Appendix C - AIN Registers

When using the Mux80 with a Modbus compatible device, such as the T7 or T7-Pro, use the following registers to read the extended analog inputs.

Mux80 AIN Registers

Name	Start Address	Type	Access
AIN#(48:127)	96	FLOAT32	R
AIN#(48:127)_RANGE	40096	FLOAT32	R/W
AIN#(48:127)_NEGATIVE_CH	41048	UINT16	R/W
AIN#(48:127)_RESOLUTION_INDEX	41548	UINT16	R/W
AIN#(48:127)_SETTLING_US	42096	FLOAT32	R/W
AIN_ALL_RANGE	43900	FLOAT32	R/W
AIN_ALL_NEGATIVE_CH	43902	UINT16	R/W
AIN_ALL_RESOLUTION_INDEX	43903	UINT16	R/W
AIN_ALL_SETTLING_US	43904	FLOAT32	R/W

AIN#(48:127) - Starting Address: 96

Returns the voltage of the specified analog input.

- Data type: FLOAT32 (type index = 3)
- Read-only
- This register may be streamed

Expanded Names	Addresses	Formula
`AIN48, AIN49, AIN50, ...`	`96, 98, 100, ...`	`address = 96+(2*#)`

AIN#(48:127)_RANGE - Starting Address: 40096

The range/span of a single analog input. Select the desired range by writing a value from the device specific list.

- Data type: FLOAT32 (type index = 3)
- Readable and writable
- Default value: 0
- T8:
  - Valid values/ranges: 0.0=Default → ±11V. 11.0 → ±11.0, 9.6 → ±9.6, 4.8 → ±4.8, 2.4 → ±2.4, 1.2 → ±1.2, 0.6 → ±0.6, 0.3 → ±0.3, 0.15 → ±0.15, 0.075 → ±0.075, 0.036 → ±0.036, and 0.018 → ±0.018
- T7:
  - Valid values/ranges: 0.0=Default → ±10V. 10.0 → ±10V, 1.0 → ±1V, 0.1 → ±0.1V, and 0.01 → ±0.01V.
- T4:
  - Valid values/ranges: 0.0=Default → 0-2.5 V on LV lines and ±10 V on HV lines.

Expanded Names	Addresses	Formula
`AIN48_RANGE, AIN49_RANGE, AIN50_RANGE, ...`	`40096, 40098, 40100, ...`	`address = 40096+(2*#)`

AIN#(48:127)_NEGATIVE_CH - Starting Address: 41048

Specifies the negative channel to be used for each positive channel. 199=Default=> Single-Ended.

- Data type: UINT16 (type index = 0)
- Readable and writable
- Default value: 199
- T8:
  - Ignored. This register has no meaning on the T8.

- T7:
  - For base differential channels, positive must be an even channel from 0-12 and negative must be positive+1. For extended channels 16-127, see Mux80 datasheet.

Expanded Names	Addresses	Formula
AIN48_NEGATIVE_CH, AIN49_NEGATIVE_CH, AIN50_NEGATIVE_CH, ...	41048, 41049, 41050, ...	address = 41048+(1*#)

AIN#(48:127)_RESOLUTION_INDEX - Starting Address: 41548

The resolution index for command-response and AIN-EF readings. A larger resolution index generally results in lower noise and longer sample times.

- Data type: UINT16 (type index = 0)
- Readable and writable
- Default value: 0
- T8:
  - Valid values: 0-16. A value of 0 will instruct the T8 to use the best resolution for the rate specified.
- T7:
  - Valid values: 0-8 for T7, 0-12 for T7-Pro. Default value of 0 corresponds to an index of 8 (T7) or 9 (T7-Pro).
- T4:
  - Valid values: 0-5. Default value of 0 corresponds to an index of 5.

Expanded Names	Addresses	Formula
AIN48_RESOLUTION_INDEX, AIN49_RESOLUTION_INDEX, AIN50_RESOLUTION_INDEX, ...	41548, 41549, 41550, ...	address = 41548+(1*#)

AIN#(48:127)_SETTLING_US - Starting Address: 42096

Settling time for command-response and AIN-EF readings.

- Data type: FLOAT32 (type index = 3)
- Readable and writable
- Default value: 0
- T8:
  - Ignored. This register has no meaning on the T8.
- T7:
  - 0 = Auto. Max is 50000 (microseconds).
  - Minimum firmware version: 0.9328
- T4:
  - 0 = Auto. Max is 10000 (microseconds).

Expanded Names	Addresses	Formula
AIN48_SETTLING_US, AIN49_SETTLING_US, AIN50_SETTLING_US, ...	42096, 42098, 42100, ...	address = 42096+(2*#)

AIN_ALL_RANGE - Address: 43900

The range/span of a all analog inputs. Writing to this register will set the range for all analog inputs. Reading will return a range value if all channels are set to same range. Otherwise, -9999 will be returned.

- Data type: FLOAT32 (type index = 3)
- Readable and writable
- Default value: 0
- T8:
  - Valid values/ranges: 0.0=Default → ±11V. 11.0 → ±11.0, 9.6 → ±9.6, 4.8 → ±4.8, 2.4 → ±2.4, 1.2 → ±1.2, 0.6 → ±0.6, 0.3 → ±0.3, 0.15 → ±0.15, 0.075 → ±0.075, 0.036 → ±0.036, and 0.018 → ±0.018
  - Minimum firmware version: 1.0000
- T7:
  - Valid values/ranges: 0.0=Default → ±10V. 10.0 → ±10V, 1.0 → ±1V, 0.1 → ±0.1V, and 0.01 → ±0.01V.
  - Minimum firmware version: 0.9328
- T4:
  - Valid values/ranges: 0.0=Default → 0-2.5 V on LV lines and ±10 V on HV lines.

AIN_ALL_NEGATIVE_CH - Address: 43902

A write to this global parameter affects all AIN. Writing 1 will set all AINs to differential. Writing 199 will set all AINs to single-ended. A read will return 1 if all AINs are set to differential and 199 if all AINs are set to single-ended. If AIN configurations are not consistent 0xFFFF will be returned.

- Data type: UINT16 (type index = 0)
- Readable and writable
- Default value: 199
- T8:

    - Ignored. This register has no meaning on the T8.
- T7:
    - Minimum firmware version: 0.9328

AIN_ALL_RESOLUTION_INDEX - Address: 43903

The resolution index for command-response and AIN-EF readings. A larger resolution index generally results in lower noise and longer sample times. A write to this global parameter affects all AIN. A read will return the correct setting if all channels are set the same, but otherwise will return 0xFFFF.

- Data type: UINT16 (type index = 0)
- Readable and writable
- Default value: 0
- T8:
    - Minimum firmware version: 1.0000
- T7:
    - Valid values: 0-8 for T7, 0-12 for T7-Pro. Default value of 0 corresponds to an index of 8 (T7) or 9 (T7-Pro).
    - Minimum firmware version: 0.9328
- T4:
    - Valid values: 0-5. Default value of 0 corresponds to an index of 5.

AIN_ALL_SETTLING_US - Address: 43904

Settling time for command-response and AIN-EF readings. A write to this global parameter affects all AIN. A read will return the correct setting if all channels are set the same, but otherwise will return -9999. Max is 50,000 us.

- Data type: FLOAT32 (type index = 3)
- Readable and writable
- Default value: 0
- T8:
    - Ignored. This register has no meaning on the T8.
- T7:
    - 0 = Auto. Max is 50000 (microseconds).
    - Minimum firmware version: 0.9328
- T4:
    - 0 = Auto. Max is 10000 (microseconds).

For more information on multiplexing with the U6/Pro, see U6 Channel Numbers

For more information on multiplexing with the UE9, see UE9 Channel Numbers

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