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mod. IO-CB/AI-02UI-00

M.U. IO-CB/AI-02UI-1/04.10
Cod. J30-478-1AAI-02UI E

User manual

Contents

CANopen I/O module 2 Universal Isolated Analogue Inputs mod. IO-CB/AI-02UI-00

σ2 SERIES

2 isolated inputs for:
- Thermocouples
- RTD
- mA, mV, V linear inputs
- Potentiometers
- Custom sensors

APPLICABLE STANDARDS

The AI-02UI module is suited for the CiA DS301 protocol [1] and implements the CiA DS 404 standard Device Profile, as far as the Analogue Input Function Block is concerned [2].

⚠ WARNING

The product described in this manual should only be installed, operated and maintained by qualified application programmers and software engineers who are familiar with automation safety concepts and applicable national standards.

Characteristics

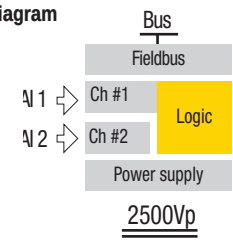
Technical data

Accuracy at 25°C	±0.1% FS (RTD = ±0.05% FS)
Temperature coefficient	0.005% FS/K
Cold junction compensation accuracy	±0.5 K (between 0... 50°C)
Input impedance	mA < 300Ω mV> 100MΩ V > 10kΩ
Digital resolution	16 bit
Input types	TC J, K, L ,N, R, S, T Pt100, Pt1000 mA, mV, V Potentiometer and other SW downloadable TCs
Conversion time	20 ms (RTD = 120 ms)
Overvoltage protection	30 V
NMR 50...60Hz	> 80 dB
CMRR	> 100 dB

General

3 way isolation	2.5 kVp
Power supply	24 Vdc; –15...+25%
Power consuption	2.5 W
Dimensions	L: 65; H: 110; W: 66
Weight	220 g
Safety regulations EN61010-1	**Isolation class II** (50Vrms), Installation cathegory II, Pollution degree 2
CE marking	EN61131-2

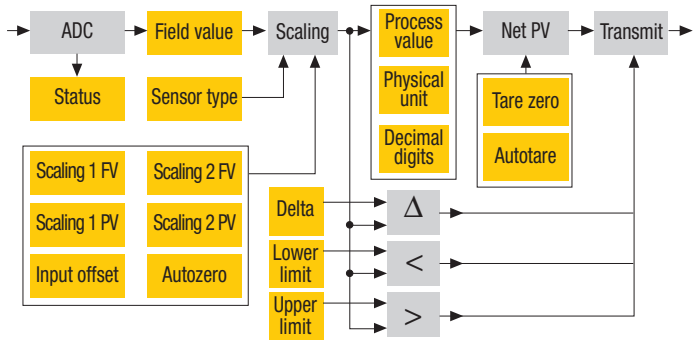
3 way isolation diagram



Environment

	Operating	Storage
Temperature	-10...+65°C	-40...+85°C
Relative Humidity	5...95% non condensing Appropriate measures must be taken against humidity >85%	5...95% non condensing For a short period, slight condensation may appear on the housing
Mounting	Vertical, free air	
Protection	IP20	
Vibrations (3 axes)	10...57Hz 0.0375mm 57...150Hz 0.5g	
Shock (3 axes)	15g, 11ms half sine	

Functional Block Diagram



The analogue input function block describes, for each input channel, how field values are converted to process values. The field values are converted to the real physical dimension of the measured quantity, and the result is called "Process Value". The conversion from Field Value to Process Value is generally described as a linear transformation.

This is defined by two pairs of field values and corresponding process values (Input Scaling 1 FV/Input Scaling 1 PV and Input Scaling 2 FV/Input Scaling 2 PV), called calibration point 1 and 2.

Non-linear transformation (e.g. for thermocouples and PT100 sensors) is possible, and is defined within the parameter "Sensor Type". In this case the input scaling values are meaningless.

The calibration characteristic can be shifted by an additional "input offset" value.

Writing "1" on autozero will enable the zero offset value to be set so that the instantaneous measured “process value” becomes zero. The tare-zero value works like the zero offset value, but results in an additional "net process value". Writing "1" on autotare will enable the tare zero value to be set so that the instantaneous measured “net process value” becomes zero. The parameters "Span Start" and "Span End" define the process value validity range. If the process value exceeds these limits it will be marked as "overflowed".

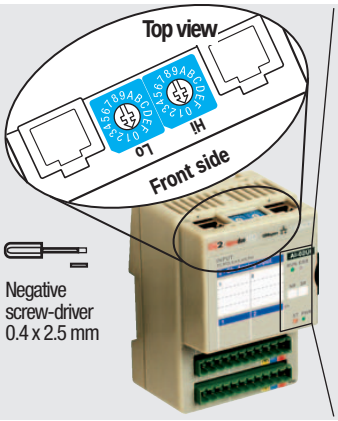
PDOs used by the module

TPDO	Properties	Mapped objects	Index	Sub-index
TPDO 1	COBID: 180h+ NodeID	NetPV1	9140h	01h
	Transmission Type: FFh	AI Operating mode1	6112h	01h
TPDO 2	COBID: 280h+ NodeID	NetPV2	9140h	02h
	Transmission Type: FFh	AI Operating mode2	6112h	02h
TPDO 3	COBID: 380h+ NodeID	NetPV1	9140h	01h
	Transmission Type: FFh	NetPV2	9140h	02h
TPDO 4	COBID: 480h+ NodeID	Cold Junction Measure	2000h	01h
	Transmission Type: FFh			

Note: The transmission type is configurable; FFh is the default value.

Hardware Set-up

Hexadecimal rotary switches and service LEDs



LED	Status	Meaning
RUN	ON	Operational
	Blinking	Pre-operational (CANopen)
	Single flash	STOPPED
	OFF	Device in RESET state
ERR	ON	BUS OFF
	Single flash	Warning limit reached
	Double flash	Error Control Event
	Triple flash	Sync Error (CANopen)
	OFF	No error. Device working
ST	ON	DIAG Error
	Blinking	INIT and DIAG running
	Single flash	Baud rate setting
	OFF	Module OK and ready
PWR	ON	Module Power Supply ON
	OFF	Module Power Supply OFF

Bit Rate and Node ID configuration

Bit rate

Lo switch	Baud rate kbps	Bus length m
1	20	2500
2	50	1000
3	100	500
4	125	500
5	250	250
6	500	100
7	800	50
8	1000	25

Node ID

Hi switch	Lo switch	Valid ID Node
0	1	01h (address 1)
0	2	02h (address 2)
↓	↓	↓
7	F	7Fh (address 127D)

Procedure for Node ID and Bit Rate configuration

The HI and LO hexadecimal rotary swithches set the module's Bit Rate and CAN Node ID. During the configuration, the module must be off line and the CAN bus must be physically disconnected.

To configure thE module, follow the procedure:

1. Turn the Power OFF
2. Set the **HI** switch to "F"
3. Select the desired Bit Rate value by setting the **LO** switch following the table (e.g. "8" for 1 Mbps)
4. Turn the Power ON
5. Shift the **HI** switch to "E" (all the module service LEDs should flash)
6. Turn the Power OFF. Now configure Node ID
7. Set the **HI** and **LO** switches to the desired valid Node ID following the table
8. Turn the Power ON.

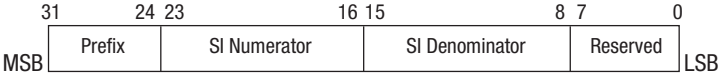
Alternatively, at step 7 set the value 00h. Then, at the next Power ON, the last valid stored value will be resumed as Node ID.

The default values are: Bit Rate = 20 kbps, Node ID = 127D

Parameter configuration

Index 6110h - AI Sensor type
Index 6131h - AI Physical Unit PV
Index 6132h - AI Decimal Digits PV

The AI Physical Unit PV assigns SI units and prefixes to the process value, with the following structure:



Physical units and prefixes are coded according to CiA standard [3]. Within the DS404 profile, some additional physical units are specified:

Code	Physical Unit
55h	m/s
56h	Nm
A1h	at
A2h	mmH^20

Code	Physical Unit
A3h	mmHg
A4h	atm
ABh	PSI
ACh	°F

Value	Sensor type	Decimal digits
TCJ (default)	0x01	2
TCK	0x02	2
TCL	0x03	2
TCN	0x04	2
TCR	0x05	2
TCS	0x06	2
TCT	0x07	2
PT100 3w	0x1E	2

Value	Sensor type	Decimal digits
PT1000	0x21	2
PT100 2w	0x24	2
PT100 4w	0x25	2
0...10V	0x2A	3
0...150mV	0x2F	3
4...20mA	0x33	3
0...20mA	0x34	3
POT	0x78	3

(SubIndex 1 -> channel 1, SubIndex 2 -> channel 2)

Index 61A0h – AI Filter Type
Index 61A1h – AI Filter Constant

AI Filter Type defines the type of filter to be applied to FV, AI Filter Constant defines the iteration index. For both entries, subindex 01 refers to module channel 1 and subindex 02 refers to module channel 2.

Value	Description	Operation
0	No filter	
1	Moving average	$Value_N = Value_{N-1} + \frac{Input - Value_{N-1}}{Filter\ Constant}$
2	Repeating average	$Value = \frac{\sum_{1}^{N} Input_N}{N}$ N depends on Filter Constant

Module specific parameters

Index 2000h – Cold Junction Measure

Temperature of the cold junction, measured on the module's terminal block. Available through TPDO4

Index 3000h – Node Address

Current Module Node ID - Read only access

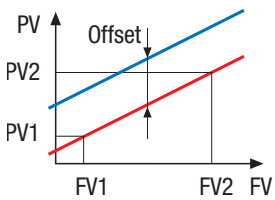
Index 3001h – Baudrate

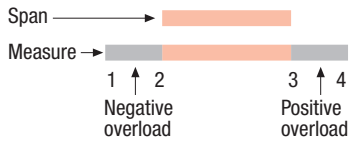
Current Module Bit rate - Read only access

Scaling input variables

Index 9120h – AI Input Scaling 1FV
Index 9121h – AI Input Scaling 1PV
Index 9122h – AI Input Scaling 2FV
Index 9123h – AI Input Scaling 2PV
Index 9124h – AI Input Offset

As regards linear inputs, the above variables allow the scale of the physical input to be changed and the desired physical unit to be assigned to this input. In addition, an offset can be added.





Index 9148h – AI Span start
Index 9149h – AI Span end

These two variables take into account the validity of the span values, indicating possible overloads and limiting the measure in correspondence of the extreme points of the span.

Span programmed values (°C)

Input	Span Start	Span End
TCJ	-210°C	1200°C
TCK	-200°C	1372°C
TCL	-200°C	600°C
TCN	0°C	1300°C
TCR	0°C	1600°C
TCS	0°C	1760°C
TCT	-200°C	400°C

Input	LO Range	HI Range	Span Start	Span End
PT100	-	-	-200°C	600°C
PT1000	-	-	-200°C	600°C
0...10V	0	10.5	0V	10V
0...150mV	0	155	0mV	150mV
4...20mA	0	21	4mA	20mA
0...20mA	0	21	0mA	20mA
POT	0	100	0%	100%

Index 6150h – AI Status

bit 7 – 3	2	1	0
Reserved	Negative overload	Positive overload	Not valid (e.g. sensor break)

Index 9138h – Tare Zero

Tare value to be subtracted from PV

Index 6114h – AI ADC Sample Rate

ADC acquisition time

Index 6F20h – Life Counter

A counter that increments at each new generated sample

Index 9143h – AI Interrupt Delta NetPV
Index 9144h – AI Interrupt Lower Limit Net PV
Index 9145h – AI Interrupt Upper Limit Net PV

The last the variables relate to the asynchronous mode of transmission of a PDO (transmission type 255). A comparison is made with the mapped Net PV value and a transmission is initiated asynchronously when any of the limits is reached.

Commands

Index 6112h – AI Operating Mode

Determines the operating state of the two input channels according to the following values:

00h	Initialising
01h	Operating
0Ah	Custom linearisation table assignment

Index 6160h – AI Control Byte

Enables (1) or disables (0) some of the commands accepted by the module:

bit	7 – 3	2	1	0
1 = active	Reserved	Auto-tare	Auto-zero	Auto-calibration

Index 6111h – AI Autocalibration

While in initialisation mode, the module can execute an autocalibration procedure upon receipt of an SDO containing the "cali" signature in the data field.

Byte	0	1	2	3	4	5	6	7
Write Request	22h	11h	61h	0xh[1]	63h	61h	6Ch	69h
					c	a	l	i
	COB – ID = 600h + NodeID							

Note: 1 x = 1 for channel 1, 2 for channel 2

Index 6125h – AI Autozero

Upon receipt of an SDO containing the "zero" signature in the data field, the module modifies the AI Input Offset in such a way that the AI Input PV becomes zero.

Byte	0	1	2	3	4	5	6	7
Write Request	22h	25h	61h	0xh[1]	7Ah	65h	72h	6Fh
					z	e	r	o
	COB – ID = 600h + NodeID							

Note: 1 x = 1 for channel 1, 2 for channel 2

Index 6139h – AI Autotare

Writing a signature value of "tara" to this object causes the AI Tare Zero to be modified in such a way that the actual AI Net PV becomes zero.

Byte	0	1	2	3	4	5	6	7
Write Request	22h	39h	61h	0xh[1]	74h	61h	72h	61h
					t	a	r	a
	COB – ID = 600h + NodeID							

Note: 1 x = 1 for channel 1, 2 for channel 2

Emergency messages

The module automatically sends emergency messages including error codes. The communication errors are described in CiA DS301 [1]. The error codes are expressed as a DEVICE SPECIFIC ERROR type of code, one for each channel: 0xFF01 for channel 1 and 0xFF02 for channel 2. The codes indicating a specific condition are also inserted, following the table below:

Code	Error
0000000000	**No error** –This code is generated when exiting an error contidion, to notify the end of one of the error states
0000000001	**Error No Valid Calib** – An attempt to change the state of a input channel not properly calibrated to "operating"
0000000002	**Error No Config** – An attempt to change the state of a input channel with a non valid Sensor Type to "operating"
0000000006	**Error No Command** – Invalid command received
0000000007	**Error Wrong Command** – An attempt to execute a command from an illegal state
0000000008	**Error Wrong Assignment** – An attempt to assign a parameter from an illegal state

	0	1	2	3	4	5	6	7
Emergency Message	0xh[1]	FFh	21h	00h	00h	00h	0Eh	00h
	COB – ID = [entry 1014h] + NodeID							
				Error code				

Note: 1 x = 1 for channel 1, 2 for channel 2

Parameter Store/Restore

This module allows parameters to be saved in a non volatile memory. In order to avoid storing parameters by mistake, storage is only executed when a specific signature is written to the appropriate subindex. The signature is "save".

Similarly, the default values of parameters, according to the communication or device profile, are restored. On receipt of the correct signature in the appropriate subindex, the device restores the default parameters and then confirms the SDO transmission. The signature is "load".

The new configuration becomes active after a reset, i.e. after a "Power OFF/Power ON cycle" or an NMT "Reset Node" message.

Byte	0	1	2	3	4	5	6	7
Store Parameter	22h	10h	10h	01h	73h	61h	76h	65h
					s	a	v	e
	COB – ID = 600h + NodeID							
Restore Parameter	22h	11h	10h	01h	6Ch	6Fh	61h	64h
					l	o	a	d
	COB – ID = 600h + NodeID							

SDO Messages

The entries of a device Object Dictionary are accessed trough SDO (Service Data Object) messages. The basic SDO messages are as follows, as based on the Client – Server request and response model:

Byte	0	1	2	3	4	5	6	7
Read Request	40h	Index		Sub-Index	Reserved			
	COB – ID = 600h + NodeID							
Read Response	4Fh	Index		Sub-Index	Data			
	COB – ID = 580h + NodeID							
Write Request	22h	Index		Sub-Index	Data			
	COB – ID = 600h + NodeID							
Write Response	60h	Index		Sub-Index	Reserved			
	COB – ID = 580h + NodeID							

Reference documents

List of CiA documents to which the user should refer

[1] CiA DS301 - CANopen Application Layer and Communication Profile
[2] CiA DS404 - CANopen Device Profile: Measuring Devices and Closed-Loop Controllers
[3] CiA DRP303-2 – Representation of SI Units and Prefixes

Accessories, Spare Parts and Warranty

Power Supply 45W 24Vdc 2A	AP-S2/AL-DR45-24
Power Supply 120W 24Vdc 5A	AP-S2/AL-DR120-24
Additional Terminal Block 2x11	AP-S2/TB-211-1
Female Plug 11 Screw clamp	AP-S2/SPINA-V11
Female Plug 11 Spring clamp	AP-S2/SPINA-M11
RJ45 terminated cable 14cm	AP-S2/LOCAL-BUS76
RJ45 terminated cable 22cm	AP-S2/LOCAL-BUS152
CAN Bus termination Adapter	AP-S2/TERM-CAN

Warranty: 3 years excluding defects due to improper use

Object Dictionary (with default values)

⚠ In order to configure the module, it is necessary to connect it to a PC with the CAN interface and the superivisory software installed. The configuration can be obtained by writing the desired values to the module's variables listed in the Object Dictionary.

Object Dictionary structure

Index (hex)	Sub Index	Object	Name	Default [hex]	Type	Acc. Attr.	MO
1000		VAR	Device Type	00020194	UNSIGNED32	RO	M
1001		VAR	Error Register	00	UNSIGNED8	RO	M
1003		ARRAY	Predefined error field	00000000	UNSIGNED32	RO	O
1005		VAR	COB-ID SYNC	00000080	UNSIGNED32	RW	O
1006		VAR	Communication cycle period	00000000	UNSIGNED32	RW	O
1007		VAR	Synchrounous window length	00000000	UNSIGNED32	RW	O
1008		VAR	Manufacturer Device Name	"0600"	Vis-String	const	O
1009		VAR	Manufacturer Hardware Version	"1.00"	Vis-String	const	O
100A		VAR	Manufacturer Software Version	"1.00"	Vis-String	const	O
100C		VAR	Guard Time	0000	UNSIGNED16	RW	O
100D		VAR	Life Time Factor	00	UNSIGNED8	RW	O
1010		ARRAY	Store Parameters		UNSIGNED32		O
	00h	VAR	Largest subindex supported	01	UNSIGNED8	RO	
	01h	VAR	Save all parameters	03	UNSIGNED32	RW	
1011		ARRAY	Restore Default Parameters		UNSIGNED32	RW	O
	00h	VAR	Largest subindex supported	01	UNSIGNED8	RO	
	01h	VAR	Restore all default parameters	01	UNSIGNED32	RW	
1014		VAR	COB-ID EMCY	80+NodeID	UNSIGNED32	RW	O
1015		VAR	Inhibit Time EMCY	0000	UNSIGNED16	RW	O
1017		VAR	Producer heartbeat time	07D0	UNSIGNED16	RW	O
1018		RECORD	Identity Object		Identity (23h)		M
	00h	VAR	Number of entries	01	UNSIGNED8	RO	
	01h	VAR	Vendor ID	000000E9	UNSIGNED32	RO	
1200		RECORD	Server SDO Parameters				
1800		RECORD	1st Transmit PDOComm Param.		PDOCommPar (20h)		M
	00H	VAR	Largest subindex supported	05	UNSIGNED8	RO	
	01h	VAR	COB-ID used	180+NodeID	UNSIGNED32	RW	
	02h	VAR	Transmission type	FF	UNSIGNED8	RW	
	03h	VAR	Inhibit time	0000	UNSIGNED16	RW	
	04h	VAR	Reseved		UNSIGNED8	RW	
	05h	VAR	Event timer	0000	UNSIGNED16	RW	
1801		RECORD	2nd Transmit PDOComm Param.		PDOCommPar (20h)		M
	00h	VAR	Largest subindex supported	05	UNSIGNED8	RO	
	01h	VAR	COB-ID used	280+NodeID	UNSIGNED32	RW	
	02h	VAR	Transmission type	FF	UNSIGNED8	RW	
	03h	VAR	Inhibit time	0000	UNSIGNED16	RW	
	04h	VAR	Reseved		UNSIGNED8	RW	
	05h	VAR	Event timer	0000	UNSIGNED16	RW	
1802		RECORD	3rd Transmit PDOComm Param.		PDOCommPar (20h)		M
	00h	VAR	Largest subindex supported	05	UNSIGNED8	RO	
	01h	VAR	COB-ID used	380+NodeID	UNSIGNED32	RW	
	02h	VAR	Transmission type	FF	UNSIGNED8	RW	
	03h	VAR	Inhibit time	0000	UNSIGNED16	RW	
	04h	VAR	Reseved		UNSIGNED8	RW	
	05h	VAR	Event timer	0000	UNSIGNED16	RW	
1803		RECORD	4th Transmit PDOComm Param.		PDOCommPar (20h)		M
	00h	VAR	Largest subindex supported	05	UNSIGNED8	RO	
	01h	VAR	COB-ID used	480+NodeID	UNSIGNED32	RW	
	02h	VAR	Transmission type	FF	UNSIGNED8	RW	
	03h	VAR	Inhibit time	0000	UNSIGNED16	RW	
	04h	VAR	Reseved		UNSIGNED8	RW	
	05h	VAR	Event timer	0000	UNSIGNED16	RW	
1A00		RECORD	1st Transmit PDOMapping		PDOMapping (21h)		M
	00h	VAR	N° of mapped application obj	02	UNSIGNED8	RO	
	01h	VAR	Net PV1	91400120	UNSIGNED32	RO	
	02h	VAR	AI Operating Mode 1	61120108	UNSIGNED32	RO	
1A01		RECORD	2nd Transmit PDOMapping		PDOMapping (21h)		M
	00h	VAR	N° of mapped application obj	02	UNSIGNED8	RO	
	01h	VAR	Net PV2	91400220	UNSIGNED32	RO	
	02h	VAR	AI Operating Mode 2	61120208	UNSIGNED32	RO	
1A02		RECORD	3rd Transmit PDOMapping		PDOMapping (21h)		M
	00h	VAR	N° of mapped application obj	02	UNSIGNED8	RO	
	01h	VAR	Net PV1	91400120	UNSIGNED32	RO	
1A03		RECORD	4th Transmit PDOMapping		PDOMapping (21h)		M
	00h	VAR	N° of mapped application obj	01	UNSIGNED8	RO	
	01h	VAR	Could Junction Measure	20000110	UNSIGNED32	RO	
	02h	VAR		00000000	UNSIGNED32	RO	
2000		ARRAY	Cold Junction Temperature		INTEGER16		O
	00h	VAR	Number of entries	01	UNSIGNED8	RO	
	01h	VAR	Cold Junction Measure		INTEGER16	RO	
3000		VAR	Node Address	7F	UNSIGNED8	RO	O
3001		VAR	Node Baurate	01	UNSIGNED8	RO	O
6110		ARRAY	AI Sensor Type		UNSIGNED16		O
	00h	VAR	Number of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Sensor Type ch1	01	UNSIGNED16	RW	
	02h	VAR	AI Sensor Type ch2	01	UNSIGNED16	RW	
6111		ARRAY	AI Autocalibration		UNSIGNED32		O
	00h	VAR	Number of entries	02	UNSIGNED8		
	01h	VAR	AI Autocalibration ch1		UNSIGNED32	WO	
	02h	VAR	AI Autocalibration ch1		UNSIGNED32	WO	
6112		ARRAY	AI Operating Mode		UNSIGNED8		O
	00h	VAR	Number of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Operating Mode ch1	00	UNSIGNED8	RW	
	02h	VAR	AI Operating Mode ch2	00	UNSIGNED8	RW	
6114		ARRAY	AI ADC Sample Rate		UNSIGNED32		O
	00h	VAR	Number of entries	02	UNSIGNED8	RO	
	01h	VAR	AI ADC Sample Rate ch1	00004E20	UNSIGNED32	RO	
	02h	VAR	AI ADC Sample Rate ch2	00004E20	UNSIGNED32	RO	
6125		ARRAY	AI Autozero		UNSIGNED32		O
	00h	VAR	Number of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Autozero ch1		UNSIGNED32	WO	
	02h	VAR	AI Autozero ch2		UNSIGNED32	WO	
6131		ARRAY	AI Physical Unit PV		UNSIGNED32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Physical Unit PV ch1	002D0000	UNSIGNED32	RW	
	02h	VAR	AI Physical Unit PV ch2	002D0000	UNSIGNED32	RW	
6132		ARRAY	AI Decimal Digits PV		UNSIGNED8		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Decimal Digits PV ch1	02	UNSIGNED8	RW	
	02h	VAR	AI Decimal Digits PV ch2	02	UNSIGNED8	RW	
6139		ARRAY	AI AutoTare		UNSIGNED32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI AutoTare ch1		UNSIGNED32	WO	
	02h	VAR	AI AutoTare ch2		UNSIGNED32	WO	
6150		ARRAY	AI Status		UNSIGNED8		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Status ch1	00	UNSIGNED8	RO	
	02h	VAR	AI Status ch2	00	UNSIGNED8	RO	
6160		ARRAY	AI Control Byte		UNSIGNED8		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Control Byte ch1		UNSIGNED8	WO	
	02h	VAR	AI Control Byte ch2		UNSIGNED8	WO	
61A0		ARRAY	AI Filter Type		UNSIGNED8		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Filter Type ch1	00	UNSIGNED8	RW	
	02h	VAR	AI Filter Type ch2	00	UNSIGNED8	RW	
61A1		ARRAY	AI Filter Constant		UNSIGNED8		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Filter Constant ch1	01	UNSIGNED8	RW	
	02h	VAR	AI Filter Constant ch2	01	UNSIGNED8	RW	
6F20		ARRAY	Life Counter		UNSIGNED8		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	Life Counter ch1	00	UNSIGNED8	RO	
	02h	VAR	Life Counter ch2	00	UNSIGNED8	RO	
9100		ARRAY	AI Input FV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Input FV ch1		INTEGER32	RO	
	02h	VAR	AI Input FV ch2		INTEGER32	RO	
9120		ARRAY	AI Input Scaling 1 FV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Input Scaling 1 FV ch1	00000000	INTEGER32	RW	
	02h	VAR	AI Input Scaling 1 FV ch2	00000000	INTEGER32	RW	
9121		ARRAY	AI Input Scaling 1 PV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Input Scaling 1 PV ch1	00000000	INTEGER32	RW	
	02h	VAR	AI Input Scaling 1 PV ch2	00000000	INTEGER32	RW	
9122		ARRAY	AI Input Scaling 2 FV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Input Scaling 2 FV ch2	7FFFFFFF	INTEGER32	RW	
	02h	VAR	AI Input Scaling 2 FV ch2	7FFFFFFF	INTEGER32	RW	
9123		ARRAY	AI Input Scaling 2 PV		INTEGER32		O
	00h	VAR	Number of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Input Scaling 2 PV ch1	7FFFFFFF	INTEGER32	RW	
	02h	VAR	AI Input Scaling 2 PV ch2	7FFFFFFF	INTEGER32	RW	
9124		ARRAY	AI Input Offset		INTEGER32		O
	00h	VAR	Number of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Input Offset ch1	00000000	INTEGER32	RW	
	02h	VAR	AI Input Offset ch2	00000000	INTEGER32	RW	
9130		ARRAY	AI input PV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI input PV ch1		INTEGER32	RO	
	02h	VAR	AI input PV ch2		INTEGER32	RO	
9138		ARRAY	AI Tare Zero		INTEGER32		O
	00h	VAR	Number of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Tare Zero ch1	00000000	INTEGER32	RW	
	02h	VAR	AI Tare Zero ch2	00000000	INTEGER32	RW	
9140		ARRAY	AI Net PV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Net PV ch1		INTEGER32	RO	
	02h	VAR	AI Net PV ch2		INTEGER32	RO	
9143		ARRAY	AI Interrupt Delta Net PV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Interrupt Delta Net PV ch1	00000001	INTEGER32	RW	
	02h	VAR	AI Interrupt Delta Net PV ch2	00000001	INTEGER32	RW	
9144		ARRAY	AI Interrupt Lower Limit Net PV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Interrupt Lower Limit Net PV ch1	FFFFB1E0	INTEGER32	RW	
	02h	VAR	AI Interrupt Lower Limit Net PV ch2	FFFFB1E0	INTEGER32	RW	
9145		ARRAY	AI Interrupt Upper Limit Net PV		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Interrupt Upper Limit Net PV ch1	0001D4C0	INTEGER32	RW	
	02h	VAR	AI Interrupt Upper Limit Net PV ch2	0001D4C0	INTEGER32	RW	
9148		ARRAY	AI Span Start		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Span Start ch1	FFFFB10	INTEGER32	RW	
	02h	VAR	AI Span Start ch2	FFFFB10	INTEGER32	RW	
9149		ARRAY	AI Span End		INTEGER32		O
	00h	VAR	N° of entries	02	UNSIGNED8	RO	
	01h	VAR	AI Span End ch1	0001D4C0	INTEGER32	RW	
	02h	VAR	AI Span End ch2	0001D4C0	INTEGER32	RW	