

- 1 heat flow measurement
- 1 thermocouple measurement (+T)
- 1 optocoupled output (+O)
- 2 integrated regulators (+O)
- 24 bits A/D conversion

- Derivative and zero functions integrated
- Fast deployment
- Parameters storage
- Cables included



DESCRIPTION

aDDa-M electronic (aDvanced Data acquisition) is built around a 24 bits A/D converter for heat flow and temperature conditioning. It also includes a microcontroller for communication and floating-point calculations.

PRODUCT SELECTION

Product number	Product reference	Measurement		
		Channel 1	Channel 2	Optocoupler
103.01	aDDa-M-F	Flux		
103.81	aDDa-M-F+O	Flux		1
103.82	ADDa-M-F+F+O	Flux	Flux	1
103.03	aDDa-M-F+T	Flux	Temperature	
103.83	aDDa-M-F+T+O	Flux	Temperature	1
103.84	aDDa-M-F+S+O	Flux	Sensor (F+T)	1
103.05	aDDa-M-T+T	Temperature (2p)	Temperature	
103.85	aDDa-M-T+T+O	Temperature (2p)	Temperature	1
103.86	aDDa-M-T+T+O	Temperature	Temperature	1
103.87	aDDa-M-R+O	Active sensor		1

SUPPLY AND COMMUNICATION

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Units
VCC	Operating voltage	6.2	24	30.8	V _{DC}
I _{in}	Supply current		15		mA

- Protected against reverse voltage

COMMUNICATION

RS485 type, half duplex, with proper protocol.

Symbol	Parameter	Min	Typ	Max	Units
B _{rate}	Transfer data rate		19'200		bps
Address	aDDa-M-F and aDDa-M-F+O	0x10	0x11	0xEF	
Address	aDDa-M-F+T and aDDa-M-F+T+O	0x10	0x12	0xEF	

PIN CONFIGURATION FOR USB TYPE A STACKED

Pin	Symbol	Parameter
1	VCC	Power supply
2	D-	RS485 differential communication, negative signal
3	D+	RS485 differential communication, positive signal
4	GND	Ground
Screen	Earth	Screen continuity



OPTOCOUPLED OUTPUT (+O)

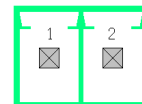
ELECTRICAL CHARACTERISTICS

Open collector type, npn

Symbol	Parameter	Min	Typ	Max	Units
V_{isol}	Breakdown voltage		1500		V_{rms}
V_{CE}	Open collector-emitter voltage			30	V_{DC}
I_C	Collector current		2.4	5	mA
$V_{CE(sat)}$	Closed collector-emitter voltage ($I_C = 0.5mA$)			1	V_{DC}
t_{LH}	Rise time ($V_{CC} = 24V, R_L = 10k\Omega$)		70		μs
t_{HL}	Fall time ($V_{CC} = 24V, R_L = 10k\Omega$)		70		μs
f	Output frequency	1.8	50	7k	Hz

PIN CONFIGURATION FOR PHOENIX MC 1,5/2-ST-3.5

Pin	Symbol	Parameter
1	+	Collector. Wire 0.14..1.5 mm ² (AWG28..16)
2	-	Emitter. Wire 0.14..1.5 mm ² (AWG28..16)



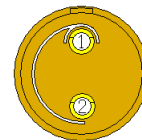
HEAT FLOW INPUT

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Units
R_{in}	Differential input resistance	200k			Ω
V_{step}	Resolution		24		bits
noise _{pp}	Peak to peak measurement noise		1		μV
CMRR	Common Mode Rejection Ratio		100		dB
F_{Sample}	Sample rate	8.3	50		Hz
$A_{in+/-}$	Analogue input voltage	-0.03		5	V
$A_{in+} - A_{in-}$	Differential input voltage	-2.5		2.5	V
CMA_{in}	Input common voltage		2.5		V

HEAT FLUX CONNECTOR

Pin	Symbol	Parameter
1	F_{in+}	Positive differential input
2	F_{in-}	Negative differential input
Screen	Earth	Screen continuity



THERMOCOUPLE INPUT (+T)

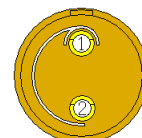
Adapted for J, K or T thermocouple measurement, following ITS-90 norm.

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Units
R_{in}	Differential input resistance	200k			Ω
V_{step}	Resolution		24		bits
noise _{pp}	Peak to peak measurement noise		1		μV
CMRR	Common Mode Rejection Ratio		100		dB
F_{Sample}	Sample rate	0.5	2.5	8.3	Hz
TC_+, TC_-	Analogue input voltage	-0.03		5	V
$TC_+ - TC_-$	Differential input voltage	-2.5		2.5	V
CMA_{in}	Input common voltage		2.5		V
CJC_{Temp}	Cold junction compensation error		0.3		$^{\circ}C$

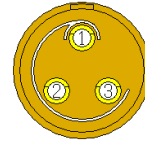
THERMOCOUPLE (2P) CONNECTOR

Pin	Symbol	Parameter
1	F_{in+}	Positive thermocouple input
2	F_{in-}	Negative thermocouple input
Screen	Earth	Screen continuity



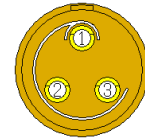
THERMOCOUPLE (3P) CONNECTOR

Pin	Symbol	Parameter
1		Do not use
2	TC ₊	Positive thermocouple input
3	TC ₋	Negative thermocouple input
Screen	Earth	Screen continuity



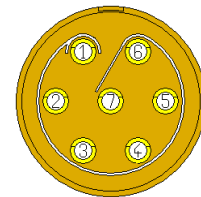
SENSOR CONNECTOR

Pin	Symbol	Parameter
1	HF-	Negative heat flux input
2	Common+	Common positive input
3	TC-	Negative thermocouple input
Screen		Earth
Insulation		



ACTIVE SENSOR CONNECTOR

Pin	Symbol	Parameter
1	CMD	NPN commad, to 0V
2	HF+	Positive heat flux input
3	TC+	Positive thermocouple input
4	TC-	Negative thermocouple input
5	HF-	Negative heat flux input
6	24V	Positive supply
7	0V	Negative supply
Screen		Earth
Insulation		



INTERNAL FUNCTIONS

AUXILIARY MEASUREMENTS

2 other measurements are done in the module:

- Supply input voltage
- PCB temperature

MATHEMATIC FUNCTIONS

3 mathematic functions are done on heat flow measurements:

- Low-band filter
- Derivate
- Zero function

Each data can be read on the bus.

T+T modules are calculating:

- Difference of temperature (ΔT)
- Heat flux with ΔT /sensitivity
- Low-band filter, derivate and zero function on T1, T2, ΔT or flux

REGULATORS (+O)

2 regulators are implemented in the module. They can make internal or external regulation, as explained:

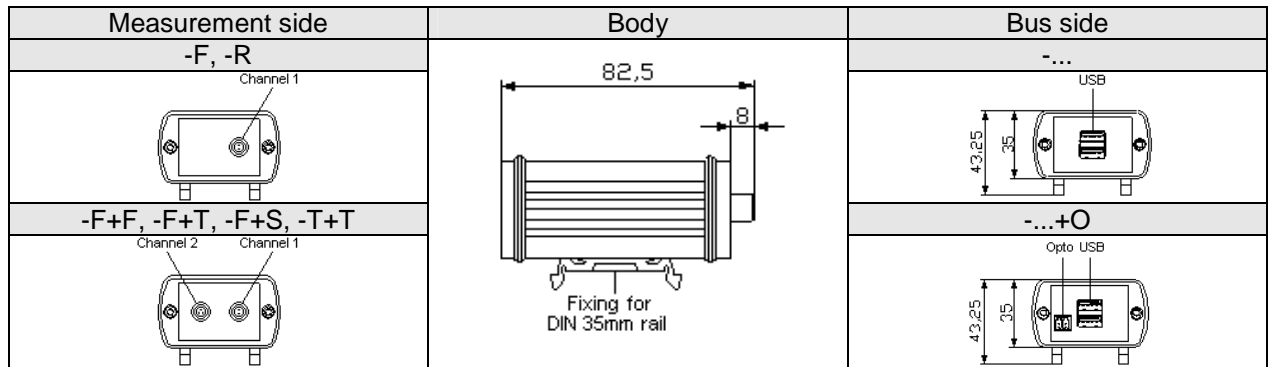
Regulator	Output pin	Output type			
		Internal	PWM	50Hz	60Hz
Opto	Opto	X	X	X	X
Int		X			

They can perform 3 types of functions:

- Constant output (slave from automat)
- Digital PID (local regulation)
- Hysteresis regulator (local regulation or event detection)

aDDa-M-R+O module reports Int regulator output on command pin for active sensor.

CROWDING



CONTENTS

- 1 aDDa-M-F(+T)(+O) module
- 1 USB cable type A-A of 0.3m
- 1 Phoenix 2 pins jack for optocoupled output (only ...+O)

TFX SA reserves the right to change the circuitry and specifications without notice at any time.