**mSTAR Field Test Sheet**

|  |  |  |  |
| --- | --- | --- | --- |
| **Station Name:** | {{ site }} | **File:** | STN |
| **Performed By:** | {{ name }} | **Date:** | {{ date }} |

After using this document at a station for a calibration or repair, it MUST be filed to the station file.

**Where a WXT is used with mSTAR:**

* Record ALL CSD data parameters here in the Before and After Readings (end-to-end system checks)
* For sensors directly connected to mSTAR use the Standard Checks in this document
* For the WXT use the WXT Field Test Sheets document to check the WXT operation

**Communicating with an mSTAR:**

* Connect a laptop RS232 port to the mSTAR RS232-a port (on J2).
* Use a terminal type program (e.g. HyperTerminal or ProComm) to communicate in ASCII character mode with the following default serial port setup (other settings may be required if the unit has been configured as non-standard):

|  |
| --- |
| 9600, 8, N, 1 (9600 baud rate, 8 data bits, No parity, 1 stop bit) |

### Before and After Readings

These checks must be performed with the sensor installed in-situ i.e. on the mast and the mast erected.

| **CSD Message Data Checks** | | Record BEFORE Testing | | Record AFTER Testing | |
| --- | --- | --- | --- | --- | --- |
| Measured Parameter, field in () | | Before | Status G 🗹 | After | Status G 🗹 |
| $AA (1) Software version  (2) Station identifier  (3) Message interval (minutes)  (4...6) ss:nn:hh  (7...9) dd/mm/yyyy | | {{ AA\_BV1 }}  {{ AA\_BV2 }}  {{ AA\_BV3 }}  {{ AA\_BV4\_6 }}  {{ AA\_BV7\_9 }} |  | {{ AA\_AV1 }}  {{ AA\_AV2 }}  {{ AA\_AV3 }}  {{ AA\_AV4\_6 }}  {{ AA\_AV7\_9 }} |  |
| $HK (2) Voltage  (4) Internal temperature  (6) Vref Adjusted | | {{ HK\_BV2 }}  {{ HK\_BV4 }}  {{ HK\_BV6 }} | {{ HK\_BS1 }} | {{ HK\_AV2 }}  {{ HK\_AV4 }}  {{ HK\_AV6 }} | {{ HK\_AS1 }} |
| $BP (2) Sensor Pressure  (3) MSL Pressure  (5) QNH Pressure | | {{ BP\_BV2 }}  {{ BP\_BV3 }}  {{ BP\_BV5 }} | {{ BP\_BS1 }} | {{ BP\_AV2 }}  {{ BP\_AV3 }}  {{ BP\_AV5 }} | {{ BP\_AS1 }} |
| $BS (2) Sunshine duration | | {{ BS\_BV2 }} | {{ BS\_BS1 }} | {{ BS\_AV2 }} | {{ BS\_AS1 }} |
| $DS (2) Direction  (3) Speed over ground  (4) Heading | | {{ DS\_BV2 }} | {{ DS\_BS1 }} | {{ DS\_AV2 }} | {{ DS\_AS1 }} |
| $FX (2,3,4) Latitude: deg,min,N/S  (5,6,7) Longitude: deg,min,E/W  (8) Height above MSL | | {{ FX\_BV2 }} | {{ FX\_BS1 }} | {{ FX\_AV2 }} | {{ FX\_AS1 }} |
| $PR (2) Precipitation | | {{ PR\_BV2 }} | {{ PR\_BS1 }} | {{ PR\_AV2 }} | {{ PR\_AS1 }} |
| **$RC Lufft Data Value**  (2) Ext Temp, 5cm, T1  (4) Ext Temp, 30cm, T2  (6) Sens Internal, ~2cm, T3  (8) Salt Concentration  (10) n/a  (12) Water Film Height  (14) Road condition  (16) Ice percentage  (18) Normalised Friction | **$RC ROSA** [MS14 item]  (2) Sens inter, ~5cm [31]  (4) Ext Temp, 30cm [37]  (6) Ext Temp, 2cm [30]  (8) n/a  (10) n/a  (12) Water Film Thick [42]  (14) Road condition [36]  (16) n/a  (18) n/a | {{ RC\_BV2 }} | {{ RC\_BS1 }} | {{ RC\_AV2 }} | {{ RC\_AS1 }}  (1)  (3)  (5)  (7)  (9) n/a  (11)  (13)  (15)  (17) |
| $RH (2) Relative Humidity  (3) Dewpoint | | {{ RH\_BV2 }} | {{ RH\_BS1 }} | {{ RH\_AV2 }} | {{ RH\_AS1 }} |
| $SD (2) Snow depth in (m)  (3) Sensor temperature (˚C)  (4) Laser signal strength (0 to 255)  (5) Laser angle from vertical (˚) | | {{ SD\_BV2 }} | {{ SD\_BS1 }} | {{ SD\_AV2 }} | {{ SD\_AS1 }} |
| $SM (2) Soil moisture | | {{ SM\_BV2 }} | {{ SM\_BS1 }} | {{ SM\_AV2 }} | {{ SM\_AS1 }} |
| $SR (2) Solar irradiance | | {{ SR\_BV2 }} | {{ SR\_BS1 }} | {{ SR\_AV2 }} | {{ SR\_AS1 }} |
| $SS Sea State  Spectral (3) Water / Tide level  (4,5) 1st peak height/period  (6,7) 2nd peak height/period  (8) Width  Tradition (10) Water / Tide level  (11) Significant wave height  (12) Significant wave period  (13) Average height top 10%  (14) Maximum wave height  (15) Zero crossing period | | {{ SS\_BV2 }} | {{ SS\_BS1 }} | {{ SS\_AV2 }} | {{ SS\_AS1 }} |
| $T0 (2) 100cm temp | | {{ T0\_BV2 }} | {{ T0\_BS1 }} | {{ T0\_AV2 }} | {{ T0\_AS1 }} |
| $T1 (2) 10cm temp | | {{ T1\_BV2 }} | {{ T1\_BS1 }} | {{ T1\_AV2 }} | {{ T1\_AS1 }} |
| $T2 (2) 20cm temp | | {{ T2\_BV2 }} | {{ T2\_BS1 }} | {{ T2\_AV2 }} | {{ T2\_AS1 }} |
| $T5 (2) 50cm temp | | {{ T5\_BV2 }} | {{ T5\_BS1 }} | {{ T5\_AV2 }} | {{ T5\_AS1 }} |
| $TA (2) Air temp | | {{ TA\_BV2 }} | {{ TA\_BS1 }} | {{ TA\_AV2 }} | {{ TA\_AS1 }} |
| $TE (2) 1-3cm Road temp | | {{ TE\_BV2 }} | {{ TE\_BS1 }} | {{ TE\_AV2 }} | {{ TE\_AS1 }} |
| $TS (2) Surface/grass temp | | {{ TS\_BV2 }} | {{ TS\_BS1 }} | {{ TS\_AV2 }} | {{ TS\_AS1 }} |
| $TU (2) 5cm temp | | {{ TU\_BV2 }} | {{ TU\_BS1 }} | {{ TU\_AV2 }} | {{ TU\_AS1 }} |
| $TX (2) \_\_\_cm temp | | {{ TX\_BV2 }} | {{ TX\_BS1 }} | {{ TX\_AV2 }} | {{ TX\_AS1 }} |
| $TY (2) \_\_\_cm temp | | {{ TY\_BV2 }} | {{ TY\_BS1 }} | {{ TY\_AV2 }} | {{ TY\_AS1 }} |
| $TZ (2) \_\_\_cm temp | | {{ TZ\_BV2 }} | {{ TZ\_BS1 }} | {{ TZ\_AV2 }} | {{ TZ\_AS1 }} |
| $VB (2) 1-min Visibility (m) | | {{ VB\_BV2 }} | {{ VB\_BS1 }} | {{ VB\_AV2 }} | {{ VB\_AS1 }} |
| $WD (2) Wind direction | | {{ WD\_BV2 }} | {{ WD\_BS1 }} | {{ WD\_AV2 }} | {{ WD\_AS1 }} |
| $WR (2) Instant wind direction relative  (3) Instant wind speed relative | | {{ WR\_BV2 }} | {{ WR\_BS1 }} | {{ WR\_AV2 }} | {{ WR\_AS1 }} |
| $WS (2) Wind speed | | {{ WS\_BV2 }} | {{ WS\_BS1 }} | {{ WS\_AV2 }} | {{ WS\_AS1 }} |
| $WX (2) Present Weather (intensity) | | {{ WX\_BV2 }} | {{ WX\_BS1 }} | {{ WX\_AV2 }} | {{ WX\_AS1 }} |
| $MS14 Use ROSA Field Test Sheets | |  |  |  |  |

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| --- | --- | --- | --- |
| **Pressure Sensor and Station Height Checks** | Record BEFORE Testing | Record AFTER Testing | Ok |
| CSD message $TA(2) Air temp | {{ TA\_BV2 }} | {{ TA\_AV2 }} |  |
| CSD message $BP(2) Sensor | {{ BP\_BV2 }} | {{ BP\_AV2 }} |  |
| CSD message $BP(3) MSL | {{ BP\_BV3 }} | {{ BP\_AV3 }} |  |
| CSD message $BP(5) QNH | {{ BP\_BV5 }} | {{ BP\_AV5 }} |  |
| Absolute ( Air Temp Before - Air Temp After ) = | ( ≤ 20˚C? ) | |  |
| MSL – Sensor = |  |  |  |
| QNH – Sensor = |  |  |  |

(QNH – Sensor) Before and After values MUST agree within: Runway height up to ±1000 m… ±0.3 hPa

“MSL – Sensor” Before and After values MUST agree within: Station height up to ±25 m… ±0.3 hPa

(acceptance ranges are valid for Air Temperture change Station height 25 to 100 m… ±1 hPa

of no more than 20˚C between the Before and After) Station height 100 to 200 m… ±2 hPa

Station height 200 to 500 m… ±5 hPa

Station height 500 to 1000 m… ±10 hPa

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| --- | --- | --- | --- |
| **Test Equipment Used** | Model | Serial | Calibration Expires |
| Pressure Standard | PTB220 / PTB330 |  |  |
| RH/AT Standard | HMP155 |  |  |
| PRT Probe (Greisinger Digital Thermometer) |  |  |  |
| Rain[e] Calibration Mass |  |  |  |
| LI-COR Standard | LI-200Z / LI-200R | Serial  Cal uA/kW/m2 |  |
| Universal Calibrator |  |  |  |
| Multimeter |  |  |  |
| Druck Calibrator |  |  |  |
| Megger |  |  |  |
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| **Changed Sensors** | Old Serial Number | New Serial Number |
| --- | --- | --- |
| Aquaflex |  |  |
| GPS-17, Lars Thrane LT-1000 |  |  |
| HMP45A HMP45D HMP155 HUM50 ...circle one |  |  |
| Licor Solar Sensor |  |  |
| Licor Cal. Const. | μA/kWm-2 | μA/kWm-2 |
| Lufft Road IRS31 |  |  |
| PTB220 PTB330 DPA21 …circle one |  |  |
| PWD10 visibility |  |  |
| Rain Gauge |  |  |
| SHM30 Jenoptik, SHM31 Lufft |  |  |
| UTA Amplifier |  |  |
| Vector A101M |  |  |
| Vector W200P |  |  |
| Vegapuls 6x |  |  |
| Windsonic/WindObserver |  |  |
| WMS301 |  |  |
| WMT700 |  |  |
| WXT |  |  |
| YSI Air |  |  |
| YSI 1-3cm |  |  |
| YSI 5cm |  |  |
| YSI 10cm |  |  |
| YSI 20cm |  |  |
| YSI 50cm |  |  |
| YSI 100cm |  |  |
| YSI Surface (Grass Min) |  |  |
| YSI Tx |  |  |
| YSI Ty |  |  |
| YSI Tz |  |  |
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| --- | --- | --- |
| **Changed Units** | Old Serial Number | New Serial Number |
| mSTAR I/F PCB |  |  |
| mSTAR Fox PCB |  |  |
| or mSTAR-C: Fox PCB & Vref |  |  |
| mSTAR fox battery |  |  |
| Harvest Modem |  |  |
| Satlink2, Satlink3 |  |  |
| Battery  (Concorde PVX-340T) |  |  |
| Battery (DEKA 8GU1H) |  |  |
| Battery (Synergy G12-16) |  |  |
| Battery (IDC31DT) |  |  |
| SunSaver-10 Regulator |  |  |
| PRS1010 Regulator |  |  |
| Amtex DC-to-DC APK25-1224 |  |  |
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# Standard Checks

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| --- | --- |
| **mSTAR Model** | **System Versions** |
| mSTAR-A mSTAR-B mSTAR-C | Interface Board: Hardware Version = Board Revision = |
| Fox Board: Software Version = ADC Version = |

mSTAR-A IF = 1 i.e. interface card version 1

mSTAR-B IF = 2, AD = 1 i.e. interface card version 2 and Fox built in ADC

mSTAR-C IF = 2, AD = 2 i.e. interface card version 2 and 16 bit ADC add on to Fox board and Vref

Note: mSTAR power supply voltage must be ≥ 11.7 volts for the software and interfaces to operate correctly.

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| --- | --- | --- | --- | --- | --- |
| **House Keeping (ADMIN mode)** | + - | Signal (Vdc) | Measured |  | Ok |
| mSTAR power supply (external) | J1:2 - J1:3 | >11.7 | Vdc |  |  |

**Hint:** If mSTAR and the connected remote system are set up for time synchronisation then - after power up mSTAR will synchronise completely to the first received valid time string. Wait until after this process occurs before checking the System Time.

|  |  |
| --- | --- |
| **System Time** (There is an 8 sec window to type in the time.) | Ok |
| Type “time” and press return Check the displayed time is within ±5 seconds of current UTC time  If the clock needs adjusting then Type in the time in the format YYYYMMDDHHNNSS and press return |  |

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| --- | --- | --- | --- |
| **mSTAR-C ADC and Vref Checks** (ADMIN mode - Hardware Menu command 4) | Typically Value | Actual Value | Ok |
| mSTAR Calibration Valid until? | Date: | |  |
| ADC Offset default = 0.000000 | ± 0.000xxx V | V |  |
| ADC Gradient default = 1.000000 | 0.999xxx \_  or 1.000xxx \_ |  |  |
| Vref Raw | 1.024xx V | V |  |
| Vref Offset default = 0.00000 Value ≤ ±0.002 V | ± 0.002xx V | V |  |
| Vref Adjusted Value 1.02400 ± 0.00005 V | 1.0240x V | V |  |

It is VERY unlikely to see the both the ADC Offset and ADC Gradient and Vref Offset at the software default values.

**Additional Step for Vref Dongle:**

If the above **mSTAR-C ADC and Vref Checks** failed, or the mSTAR Vref dongle is being changed then refer to section Additional Checks/Tests and Fault Finding below and perform the process When Changing a Vref Dongle (dongle-pairing).

|  |  |
| --- | --- |
| **Other Field Test Sheets to be Used** | Ok |
| **ROSA** use ROSA Field Test Sheets |  |
| **Snow Depth** use SHMxx Field Test Sheets |  |
| **Sunshine Duration** use CSDxx Field Test Sheets |  |
| **Visibility** use PWD10/22 Field Test Sheets |  |

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| --- | --- | --- | --- | --- |
| **GPS** - Direction/Speed (± 10 ˚T, ± 1 m/s) | Expected | Measured | Difference | Ok |
| 1 minute average direction | Qualitative | ˚T |  |  |
| 1 minute average speed over ground | Qualitative | m/s |  |  |
| 1 minute average heading (degrees True) | Qualitative | ˚T |  |  |
| **GNSS** - Fix/Position (± 0.1 ', ± 10 m) |  |  |  |  |
| Latitude S(X˚ Y.Y') |  |  |  |  |
| Longitude E(X˚ Y.Y') |  |  |  |  |

|  |  |
| --- | --- |
| **LiCor UTA Label Check - only perform this if the label has not already been corrected and coloured red** | Ok |
| On the UTA remove the black and white sticker over the Com and –IN terminals.  Restick the label so the white portion is adjacent the -IN terminal.  Colour in the white section of the label with red marker (which is now adjacent the -IN terminal). |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LiCor Solar Interface - Sensor Removed, use current source**  AD=1... ±29 Wm-2, AD=2... ±20 Wm-2 | Expected  (W/m2) | mSTAR  (W/m2) | Difference  (W/m2) | Ok |
| Input to UTA using 0.05% current calibrator  Licor Cal Constant = \_\_\_\_\_ uA  Licor Cal Constant / 2 = \_\_\_\_\_ uA | 1000  500 | \_\_\_\_\_  \_\_\_\_\_ | \_\_\_\_\_  \_\_\_\_\_ |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LiCor Solar - Sensor Connected, End-to-End** | Druck  (W/m2) | mSTAR  (W/m2) | Difference  (W/m2) | Ok |
| Live value (current sky)@ *±100 Wm-2*    Reference Licor Sensor Cal Constant = \_\_\_\_\_ uAkW-1m-2    Calibrator output (1 minute average) = \_\_\_\_\_ uA  (Calibrator output / Sensor Cal Constant) x 1000 => | \_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_ |  |
| Sensor dark value check - Sensor covered  AD=1... ±29 Wm-2, AD=2... ±20 Wm-2 | 0 |  |  |  |
| Sensor wiring polarity check (torch kit directly into sensor and adjust until data value is between 750 and 1500 Wm-2 for the system) # |  |  |  |  |

Note #: If the sensor connection is polarity reversed then data may appear correct but will limit at about 500 W/m2.

@ LI-COR testing with the Druck DPI620 CE:

The reference sensor must be level and oriented so that the sensor cable is aligned to True South.

Connect the reference sensor clear centre conductor to COM (common) terminal and shield to mA+ terminal of CH1 (channel 1).

* Use the Task menu on the Druck to select “Channel 1”, then change the Settings so that the function is “measure” “Current” then press the green tick to accept the change of function.
* Select “**Utility**” and change the channel setting to “**Max/Min/Avg**” then press the green tick to accept the change of function.
* Press the green tick again to accept the Task settings.
* Once the LICOR is set up in place and you are ready to take measurements - Press reset button.

Take the reading and divide it by the reference LI-COR cal constant, then compare this to the LI-COR under test.

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| --- | --- | --- | --- | --- |
| **Lufft Road** (± 5 ˚C, ± 1 mm) | Expected | Measured | Difference | Ok |
| Internal Temperature | Qualitative | ˚C | ˚C |  |
| External Temperature 1 | Qualitative | ˚C | ˚C |  |
| External Temperature 2 | Qualitative | ˚C | ˚C |  |
| ~~Salt Concentration~~ | ~~Qualitative~~ | ~~%~~ | ~~%~~ |  |
| ~~Freeze Temperature~~ | ~~Qualitative~~ | ~~˚C~~ | ~~˚C~~ |  |
| Water Film Thickness | Qualitative | mm | mm |  |
| Road Condition  10= Dry 15= Moist 20= Wet  25= Moist with salt 30= Wet with salt 35= Ice  40= Snow 45= Frost | Qualitative |  |  |  |
| ~~Ice percentage 0 to 100 \*~~ | ~~Qualitative~~ | ~~%~~ | ~~%~~ |  |
| ~~Friction 0 to 1~~ | ~~Qualitative~~ |  |  |  |

Note: Lufft output code: 55h = conditions unmeasurable (normal for Salt, Freezing temp and Ice percentage in warm conditions, and if dry) .

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| --- | --- | --- | --- | --- | --- |
| **Pressure**  0.5 hPa | System:  Each Cell  (hPa) | Inspectors:  corrected  (hPa) | System:  Cells Average  (hPa) | Difference  (hPa) | Ok |
| Sensor Unit 1 Unit 2 Unit 3 | \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_ |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Rain Gauge** (±0.2 mm) *(Manually empty bucket after test)* | Expected | mSTAR | Difference | Ok |
| Pour water through rain gauge 10 tips | 10 counts | counts | counts |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Relative Humidity Sensor**  HMP45A: ±5 %RH (for HMP45D see ROSA)  HMP155: ±5 %RH  HUM50: ±10 %RH | Probe Type  HMP45A  HMP155  HUM50 | Inspectors  (%RH) | mSTAR  (%RH) | Difference  (%RH) | Ok |
| Sensor at height \_\_\_\_ m |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Soil Moist and Temperature** (± 10 %, ± 0.5 ˚C) | Expected | mSTAR | Difference | Ok |
| Aquaflex Temperature | Qualitative | ˚C |  |  |
| Aquaflex Soil Moisture | Qualitative | % |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Temperature Sensors**  YSI ± 0.5 ˚C  HMP45A ± 0.5 ˚C (for HMP45D see ROSA)  HMP155 ± 0.5 ˚C  HUM50 ± 1.0 ˚C | Probe Type  YSI  HMP45A  HMP155  HUM50 | Inspectors  (˚C) | mSTAR  (˚C) | Difference  (˚C) | Ok |
| Air at height \_\_\_\_ m |  |  |  |  |  |
| Air at height 2m |  |  |  |  |  |
| Air at height 10m |  |  |  |  |  |
| Surface (grass minimum) |  |  |  |  |  |
| Soil at depth \_\_\_\_ cm | YSI | Qualitative |  |  |  |
| Soil at depth \_\_\_\_ cm | YSI | Qualitative |  |  |  |
| Soil at depth \_\_\_\_ cm | YSI | Qualitative |  |  |  |
| Soil at depth \_\_\_\_ cm | YSI | Qualitative |  |  |  |
| Soil at depth \_\_\_\_ cm | YSI | Qualitative |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Vegapuls Sensor Distance** - to horn neck reference point (± 0.05 m) | Inspectors | Measured | Difference | Ok |
| mSTAR Distance | m | WL m | m |  |

Note: Sensor Distance above water (SD) = Sensor Height above datum (SH) – Tide / water Level (TL)

|  |  |
| --- | --- |
| **Wind Sensor Inspection** | Ok |
| Anemometer Check bearings - Replace sensor if necessary |  |
| Vane Check bearings - Replace sensor if necessary |  |
| Vane and ultrasonic Check orientation of sensor base is within ±1 degree of True North |  |

For moving platforms (e.g. ships) use wind Relative values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wind Direction Interface & Sensor - Analog Vane Sensors only**  ± 10 deg **True / Relative *(circle one)*** | Expected  (deg) | Measured  (deg) | Difference  (deg) | Ok |
| Align sensor by hand to East / 090 | 090 |  |  |  |
| Align sensor by hand to South / 180 | 180 |  |  |  |
| Align sensor by hand to West / 270 | 270 |  |  |  |
| Align sensor by hand to North / 360 | 360 |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wind Sensor in Situ True / Relative *(circle one)*** | Qualitative | Measured | Difference | Ok |
| Wind speed Qualitative ± 5 m/s | m/s | m/s |  |  |
| Wind direction Qualitative ± 20 degrees | deg | deg |  |  |

Deg Magnetic = Deg True - 20 (this approximation is adequate for all New Zealand stations)

Qualitative - Value: Wind speed should be estimated using the Beaufort scale.

Hint - to provide a wind direction and speed visual indicator tie a thin ribbon to the mast, in a non-obstructing location.

Additional Checks/Tests and Fault Finding

Power Supply Fault Finding

|  |  |  |  |
| --- | --- | --- | --- |
| **House Keeping** (ADMIN mode) | Signal  (Vdc) | Measured  (Vdc) | Ok |
| mSTAR power supply (software value) | external ± 0.3 |  |  |
| mSTAR 5 volt supply (software value) | 5.0 ± 0.3 |  |  |

Note: mSTAR power supply voltage must be ≥ 11.7 volts for the mSTAR software and interfaces to operate correctly.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Power Supplies** | + - | Signal  (Vdc) | Measured  (Vdc) | Ok |
| mSTAR power supply | J1:2 - J1:3 | >11.7 |  |  |
| ROSA power supply | J3:1 – J3:6 | > 11.5 |  |  |
| Lufft Road power supply | J3:1 – J3:6 | >11.5 |  |  |
| Pressure PTB220 power supply IF V1  IF V2 | J7:5 – J7:6  J11:1 – J11:2 | >11.5 |  |  |
| Humidity power supply | J8:1 – J8:2 | >11.5 |  |  |
| Humidity supply return | J8:2 - J1:3 | < 0.4 |  |  |
| Aquaflex Soil power supply | J9:1 – J9:2 | >11.5 |  |  |
| Aquaflex Soil supply return | J9:2 - J1:3 | < 0.4 |  |  |
| LiCor UTA power supply | J10:1 – J10:2 | >11.5 |  |  |
| LiCor UTA supply return | J10:4 - J1:2 | < 0.4 |  |  |
| Sunshine Duration power supply | J10:1 – J10:2 | >11.5 |  |  |
| Sunshine Duration supply return | J10:6 - J1:2 | < 0.4 |  |  |
| Vegapuls Level 12 volt power supply | J11:1 – J11:2 | >11.5 |  |  |
| Vegapuls Level 24 volt power supply | Amtex + to - | 24.0 ± 0.5 |  |  |

When Changing a Vref Dongle (dongle-pairing)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **mSTAR Internal Temperature**  (Display Sensor / Housekeeping) | | | Internal Temp  ˚(C) | Ok |
| Internal Temperature MUST be from 10 to 20°C. If not then dongle pairing mustNOT be performed.  If outside 10 to 20°C then replace the mSTAR & dongle with a laboratory calibrated and matched paired. | | |  |  |
| **mSTAR-C Vref Calibration (dongle pairing)**  (ADMIN mode - Hardware Menu command 3) | Vref Raw  (Vdc) | Vref Offset  (uV) | Vref Adjusted  (V) | Ok |
| Vref Adjusted **MUST** be: 1.02400 ± 0.00005 V |  |  |  |  |

Rain gauge Fault Finding

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raingauge** (±0.2 mm) | + - | Signal  (mm/min) | Measured  (mm/min) | Ok |
| 0.2 mm/tip Calibrator 0.0 Hz  Calibrator 1.0 Hz | J4:5 - J4:6 | 0.0  12.0 |  |  |
| 1.0 mm/tip Calibrator 0.0 Hz  Calibrator 0.5 Hz | J4:5 - J4:6 | 0.0  30.0 |  |  |

Ultrasonic Wind Sensor Fault Finding

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wind Ultrasonic** | Expected | Measured | Difference | Ok |
| Wind speed margin verifier | ≤ 0.2 m/s | m/s | m/s |  |

Analog Wind Sensor Fault Finding

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wind Speed Interface and Sensor (cups only)**  (± 10%) | + - | Signal  (Vdc) | Measured  (Vdc) | Ok |
| Sensor input High (cups held so output high) | J4:3 - J4:4 | Vector > 7.0  WMS301 > 4.7 |  |  |
| Sensor input Low (cups held so output low) | J4:3 - J4:4 | < 0.7 |  |  |
| Sensor input Low return | J4:4 - J1:3 | < 0.15 |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wind Speed Interface and Sensor (cups only)**  +J4:3 - J4:4 ± 0.1 m/s | Expected (m/s)  Vector WMS301 | Measured  (m/s) | Difference  (m/s) | Ok |
| Calibrator CMOS input 512 Hz | 51.2 357.6 |  |  |  |
| Calibrator CMOS input 64 Hz | 6.4 44.5 |  |  |  |
| Calibrator CMOS input 0 Hz | 0 0 |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wind Direction Interface - Vanes** sensors only (± 5 deg) | Approximate voltage (Vdc)  J5:5 - J5:6 | Signal  (deg) | Measured  (deg) | Ok |
| Measure wind direction by inputting signal to J5-5...  Connect together J5-1 and J5-3.  Connect together J5-2 and J5-4 and J5-6.  Then Connect calibrator red to J5-1, black to J5-5, white to J5-6.  Adjust calibrator switch to generate signals.  Or Connect four 2.7 kOhm 1% resistors in series J5-1 to J5-6.  Connect J5-5 to resistor ends/junctions to generate signals. | 0.000 | 360 |  |  |
| 0.125 | 090 |  |  |
| 0.250 | 180 |  |  |
| 0.375 | 270 |  |  |
| 0.500 | 360 |  |  |

YSI Temperature Sensor Fault Finding

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **YSI Temperature Interface - Board V1**  mSTAR-A(± 0.6 ˚C) | + - | Expected  (˚C) | mSTAR  (˚C) | Difference  (˚C) | Ok |
| YSI temperature 18k7 Ohms  Channel 1 35k25 Ohms | J6:2 – J6:3 | 22.3  -0.4 |  |  |  |
| YSI temperature 18k7 Ohms  Channel 2 35k25 Ohms | J6:5 – J6:6 | 22.3  -0.4 |  |  |  |
| YSI temperature 18k7 Ohms  Channel 3 35k25 Ohms | J7:2 – J7:3 | 22.3  -0.4 |  |  |  |
| **YSI Temperature Interface - Board V2**  mSTAR-B(± 0.6 ˚C) mSTAR-C(± 0.3 ˚C) | + - | Expected  (˚C) | mSTAR  (˚C) |  | Ok |
| YSI temperature 18k7 Ohms  Channel 1 35k25 Ohms | J6:1 – J6:2 | 22.3  -0.4 |  |  |  |
| YSI temperature 18k7 Ohms  Channel 2 35k25 Ohms | J6:3 – J6:4 | 22.3  -0.4 |  |  |  |
| YSI temperature 18k7 Ohms  Channel 3 35k25 Ohms | J6:5 – J6:6 | 22.3  -0.4 |  |  |  |
| YSI temperature 18k7 Ohms  Channel 4 35k25 Ohms | J7:1 – J7:2 | 22.3  -0.4 |  |  |  |
| YSI temperature 18k7 Ohms  Channel 5 35k25 Ohms | J7:3 – J7:4 | 22.3  -0.4 |  |  |  |

End