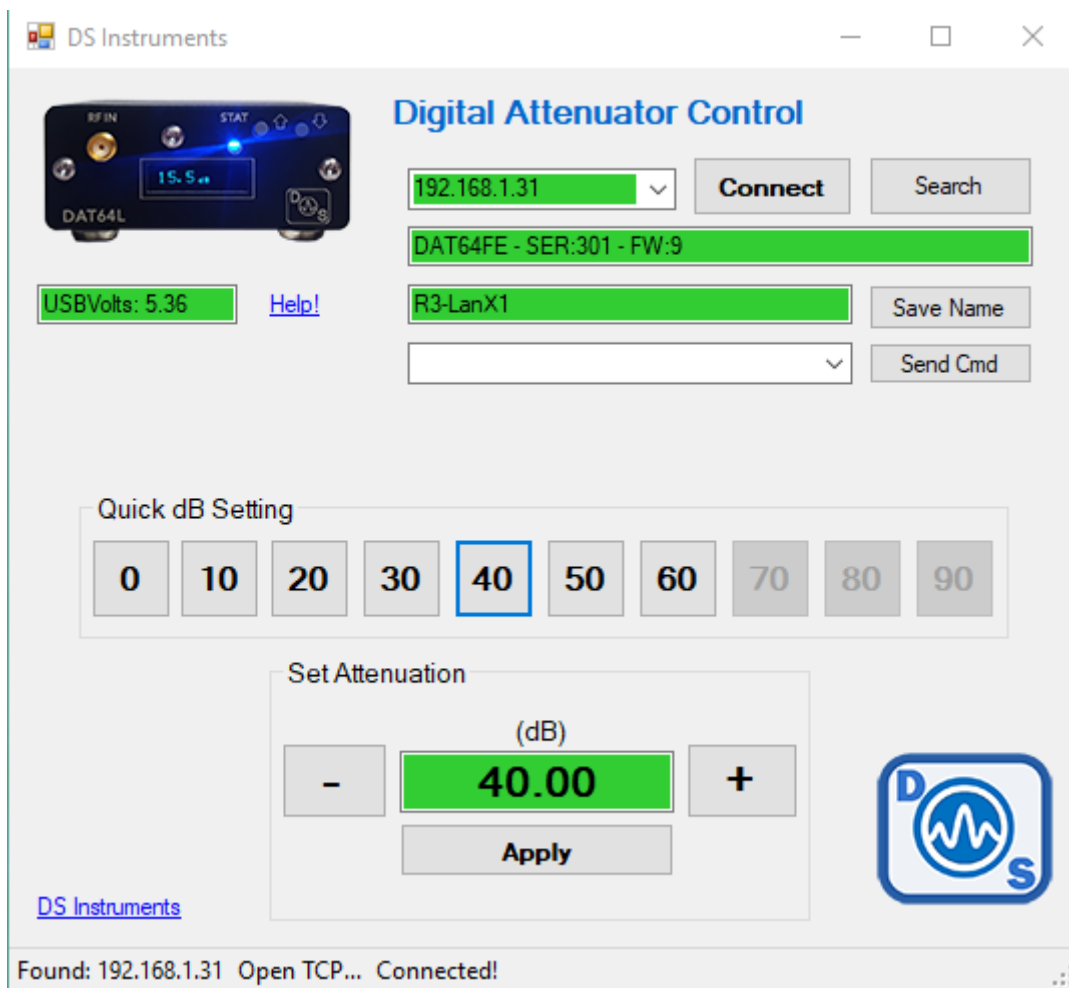
DS Instruments Combined Command List:

NOTE: To execute commands faster, the OLED display and the buzzer can be disabled.

Command	Example 1	Example 2	Description
FREQ:CW	FREQ:CW 2GHZ	FREQ:CW 123.5MHZ	Set signal generator output frequency
FREQ:CW?			Return output frequency
OUTP:STAT	OUTP:STAT ON	OUTP:STAT OFF	Turn RF output on or off
OUTP:STAT?			Return RF output state setting
ATT	ATT 30	ATT 13.5	Set value for DAT units
ATT?			Request current attenuation setting
PHASE	PHASE 90	PHASE -30	Set phase shift in degrees
PHASE?			Return current phase setting
*IDN?			Return the SCPI identification string
*PING?			returns "PONG!" if device is responding

SYST:ERR?			Returns any pending error codes
*RST			Reset unit now
*DISPLAY	*DISPLAY OFF	*DISPLAY ON	Power on or off the display
*BUZZER	*BUZZER ON	*BUZZER OFF	Mute the buzzer
*SAVSTATE			Save frequency & attenuation as boot defaults
*UNITNAME	*UNITNAME Bob	*UNITNAME DEV-34	Set a unique name in flash memory
*UNITNAME?			Return this device's name

Digital Step Attenuator Control Application:



Example Code – Address Discovery (C# .NET Framework):

Send a UDP broadcast of the string "00 00 00 F6" in hex to the local subnet, port 30718 (0x77FE). Any DSI device will reply with a "00 00 00 F7" followed by some basic information. The IP address is derived by reading it off the UDP header of the reply packet, usually by using parse code to look for the source IP.

```

private void UDPlan() {
    int GroupPort = 30718;
    string returnData = "none";
    UdpClient udp = new UdpClient();
    string responseAddress = "";
    IPEndPoint groupEP = new IPEndPoint(IPAddress.Broadcast, GroupPort);
    byte[] sendBytes4 = { 0x00, 0x00, 0x00, 0xF6 }; // UDP SEARCH PACKET
    udp.Send(sendBytes4, sendBytes4.Length, groupEP);
    IPEndPoint receiveEndPoint = new IPEndPoint(IPAddress.Any, 0);
    int myTimeoutCounter = 0;
    while (udp.Available == 0 && myTimeoutCounter++ < 20) {
        System.Threading.Thread.Sleep(100);
    }
    if(udp.Available > 0) {
        byte[] receiveBytes = udp.Receive(ref groupEP);
        returnData = BitConverter.ToString(receiveBytes);
        responseAddress = groupEP.Address.ToString(); // Here is the address
        statusBarAdd("Found: " + responseAddress);
    }
    udp.Close();
}

```

Example Code –Opening a Connection (C# .NET Framework):

```

TcpClient myGlobalTCPClient = null;
public void openTcpConnection(string serverIP) {
    myGlobalTCPClient = testTCPconnection(serverIP);
}

private static bool IsConnectionSuccessful = false;
private static Exception socketexception;
private static ManualResetEvent TimeoutObject = new ManualResetEvent(false);

public static TcpClient testTCPconnection(string serverIP) {
    TimeoutObject.Reset();
    socketexception = null;

    int serverport = 10001; // DATA PORT
    TcpClient tcpclient = new TcpClient();

    tcpclient.BeginConnect(serverIP, serverport, new AsyncCallback(CallBackMethod), tcpclient);

    if(TimeoutObject.WaitOne(2000, false)) {
        if(IsConnectionSuccessful) {
            tcpclient.SendTimeout = 5;
            tcpclient.ReceiveTimeout = 5;
            return tcpclient;
        } else {
            throw socketexception;
        }
    } else {
        tcpclient.Close();
        throw new TimeoutException("TimeOut Exception");
    }
}

```

```

private static void CallBackMethod(IAsyncResult asyncresult) {
    try {
        IsConnectionSuccessful = false;
        TcpClient tcpclient = asyncresult.AsyncState as TcpClient;

        if(tcpclient.Client != null) {
            tcpclient.EndConnect(asyncresult);
            IsConnectionSuccessful = true;
        }
    } catch(Exception ex) {
        IsConnectionSuccessful = false;
        socketexception = ex;
    } finally {
        TimeoutObject.Set();
    }
}

```

```

private string sendLanGetResponse(string myCommand, bool waitAndRead) {
    TcpClient myClient = myGlobalTCPClient;
    string myLanResponse = string.Empty;

    Byte[] myData = System.Text.Encoding.ASCII.GetBytes(myCommand + "\n");
    NetworkStream myStream = myClient.GetStream();
    myStream.ReadTimeout = 1000;
    myStream.Write(myData, 0, myData.Length);
    // TX done
    //RX
    if(waitAndRead) {
        myData = new Byte[256];
        Int32 myBytes = myStream.Read(myData, 0, myData.Length);
        myLanResponse = System.Text.Encoding.ASCII.GetString(myData, 0, myBytes);
        if(myLanResponse.Length > 1) {
            if(myLanResponse.EndsWith("\r\n")) {
                myLanResponse = myLanResponse.Substring(0, myLanResponse.Length - 2); // crop characters
            }
        }
    }
    return myLanResponse;
}

```

Example Code – Simple Python TCP connection:

```
import socket
TCP_IP = '192.168.1.177'    # Device IP address
TCP_PORT = 10001          # fixed for all DSI models
BUFFER_SIZE = 64
MESSAGE = "*IDN?\r\n"     # SCPI identify command
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect((TCP_IP, TCP_PORT))
s.send(MESSAGE.encode())
rxdata = s.recv(BUFFER_SIZE)
s.close()
print("Response:", rxdata)
```

Notes

- Complete SCPI command lists are located on our website (<https://www.dsinstruments.com/downloads/>)
- Full datasheets are available on the product pages (<https://www.dsinstruments.com/store/>)
- Tech support email can be reached at support@dsinstruments.com

Visit us online for control software and tech support any time!

Thanks for your business!