24 Vdc 32 Digital Input Data Logger Module AL-3138

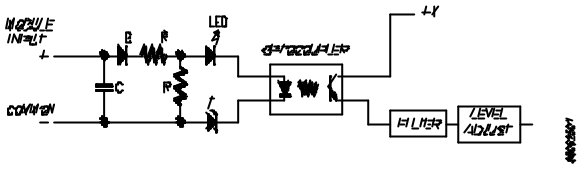
Doc. Cod.: 6112-438.9 Revision: A

1. Product Description

The AL-3138 is a 32 input 24 Vdc Data Logger Module belonging to AL2002 and AL-2003 PLC series. The AL-3138 is capable of milisecond event time stamp in each one of the 32 inputs. Also the inputs can be used as digital inputs at the same time.

The AL-3138 have hot-swapping characteristics.

The simplified electric circuit of each input is shown below:



2. Packing List

The product packing contains the following part:

- AL-3138: 32 digital input data logger module

3. Functional Characteristics

3.1. General Characteristics

- 32 optocoupled inputs
- Data logging resolution:1 ms
- Hardware syncronizationwith the UCP
- Hot Swapping
- Input status indication by LEDs
- CPU module accessing indicated by Activity LED.
- Protection: watchdog circuit with LED on panel
- Common connections: between inputs: for each 8 inputs
- Connection cable gauge: 0.5 to 1.5 mm^2.
- Operation temperature: 0 to 60 °C
  exceeding IEC 1131 standard
- Storage temperature: -25 to 75 °C
  according IEC 1131 standard
- Operation relative humidity: 5 to 95% (no condensing)
  according IEC 1131 standard
- Weight:
  net: 500 g
  shipped: 700 g
- Degree of protection: IP 20, against contact with live moving parts inside and no protection against water
  according to IEC Pub. 144(1963) standard
- MTBF: 35,000 hours @40°C
  calculated according MIL-HDBK-217E

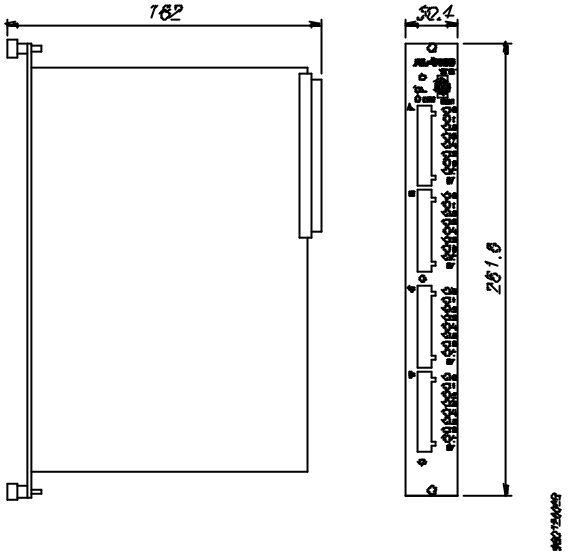
3.2. Electrical Characteristics

- Logical level 1:
  input voltage: 15 to 30 Vdc
- Logical level 0:
  input voltage: 0 to 5 Vdc
- Module dissipation:
  4W @ 24 Vdc
- Input current:
  7 mA @ 24 Vdc
- Bus power consumption:
  100 mA @ 5V
- Transition time 0-1 and 1-0: 200µs
- Isolation voltage between inputsand system:
  2500 Vdc
- Protection:
  300V varistor between input common and ground
- Dielectric Strength
  500 Vdc: PROFIBUS signals relative to PLC bus and system ground
- Electrostatic discharge immunity (ESD):
  according IEC 1131 standard, level 4
- Damped oscillatory wave conducted noise immunity:
  according IEC 1131, level A, and IEEE C37.90.1 (SWC) standards
- Fast transient conducted noise immunity:
  according IEC 1131 standard, level B
  according IEC 801-4 standard, level 3
- Radiated electromagnetic field immunity:
  10 V/m @ 140 MHz
  according IEC 1131 standard
- Protection against electrical shock:
  according to IEC-536-1976 standard, class I

3.3. Software Characteristics

- Programming through F-event.017 function module integrated to ladder diagram through MasterTool®
- Event storage capacity: 150

4. Physical Dimensions



5. Installation

5.1. Rack

AL-3138 module can be installed in AL-3630, AL-3632 or AL-3634 racks which can support synchronism and hot swapping characteristics.

5.2. Connections

The input are connected through terminal blocks on AL-3138 panel of.

The 32 inputs are arranged as 4 bytes, one connector for each byte (named A, B, C or D). Each byte has its own common voltage connection.

The connectors pins are marked on panel with the correponding bit number.

5.3. Hot Swapping

The AL-3138 module has hot swapping characteristic. It can be replaced with the system energized.

To avoid error readings during replacing, there is a special switch on the panel (named as the hot swapping switch) which must be turned to the STBY position before module removing. The switch must be turned to RUN after changing the module.

Operation sequence for module replacing:

1. Turn the switch to STBY position

2. Remove the module from rack. Disconnect field cabling.

3. Insert new module. Connect field cabling to input connectors on module panel

3. Turn the switch to RUN. The Active LED should light if the module is declared in application program of CP.

5.4. Module Initialization

The module has selftest. When turned on (by hot swapping or byCP power on) the selftest is executed. If any hardware problem is detected, the “ERR” LED, turn on and the module must be substituted.

In normal operation the “ERR” LED turn off after the activation and the “A” (ACTIVE) LED turn on for each UCP scan (the module must be defined in application program and switch must be in RUN position).

If CPU is not sending synchronism signal, the ERR led flashes at approximately each 2 seconds.

6. Configuration

The AL-3138 input module is configured by software. There is only one strap which is used in module testing at thefactory and should be connected for normal use.

7. Programming

AL-3138 module programming is performed by F-EVENT function module. AL-3138 can operate as a Data Logger (event time stamping) or a normal input module or a combination of the two modes. F-EVENT function is used for configuring the module and event data transfer. Refers to AL-3830 or MASTERTOOL programmer manual for AL-3138 programming.

7.1. Programming Example:

Module declaration on bus:

Position	Model	Inputs	Outputs	Address
00	AL-3139	E0000-E0003		R000
01	AL-3138			R008

Application:

In the example below, the module is configured in logic number000 of the program.

TM0000 layout is shonw below:

000	Byte 0 mask
001	Byte 1 mask
002	Byte 2 mask
003	Byte 3 mask
004	Debounce
005	overflow Type

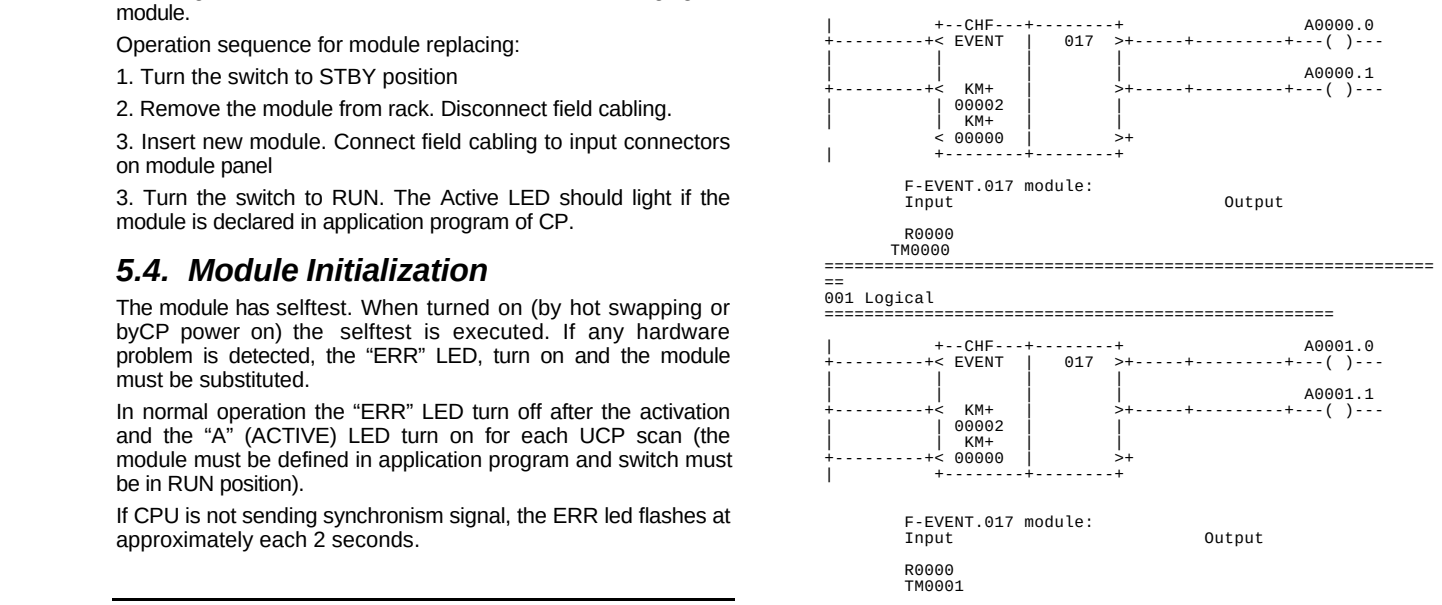
The relay A0000.0 turns on whenever the function is called and the parameters are correct.

The relay A0000.1 turns on when the module is active. A0000.1 turns off whenmodule is inactive or in error.

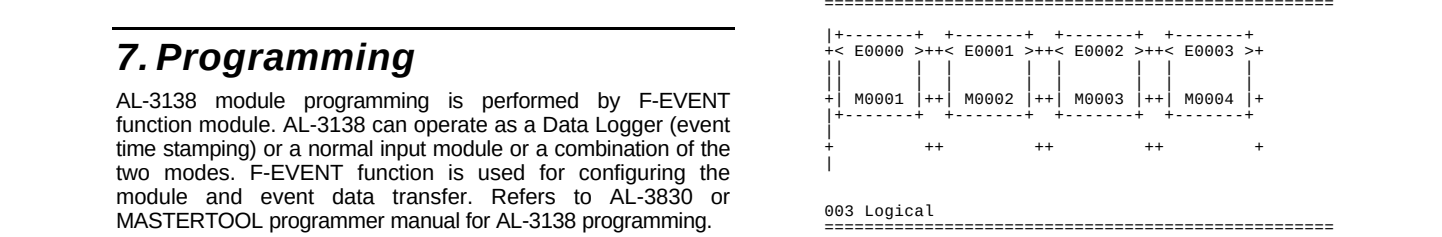
In logic number 001 shows how to read module configuration if is necessary. Table TM0001 has identical meaning to TM0000 table.

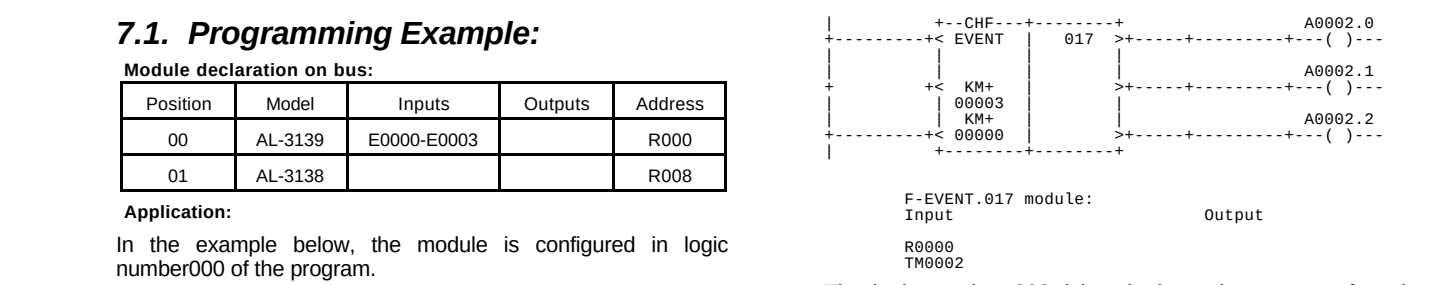
The relay A0001.0 turns on whenever the function is called and the parameters are correct.

The relay A0001.1 turns on when the module is active. If A0001.1 turns off the module is inactive or in error.



The logic number 002 shows how toread module inputs. Direct reading is possible becausethe module was declared in the bus as AL-3139. Input points reading is independent of the configuration.





The logic number 003 (above) shows how to transfer time stamped event data to UCP. The events are transferred from AL-3138 to TM0002 table (see Mastertool programming Manual for table format)

Event format is shown in the description of F-EVENT.017 in the AL-3830 or MASTERTOOL user manual.

7.2. Module Operation

The Data logger input module AL-3138 monitors 32 digital inputs and registers modifications of this inputs with resolution of millisecond.

The result comes in form of time stamped events, in other words, registers that have the variation time (hours / minutes / seconds / milliseconds), the input number of and its new state.

The time is maintained in the module throughsynchronism signal generated by the CPU (AL-2002 or AL-2003) made of second pulses. This synchronism guarantees at milisecond level the events.

> ATTENTION:
>
> The AL-3138 module cannot capture events without UCP synchronism signal. AL-3138 detects synchronism missing, and indicates through flashing ERR led on panel.

If a new time is set on AL-2002 or AL-2003 UCPs each Al3138 module active sends a “time adjusting” set of events, indicating the old and the new time, for late adjusting purposes.

The time adjust and synchronization funtions are performed by firmware on AL-3138 and CPU, beeing totally transparent to the application program.

Communication between CPU and the AL-3138 module is controlled by “F-EVENT.017” function module, supplied with AL-3830 or MASTERTOOL programmers.

The “F-EVENT.017” function module is in charge of Data Logger operations with the module, transferring data to the user program through tables.

The detailed description of “F-EVENT” function is avaiable in the AL-3830 and MASTERTOOL programmer manuals, which may be consulted.

7.3. AL-3138 Module Parameters

The AL-3138 module have 3 configuration parameters which follows:

- Input masks
- Debounce
- Overflow option

The masks permit to choose input points to not generate events (points not used).

There are 4 masks of 8 bits (one per byte). Each bit on the mask correspond to one input point. A “one” disables the corresponding input on the mask. A “zero” enables the corresponding input.

The default state of the masks is FFH, in other words, all points are disabled.

The debounce specifies the time to wait for, in order to avoid noise generated by the sensors. This time may be used in case of dry contacts that normally bounce some ten of milliseconds when closed (or opened).

The debouncing algorithm works as follows: when some input detects a variation, the module registers the event, but masks immediately the input until the debouncing time is ealpsed. After the debounce time, the input is unmasked to continue event time stamping.

If is not necessary, the debounce may be set to ZERO.

The debounce affects all all input.

The Overflow option is a bit that specifies the action to be taken by the AL-3138 module in case of memory overflow. Two options can be chosen: preserve the older or the newer events.

8. Revisions

This Technical Characteristic is valid for AL-3138 Data Logger Input Module, revision A and above.

Revision: A Doc. Cod.: 6112-438.9

The revision of this document is shown on top of the page, indicating content changing or format improvements.

Altus reserve the right to change this TC without previous warning.

The following account shows the observations corresponding to each revision:

Revision: A	Date: 07/04/98
Approval: Luis Fernando Saraiva	
Author: Alexandre Voigt da Poian	

Remarks:

- Initial revision