# Example of changing setpoint (SP1) on **CAL33/93/9400** from current value (in this case 36.0) to 28.0.

## The instrument comms address is **3** (hence all messages begin 03 – change for other addresses).

16:43:20 Sent: 03, 03, 00, 7F, 00, 01, B4, 30 = Read Current value of SP1 (0x0168 =360dec = 36.0)
Rxd: 03, 03, 02, 01, 68, C1, FA

### Step 1.
16:43:32 Sent: 03, 06, 03, 00, 00, 05, 48, 6F = Send to Security byte ("5" to parameter 0x0300)
Rxd: 03, 06, 03, 00, 00, 05, 48, 6F

### Step 2.
16:43:50 Sent: 03, 06, 15, 00, 00, 00, 8C, 24 = Enter Program Mode (write any value to parameter 0x15)
Rxd: 03, 06, 15, 00, 00, 00, 8C, 24

### Step 3.
16:44:12 Sent: 03, 06, 00, 7F, 01, 18, B8, 6A = Write new SP1 value (in this case0x0118 = 280dec = 28.0)
Rxd: 03, 06, 00, 7F, 01, 18, B8, 6A

### Step 4.
16:44:19 Sent: 03, 06, 03, 00, 00, 06, 08, 6E = Send to Security byte ("6" to parameter 0x0300)
Rxd: 03, 06, 03, 00, 00, 06, 08, 6E

### Step 5.
16:44:56 Sent: 03, 06, 16, 00, 00, 00, 8C, 60 = Exit Program Mode (write any value to parameter 0x16)
Rxd: 03, 06, 16, 00, 00, 00, 8C, 60

*Note: Step1 &4 should be ignored for **CAL9500** models*

Reading of the process value (e.g. temperature) only requires a single Modbus "read word" message from register 1C using function code 03 (Read Holding Registers). For example

16:47:35 Sent: 03, 03, 00, 1C, 00, 01, 44, 2E = Read PV
Rxd: 03, 03, 02, 00, CF, 81, D0 = Returns an integer equivalent to the current PV value.
Note that the decimal place is always returned, even if the display shows whole degrees only, and the decimal point is "implied" in the integer value (in this example the network address is still 3, and the PV returned is 0x00CF = 207 in decimal, so the PV is = 20.7).

PS - If the Cal controller is new or the parameters have been reset, the unit is has to be released by following the instructions in manual section 1.2.1 – copied below

1.2.1 Initialising the Setpoint
The instrument is provided with a safety lock to prevent it from controlling until the setpoint has been
set. This lock is automatically released the first time that the setpoint is changed from the instrument
front panel. If it is required to initialise a new instrument (or after the parameters have been reset), this
lock may be released remotely by performing the following sequence:
tempbyte = (read byte at ModBus address 0125 hex)
tempbyte = tempbyte OR 0x02 {i.e. set bit 1}
(write tempbyte back to ModBus address 0125 hex)
Note that this sequence is only required to unlock the instrument from its reset state - it is not necessary to perform this sequence each time the setpoint is changed. The other bits within this byte
are used internally and must not be modified.