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SmartScan Aero-mini MODBUS configuration

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1 Introduction

Grating wavelengths can be retrieved from SmartScan Aero-mini via MODBUS/TCP. Timestamp and LASER case temperature are also available.

All registers are 32-bit and therefore occupy two MODBUS registers. Timestamps are integers, wavelength and temperature are 32-bit swapped floating point.

MODBUS support was added in firmware revision 0x9011-r0.

2 MODBUS map directory

MODBUS/TCP connection parameters and register map are configured in map files stored in the MODBUS map directory on the interrogator's file-system.

The file-system is available via SCP using a client application such as `scp` on Linux or `WinSCP` on Windows. The MODBUS map directory is actively monitored and changes such as map save, create or delete are acted on immediately.

Directory: `/etc/smartscan/modbus.d`

3 Map file format

A map file is a human readable ASCII text, `libconfig` format file with the `.map` extension. It must contain a `tcp` and a `map` section as detailed below.

3.1 TCP/IP connection parameters

The `tcp` section defines the TCP/IP parameters, namely a TCP/IP address and port on which to listen for MODBUS requests.

```
tcp = {  
    address = "10.0.0.150";  
    port = 502;  
};
```

Where:

- `address`: IP address of Ethernet adapter on which to listen for MODBUS requests. Omit this to listen on all available Ethernet adapters. A standard SmartScan Aero-mini only has one Ethernet adapter so this can usually be omitted.
- `port`: TCP/IP port on which to listen for MODBUS requests. Multiple maps can be defined in separate files but each one must have a unique port number.

3.2 Map

The map section defines one or more register address ranges and the data to make available in that address range.

```
map = (
{
    address = 30001;
    registers = [
        "INTERNAL_TIMESTAMP_SEC",
        "INTERNAL_TIMESTAMP_NSEC",
        "INTERNAL_THERM_CASE",
        "INTERNAL_WAVELENGTH_CH0_GR0"
    ];
}
);
```

Where:

- address: Start register for the range. Can be in the 30001 to 49999. The first register in the list will be at this address. Subsequent register addresses will be offset by two from the preceding register.
- registers: An array of register descriptors, see section [Register descriptor codes](#) for the available register descriptors.

3.3 Register descriptor codes

- INTERNAL_TIMESTAMP_SEC
Seconds since UTC epoch.
- INTERNAL_TIMESTAMP_NSEC
Nanosecond addition to UTC time-stamp.
- INTERNAL_THERM_CASE
LASER case temperature in °C. Must be between -5°C and 75°C.
- INTERNAL_WAVELENGTH_CHn_GRm
Channel n grating m wavelength in nano-meters. Channel number ranges from 0 to 3. Grating number ranges from 0 to 15, and are in decreasing wavelength order. E.g. INTERNAL_WAVELENGTH_CH0_GR0 is the highest wavelength grating on the first channel.

3.4 Example MODBUS maps

- Single address range


```
tcp = {
    port = 502;
};
map = (
{
    address = 30001;
    registers = [
        "INTERNAL_TIMESTAMP_SEC",
        "INTERNAL_TIMESTAMP_NSEC",
        "INTERNAL_THERM_CASE",
        "INTERNAL_WAVELENGTH_CH0_GR0"
    ];
}
);
```

- Multiple address ranges

```
tcp = {
    port = 502;
};
map = (
    {
        address = 30001;
        registers = [
            "INTERNAL_TIMESTAMP_SEC",
            "INTERNAL_TIMESTAMP_NSEC",
            "INTERNAL_THERM_CASE"
        ];
    },
    {
        address = 30101;
        registers = [
            "INTERNAL_WAVELENGTH_CH0_GR0",
            "INTERNAL_WAVELENGTH_CH0_GR1"
        ];
    },
    {
        address = 30201;
        registers = [
            "INTERNAL_WAVELENGTH_CH1_GR0",
            "INTERNAL_WAVELENGTH_CH1_GR1"
        ];
    }
);
```

4 Trouble-shooting

If there is no response to MODBUS requests at the address and port specified, it is likely that there is a syntax error in the map file. Errors are written to the system log which can be read with the logread utility by logging in to the embedded linux system with an SSH terminal client such as **PuTTY** or **ssh**. Log in as root user, no password.

