

13.0 Voltage Input Module (VIM)

The Voltage Input Module (VIM) interfaces thermocouple and voltage input signals to the control module's IOBUS. The VIM provides 16 channels, each of which can be configured to be a thermocouple or voltage input. The VIM can accommodate many input types with minimal configuration and high accuracy. Each input is electrically isolated from the module's CPU, IOBUS, and ground to isolate field faults. In addition, each channel is isolated from other channels.

13.1 VIM Module Scope Parameters

Table 13-1 lists the Module Scope softlist parameters for the VIM.

Table 13–1 VIM Module Scope Parameters

PARAMETER	SELECTION	DEFAULT
ScanRate	NA	NA
LineFreq	50 Hz, 60 Hz	60 Hz
SharedTC	YES, NO	YES

To view/edit the module scope parameters, place the cursor on the desired module in the module tree and select the Edit, Object/Item menu item. The Hardware Modules dialog box opens. Choose the “Softlist” command button. The Module Scope Softlist dialog box opens.

ScanRate: This is a read-only parameter that displays the current scan rate of the module. In general, the scan rate is the same as the scan rate of the ACM, but may be a multiple of the ACM's scan rate.

LineFreq: The module software utilizes a notch filter to reduce noise from AC power sources. Specifying the line frequency of AC power optimizes the filtering algorithm.

SharedTC: This parameter only applies when using VIMs in a redundant system. Often one thermocouple is wired to both the primary and the backup VIM. If this is the wiring arrangement for the VIM being configured, specify SharedTC to be YES. If each VIM has its own thermocouples, then SharedTC should be NO. For non-redundant VIM's, specify the default (NO).

13.2 VIM Channel Types

The following channel types are supported for the VIM module:

- VIM TIC - Thermocouple Input
- VIM VIC - Voltage Input

13.2.1 VIM TIC - Thermocouple Input Channel

The VIM Thermocouple Input Channel (TIC) type returns a real (REAL) variable.

Table 13-2 shows the softlist parameters for the VIM Thermocouple Input channel type.

Table 13–2 VIM Thermocouple Input Channel Softlist Parameters

PARAMETER	SELECTION	DEFAULT
TCType	B, E, J, K, N1, R, S, T, N2	J
EngUnits	Deg°F, Deg°C, Deg°K, Deg°R	Deg°C
StepResponseTime	0.100 to 40.0	1.0
Bias	Any Real Number	0.0
MinRange	Any Real Number	Min. range of TC type selected.
MaxRange	Any Real Number	Max. range of TC type selected.
Scale_To_Percent	YES, NO	NO
Burnout	DISABLE, UP, DOWN	DISABLE
DigFiltTimeCnst	0.0 to 159.0 sec	0.016 sec

TCType: This parameter specifies the type of thermocouple used (i.e. B, E, J, K, N1, R, S, T, N2) the default is type J.

EngUnits: The user can select from the following engineering units: Deg°F, Deg°C, Deg°K, Deg°R.

Bias: A bias value can be entered to adjust for any known offset (usually due to thermocouple aging). The bias value can be any real number and is added to the scaled thermocouple reading.

MinRange: MinRange is an optional parameter that allows the user to specify a minimum operating value in EngUnits. If the reading drops below this value, an underrange error is reported. The MinRange can be any real number.

MaxRange: MaxRange is an optional parameter that allows the user to specify a maximum operating value in EngUnits. If the reading goes above this value, an overrange error is reported. The MaxRange can be any real number.

Scale_To_Percent: This is a Boolean softlist parameter whose default value is FALSE.

Burnout: The user can specify burnout detection or open circuit detection for a thermocouple:

DISABLE No burnout or open circuit detection

UP Return maximum operating value for TIC type selected

DOWN Return minimum operating value for TIC type selected

DigFiltTimeCnst: Digital filtering can be applied to thermocouple input signals to reduce the effects of electrical noise. The digital filter is a first-order lag, adjustable for time constants of 0.0159 to 159.0 seconds. Equivalent breakpoint frequencies are 10.0 to 0.001 Hz. The default value can be increased for noisy signals.

StepResponseTime: This parameter determines the time for the channel to fully respond to a step input. A longer StepResponseTime provides higher resolution and better repeatability of the signal.

12.2.2 VIM VIC - Voltage Input

The VIM Voltage Input Channel (VIC) type returns a real (REAL) variable.

Table 13-3 lists the softlist parameters for the VIM Voltage Input channel type.

Table 13–3 VIM Voltage Input Softlist Parameters

PARAMETER	SELECTION	DEFAULT
InputRange	VDC1to5, VDC0to5, VDCNeg10to10, VDCNeg5to5, VDCNeg1to1, Custom	VDC1to5
Custom_Range_Low	-10 to 10	0
Custom_Range_High	-10 to 10	0
MinScale	Any Real Number	0.0
MaxScale	Any Real Number	100.0
EngUnits	in, ft, mm, cm, m, in3, ft3, bbl, ml, liter, m3, lb, ton, mol, g, kg, ft/sec, m/sec,ft/sec2, msec2, DegF, DegR, DegC, DegK, psi, psia, psig, InH2O, InHg, ATM, kPa, kPaa, kPag, mmHg, kg/cm2, mbar, bar, lb/ft3, g/cm3, kg/m3, mol/m3, ft3/lb, m3/kg, ppm, pH, PPH, KPPH, t/day, kg/hr, kg/day, gal/min, GPM, GPH, GPD, ACFM, ACFH, SCCM, SCFH, SCFM, MCFH, yd3/hr, yd3/day, BPD, gal/hr, gal/day, m3/hr, m3/day, l/min, l/hr, l/day, mV, Volts, mA, AMPS, Ohms, mhos, W, kW, MW, Btu, Btu/SCF, Btu/lbm, Btu/hr, hp, bhp, vars, VA, kVA, joules, Percent, pulses, Hz, rpm, deg, rad, cal, cal/SCF, cal/hr, cal/lbm, kcal, kcal/SCF, kcal/hr, kcal/lbm	Percent
StepResponseTime	0.050 to 2.000 sec.	1.0
DigFiltTimeCnst	0.0 to 159.0 sec.	0.016

InputRange: VIC channels are able to read any voltage between -10 and +10. The module utilizes auto-ranging circuitry to provide high resolution even at millivolt levels. For scaling and diagnostic purposes, the range of values being measured by the channel must be specified. Several standard ranges are selectable from a list, or, a custom range can be selected by specifying "Custom" for the InputRange and editing Custom_Range_Low and Custom_Range_High values.

Custom_Range_Low: This is an optional parameter that allows the user to specify a minimum input range in volts. If the reading drops below this value, an underrange error is reported. This parameter is only used when InputRange is specified as “custom.”

Custom_Range_High: This is an optional parameter that allows the user to specify a maximum input range in volts. If the reading goes above this value, an underrange error is reported. This parameter is only used when InputRange is specified as “custom.”

MinScale: The module will linearly scale raw data (volts) to engineering units for each channel. The scaling algorithm uses the MinScale/MaxScale parameters set by the user. For example, given a MinScale of 0.0, a MaxScale of 100.0, and an InputRange of 1-5 volts, if the input to the channel is 3 volts, the scaled value will be 50.0. MinScale can be any real number (REAL numbers are valid between -3.4028E38 and +3.4028E38.).

MaxScale: MaxScale can be any real (REAL) number.

EngUnits: Engineering units for the scaled value can be selected from a list of common engineering units.

DigFiltTimeCnst: This parameter sets the time constant of a low-pass digital filter applied to the input data. This filter reduces non-repetitive noise from the input data and can be disabled by setting this parameter to 0.0.

StepResponseTime: This parameter sets the length of a moving-average digital filter applied to the input data. StepResponseTime determines the time to fully respond to an input step. Increasing this parameter reduces periodic or repetitive noise and improves repeatability and resolution. The recommended setting for this parameter is between 0.5 and 4.0 seconds.

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