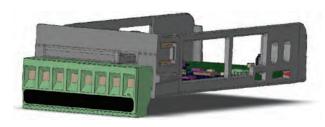
F4T/D4T Flex Module **Ouick Start Guide**



High Density Input/Output Modules FMHA-



1 2

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0600-0096-0000 Rev. D

Made in the U.S.A.

November 2016

Available F4T/D4T Literature and Resources

| Document Title and Part Number | Description |
|--|---|
| F4T Installation and Troubleshooting User Guide, part number: 0600-0092-0000 | Provides detailed specifications and information regarding mounting the base, flex module wiring and troubleshooting. |
| F4T Setup and Operations User Guide, part number: 0600-0093-0000 | Explains how to configure and operate the device for an application using Composer software as well as the user interface (touch screen). Includes detailed descriptions of all device features and parameter settings. |
| D4T Installation and Troubleshooting User Guide, part number: 0600-0107-0000 | Provides detailed specifications and information regarding mounting the base, flex module wiring and troubleshooting. |
| D4T Setup and Operations User Guide, part number: 0600-106-0000 | Explains how to configure the datalogger for an application using the user interface and Composer software. Includes detailed descriptions of all data logger features and parameter settings. |

Installation and Wiring

To install the flex module:

- 1. Note the part number to determine the number and type of inputs or outputs available to be connected in step 7.
- 3. Select a compatible base slot for the module. See the Flex Module-Slot Dependencies table below. If replacing a module, remove the old
- 4. Affix corresponding slot number labels (provided) to the module and to the removable screw terminal block.

Safety Information

We use caution symbols where needed within this document to draw your attention to important operational and safety information.

A "CAUTION" safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A "WARNING" safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

The electrical hazard symbol, (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement. Further explanations follow:

| Symbol | | Explanation |
|--------------------|-------------------------------|---|
| CAUTION or WARNING | Electrical Shock Hazard | CAUTION - Warning or Hazard that needs further explanation than label on unit can provide. Consult QSG for further information. AVERTISSEMENT: mise en garde ou danger qui demande plus de précisions que l'information sur l'étiquette de l'unité. Consultez le manuel de l'utilisateur pour plus d'informations. |

Document Overview

The purpose of this Quick Start Guide (QSG) is to acquaint the user with the F4T/D4T High Density (HD) Flex Modules and associated wiring.

Product Overview

Flex modules serve as the interface between real-world devices and the F4T/ D4T system. The flex modules described in this document offer various input and output options and greater density (more than 1) than the standard flex modules. With the exception of the Dual SSR module, all of these modules can be placed in any available slot.

- 5. With the component side of the module facing right (viewing the F4T/D4T from the rear) insert the module into the slot until it latches.
- 6. Remove the screw terminal block from the module.
- 7. Wire field devices to the appropriate terminals. Wiring details for each input and output are provided in the following sections.
- 8. Reconnect the wired screw terminal block to the module. Be sure to recon-nect the terminal block to the correct module.
- 9. Restore power to the F4T/D4T.

If the flex module is a replacement with the same part number and slot position, the F4T/D4T uses it immediately when powered up. Otherwise, use Composer software to configure the F4T/D4T to ex-pect and use the module.

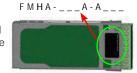
| Flex Module - Slot Dependencies | | | | | | |
|---------------------------------|---|---|-----|-----|---|---|
| | | | Slo | t # | | |
| Module Type | 1 | 2 | 3 | 4 | 5 | 6 |
| Dual SSR * FMHA-K | Υ | Υ | N | Υ | Υ | N |
| Communications FMCA-(2) | N | N | N | N | N | Υ |
| All Other Modules | Υ | Υ | Υ | Υ | Υ | Υ |

N = Not allowed Y = Allowed

Module Characteristics

Description and Identification

Many of the modules appear to look alike at first glance, therefore, it is always recommended that the module part number be verified prior to plugging it into any of the available slots in a base. Each module is identified with a part number located on the back side of the assembly next to the screw terminal block, as displayed in the graphic to the right.



Prior to wiring any of the I/O modules described in this document, it is rec-ommended that the warnings and notes listed below be reviewed.



To prevent damage to the F4T/D4T, do not connect wires to unused termi-



Note:

Maintain electrical isolation between the analog input, digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Note:

Modules IP10 when properly installed in base enclosure with slot caps in empty slots.

CAUTION: (1) Quencharc Note:

Switching pilot duty inductive loads (relay coils, solenoids, etc.) with the mechanical relay, solid-state relay or open collector output options requires use of an R.C. suppressor for AC load or a diode for a DC load.

AVERTISSEMENT: les charges inductives de commutation de lampes témoins (bobines de relais, solénoïdes, etc.) avec des options de sortie à relais mécanique, de relais statique ou collecteur ouvert requièrent un dispositif anti parasite R.C.

Note:

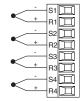
Wire size and torque for screw terminations:

- 0.0507 to 3.30 mm² (30 to 12 AWG) single-wire termination or two 1.31 mm² (16 AWG)
- 0.57 Nm (5.0 lb.-in.) torque

Input Connections

Thermocouple

FM**H**A - [**R**] A A A - A _ _ _

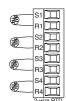


- Grounded or ungrounded sensors, greater than $20M\Omega$ input impedance, $2k\Omega$ source resistance max
- 3µA open-sensor detection
- Thermocouples are polarity sensitive. The negative lead (usually red) must be connected to S terminal
- To reduce errors, the extension wire for thermocouples must be of the same alloy as the thermocouple

Input Connections (cont.)

RTD

FMHA - [R] A A A - A _ _ _



- Platinum, 100 and 1kΩ @ 32°F (0°C) calibration to DIN curve (0.00385 $\Omega/\Omega/$ °C)
- RTD excitation current of 0.09mA typical. Each ohm of lead resistance may affect the reading by 2.55°C for a 100Ω platinum sensor or 0.25°C for a 1kΩ sensor (see table to right)

| AWG | Ohms/ 1000ft |
|-----|-----------------|
| 14 | 2.575 |
| 16 | 4.094 |
| 18 | 6.510 |
| 20 | 10.35 |
| 22 | 16.46 |
| 24 | 26.17 |
| 26 | 41.62 |
| 28 | 66.17 |

Process

FMHA - [R] A A A - A _ _ _

- 0 to 20mA @ 100Ω input impedance
- 0 to 10V
 — (dc) @ 20kΩ input impedance
- 0 to 50mV= (dc) @ 20MΩ input impedance

FMHA - [C] A A A - A _ _ _

Scalable

Potentiometer

FM [M, L] A - [C, L, Y, R] _ _ A - A _ _ _



Potentiometer: 0 to 1.2kΩ

Input Connections (cont.)

Thermistor

FMHA - [P] A A A - A _ _ _



- >20MΩ input impedance
- 0 to $40k\Omega$, 0 to $20k\Omega$, 0 to $10k\Omega$, 0 to $5k\Omega$
- 2.252k Ω and 10k Ω base at 77°F (25°C)
- User-selectable curves for Alpha Technics, Beta THERM and YSI
- · User-scaling support for Steinhart-Hart coefficients

| Thermistor Curve Setting | Base R @ 25 °C | Alpha Technics | Beta Therm | YSI | |
|-----------------------------|--|-------------------|---------------|-----|--|
| Curve A | 2.252k | Curve A | 2.2k3A | 004 | |
| Curve B | 10k | Curve A | 10k3A | 016 | |
| Curve C | 10k | Curve C | 10k4A | 006 | |
| Custom | Use Steinhart-Hart equation coefficients (A, B and C) from thermistor manufacturer corresponding to the terms of the Steinhart-Hart equation: 1 / T = A + BIn(R) + C (In(R)) ³ | | | | |

FMHA - [C] A A A - A _

Voltage Input

5 <u>6</u> 7 8

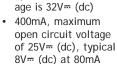
Output Connections Six Digital Outputs

open collector/switched dc

open collector/switched dc

open collector/switched dc

Open Collector
 Maximum switched open collector volt-



- Maximum output sink current per output is 1.5A (external class 2 or SELV* supply required)
- Total sink current for all outputs not to exceed 8A
- Do not connect outputs in parallel
- * Safety Extra Low Voltage

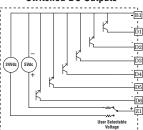
Switched DC

 User selectable voltage, 5V= (dc) at 130mA or 19 to 22V= (dc) at 80mA

Open Collector Outputs

Switched DC Outputs

D6



Six Digital Inputs

| Common | B1 | M |
|----------------|----|-----------|
| DC Input | D1 | |
| DC Input | | |
| DC Input | D2 | Щ |
| | D3 | \square |
| DC Input | D4 | |
| DC Input | D5 | Ħ |
| DC Input | D6 | |
| nternal Supply | D6 | Щ |
| пенна опрріу | Z1 | \square |
| | | |

· Voltage

- Max. input 36V at 3mA
- Input inactive when ≤ 2V
- Input active when ≥ 3V at 0.25mA
- Dry Contact
 - Input inactive when ≥ 500Ω
 - Input active when \leq 100 Ω
 - Max. short circuit 13mA

Dry Contact

4 Vdc

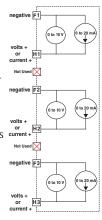
Output Connections (cont.)

Tri-Process/Retransmit Outputs

FM**H**A - [**F**] A A A - A _ _



- 0 to 20mA into 400Ω maximum load
- 0 to 10V= (dc) into 4 $k\Omega$ minimum load
- Outputs are scalable
- Output supplies power
- Each output can be independently set for
- Output may be used as current retransmit or retransmit or control



Four Mechanical Relays, Form A

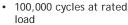
load

5A at 240V~ (ac) or 30V-(dc) maximum resistive

кз 🎞

Note: Not 60730 20mA at 24V minimum load

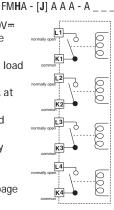
125 VA pilot duty @ 120/240V~ (ac), 25 VA at 24V~ (ac)



Output does not supply power.

For use with ac or dc

See Quencharc note (page



FMHA - [L] A A A - A _ _

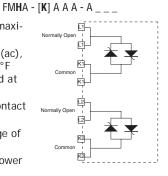
Output Connections (cont.)

*Dual 10A Solid-State Relays, Form A

• 10A at 20 to 264V~ (ac) maxi-mum resistive load normally open L2

10A per output at 240V~ (ac) max. 20A per card at 122°F (50°C), max. 12A per card at 149°F (65°C)

- Opto-isolated, without contact suppression
- Maximum off state leakage of 105µA
- Output does not supply power
- Do not use on dc loads.
- Requires two slots



Note:

This module requires 2 slots, therefore it cannot be placed in slot 3 or 6.

Note:

Not 60730 compliant.

compliant.

Output Connections (cont.)

Four 2A Solid-State Relays, Form A

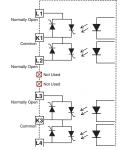
normally open L1 K1 💢 L2 🎞 I L3 кз 🎞 normally open L4

 2A at 20 to 264V~ (ac) maximum resistive load

50 VA 120/240V~ (ac) pilot duty

Optical isolation, without contact suppression

- Maximum off state leakage of 105µA
- Output does not supply power.
- Do not use on dc loads.
- N.O., COM, N.O wiring (shared common) between each set of outputs.
- See derating curve below for maximum current output.



Quad 2 Amp SSR Derating Curve All Outputs 100% Duty Cycle F4T/D4T with 2 FMs: 1 quad 2.0 input and 1 guad 2A SSR FM. Outputs 1 and 1.8 1.6 F4T/D4T with 2 FMs: 1 quad 당 일 1.4 input and 1 quad 2A SSR FM. All outputs on. 1.2 1.0 F4T/D4T with 5 FMs: 1 guad 0.8 F4T/D4T with 6 FMs: 1 quad 0.6 2A SSR

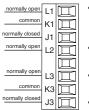
Ambient Temperature (°C)

9 10 12

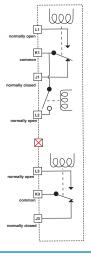
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Output Connections (cont.)

3 Mechanical Relays, 2 Form C, 1 Form A FMHA - [B] A A A - A _ _ _



- 5A at 24 to 240V~ (ac) or 30V = (dc) maximum resistive load
- 125 VA pilot duty 120/240V~ (ac) 25 VA at 24V~ (ac)
- Output does not supply power
- Form A relay shares common with one Form C relay.
- See Quencharc note (page



Warranty

F4T/D4T Flex modules are manufactured by ISO 9001 registered processes and are backed by a three-year warranty to the first purchaser for use, providing that the modules have not been misapplied.

(CST)

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| Symbol | Explanation |
|----------------|---|
| C€ | Unit is compliant with European Union directives. See Declaration of Conformity for further details on directives and standards used for compliance. |
| (1) | Unit has been reviewed and approved by CSA International for use as Temperature Indicating-Regulating Equipment per CSA C22.2 No. 24. See: www.csa-international.org |
| c SU us | Recognized component UL Files E185611 Process Control Equipment and E43684 Automatic Temperature Sensing Control Integrated Equipment, see conditions of acceptability. |

Specifications

| Input Type | Max Error @ 25 Deg | Accuracy Range | | Operating Range | | Units |
|------------------|-----------------------|----------------|------|-----------------|------|-------|
| . ,, | С | Low | High | Low | High | |
| *J | ±1.75 | 0 | 750 | -210 | 1200 | Deg C |
| *K | ±2.45 | -200 | 1250 | -270 | 1371 | Deg C |
| *T (-200 to 350) | ±1.55 | -200 | 350 | -270 | 400 | Deg C |
| N | ±2.25 | 0 | 1250 | -270 | 1300 | Deg C |
| *E | ±2.10 | -200 | 900 | -270 | 1000 | Deg C |
| R | ±3.9 | 0 | 1450 | -50 | 1767 | Deg C |
| S | ±3.9 | 0 | 1450 | -50 | 1767 | Deg C |
| В | ±2.66 | 870 | 1700 | -50 | 1816 | Deg C |
| С | ±3.32 | 0 | 2315 | 0 | 2315 | Deg C |
| D | ±3.32 | 0 | 2315 | 0 | 2315 | Deg C |
| F (PTII) | ±2.34 | 0 | 1343 | 0 | 1343 | Deg C |

Series EZ-ZONE® Flex Modules

WATLOW Electric Manufacturing Company

ISO 9001since 1996.

Declaration of Conformity

1241 Bundy Blvd. Winona, MN 55987 USA

Declares that the following products:

Designation:

Series EZ-ZONE* Flex Modules

FMLA-(LA), LCJ, LEJ, MAJ, MCJ, MEJ, YEB¹)A¹-A¹(A¹,F¹,B¹,G¹)X¹X¹

FMMA-X'(A¹,C²,E,F¹,K)(A²,C²,H_J,K)A¹-A¹(A¹,F¹,B¹,G¹)X¹X¹

FMMA-X(A,A²,A²,F,B,G)XX.

Note: X¹ = Any letter or number

FMLA, FMMA and FMHA are Process Control modules, FMCA are Communication modules; Modules are integrated Controls in either EZ-ZONE* CC, F4T or D4T Bases; Modules are P10 when property installed.

Rated Voltage and Frequency:

Rated Power

Consumption:

Consumption:

No-arc relays 158 1.C, Dual SSR module 1.C 10 Ale ach output, Mechanical relay 5A 125 VA, 25 VA at 24 V- (ac) 1.8, Discreet SSR 1/2A 1.C 20VA, Quad SSR 1.C

1.5A 50 VA, Hex I/O ELV 1.5A, all others SELV limited energy.

Flex Modules are considered components and have no function in and of themselves, it is only when installed in a Watlow EZ-ZONE* CC, Series F4T or Series D4T Base enclosure that they have useful function. Modules were tested as parts of these systems for compliance with the following directives.

2014/30/EU Electromagnetic Compatibility Directive

EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements (Industrial Immunity, Class B Emissions).

2014/35/EU Low-Voltage Directive
Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements
Automatic electrical controls for household and similar use - Particular EN 61010-1:2010 All options compliant EN 60730-1:2011 EN 60730-2-9:2010 ¹Food Service requirements for temperature sensing controls.

Only certain output options comply with 60730 spacing and dielectric requirements, see order information for compatible models.

Compliant options Compliant with 2011/65/EU RoHS2 Directive

Per 2012/19/EU W.E.E.E Directive Please Recycle Properly.

See the Declarations of Conformity for Watlow EZ-ZONE® CC, Series F4T and Series D4T models for further details on standards used for compliance. Winona, Minnesota, USA Place of Issue

Joe Millanes Name of Authorized Representative

MIL iture of Authorized Representative



Specifications (cont.)

| Input Type | nput Type Max Error @ Accuracy Rang | | Range | Operat | Units | |
|--------------------------------|-------------------------------------|------|-------|--------|-------|-------|
| . ,, | Zo Deg G | Low | High | Low | High | |
| *RTD, 100Ω | ±2.00 | -200 | 800 | -200 | 800 | Deg C |
| RTD, 1kΩ | ±2.00 | -200 | 800 | -200 | 800 | Deg C |
| mV | ±0.05 | 0 | 50 | | | mV |
| Volts | ±0.01 | 0 | 10 | | | Volts |
| mAdc | ±0.02 | 2 | 20 | | | mA DC |
| mAac | ±5 | -50 | 50 | | | mA AC |
| Potenti- ometer 1k range | ±1 | 0 | 1000 | | | Ohms |

*NSF approved inputs

| Thermistor Input | | | | | | |
|-----------------------|----------------|---------|-------|--------|--|--|
| Input Type | Max Error @ 25 | Accurac | Units | | | |
| input type | Deg C | Low | High | Ullits | | |
| Thermistor, 5k range | ±5 | 0 | 5000 | Ohms | | |
| Thermistor, 10k range | ±10 | 0 | 10000 | Ohms | | |
| Thermistor, 20k range | ±20 | 0 | 20000 | Ohms | | |
| Thermistor, 40k range | ±40 | 0 | 40000 | Ohms | | |

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