



Adapter Box ADCA400

Voltage Outputs or Current-Supplied Sensors Adapter Box for the gt4 Data Recorder



ADCA400 front view



ADCA400 back view

FEATURES

- Multi channel analog interface SyMBus24 to AD card
- Disturbance tolerant symmetrical transmission
- MDR68 front connector for reliable repetitive plugging
- 24 channel analog interface 24BNC to sensors
- 24 widely accepted BNC front connectors
 - ± 10 V input-voltage range (current sources off)
 - 2 V to 22 V with current sources switched on
 - 10 k Ω input resistance
 - 2 Hz to 50 kHz frequency response (with DMCADC450 card)
- 6x switchable 4x 3 mA center contact current supply
- Nonvolatile calibration and configuration memory
- Onboard voltage monitoring
- Green activity LED
- Low power consumption (5 W typically)
- Aluminum box with plastic housing, stackable with up to 4 devices and one gt4 on top by screw connections

The ADCA400 is an aluminum adapter box that has been developed for connecting the symmetrical DMCADC4xx analog measurement cards to up to 24 single-ended voltage outputs or the common 2 – 20 mA current supplied sensors better known by their registered trademarks ICP®, DeltaTron®, Isotron® and Piezotron®.

The adapter box has 24 BNC connectors (8 on the front and 16 on the back). Underneath each group of 4 BNC connectors is a slide switch, which can be used to switch between ± 10 V and 2 V to 22 V input-voltage with 3 mA sensor supply.

Configuration and results of the factory-calibration can be stored in a nonvolatile memory and used for compensation while measuring.

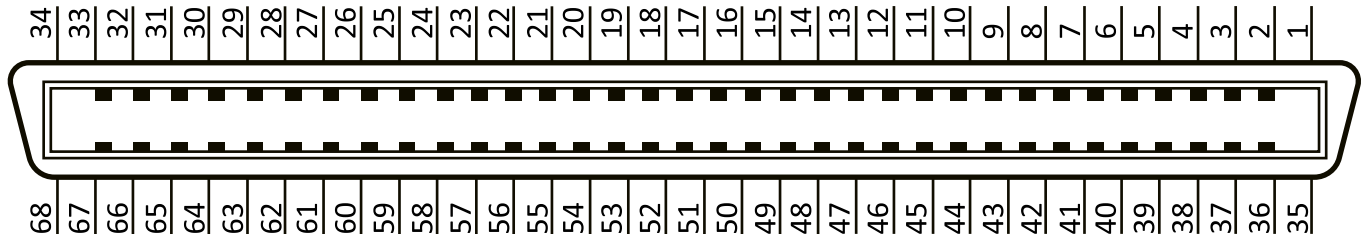
Disturbance tolerant transmission from the MDR68 connector to the analog measurement card is achieved when using the symmetrical mccabAR1xx cable.

Data recorder gt4 series on top of ADCA400



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MDR68 CONNECTOR SCHEME

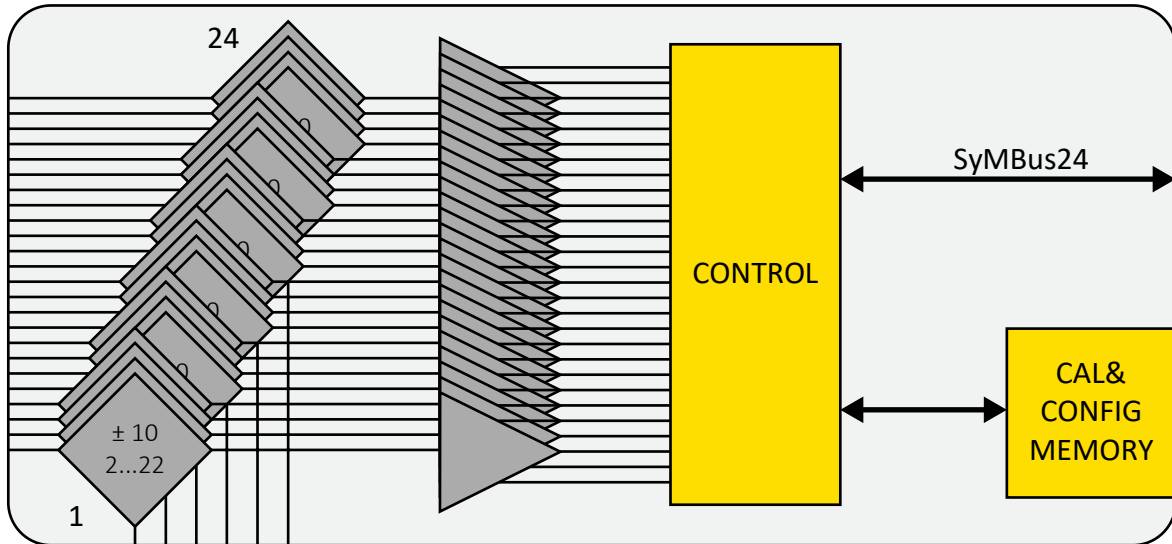


1		24	OUT08-	47	OUT21-
2	5 V	25	SENSOR 6 V	48	OUT21+
3	IS SERIAL IN	26	OUT09+	49	SENSOR 0 V
4	12 V	27	OUT09-	50	OUT20-
5	SENSOR 6 V	28	OUT10+	51	OUT20+
6	OUT01+	29	OUT10-	52	OUT19-
7	OUT01-	30	SENSOR 6 V	53	OUT19+
8	OUT02+	31	OUT11+	54	SENSOR 0 V
9	OUT02-	32	OUT11-	55	OUT18-
10	SENSOR 6 V	33	OUT12+	56	OUT18+
11	OUT03+	34	OUT12-	57	OUT17-
12	OUT03-	35	/DETECT	58	OUT17+
13	OUT04+	36	0 V	59	SENSOR 0 V
14	OUT04-	37	IS SERIAL OUT	60	OUT16-
15	SENSOR 6 V	38	SWITCH 0 V	61	OUT16+
16	OUT05+	39	SENSOR 0 V	62	OUT15-
17	OUT05-	40	OUT24-	63	OUT15+
18	OUT06+	41	OUT24+	64	SENSOR 0 V
19	OUT06-	42	OUT23-	65	OUT14-
20	SENSOR 6 V	43	OUT23+	66	OUT14+
21	OUT07+	44	SENSOR 0 V	67	OUT13-
22	OUT07-	45	OUT22-	68	OUT13+
23	OUT08+	46	OUT22+		

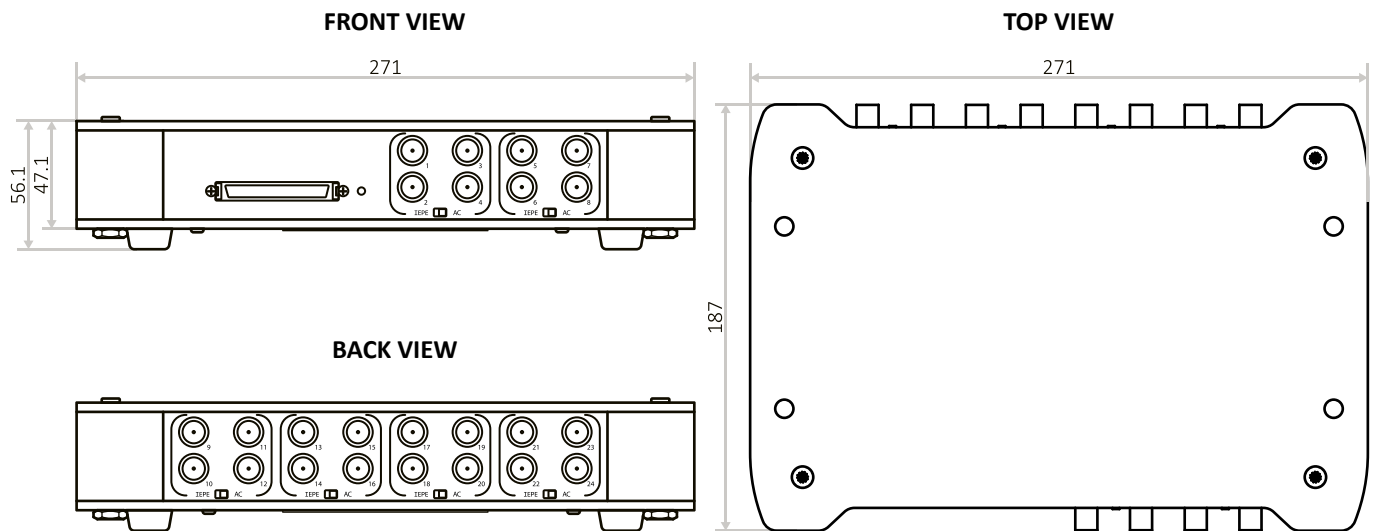


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BLOCK DIAGRAM



MECHANICAL DATA



WEIGHT

1900 gr



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ABSOLUTE MAXIMUM RATINGS					
Parameter		Min	Max	Unit	Remarks
Power	12 V to SWITCH_0 V	- 0.3	14	V	Stresses above these may cause permanent damage. This is a stress rating only; functional operation at these or any other conditions above is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Only one absolute maximum rating may be applied at any one time.
	SENSOR_6 V to SENSOR_0 V	- 0.3	8	V	
	5 V to 0 V	- 0.3	6	V	
BNC inputs to SENSOR_0 V*	- 23	23	V		
Digital inputs to 0 V	- 0.3	4	V		
Storage temperature		- 50	125	°C	

* when current sources are switched on for sensors like ICP®, min. input voltage reduces to - 0.3 V.

CONFORMITY	
Electrical safety	complies with DIN EN 61010-1
Ingress protection code	IP30 according to DIN EN 60529
Electromagnetic compatibility (EMC)	complies with DIN EN 61326

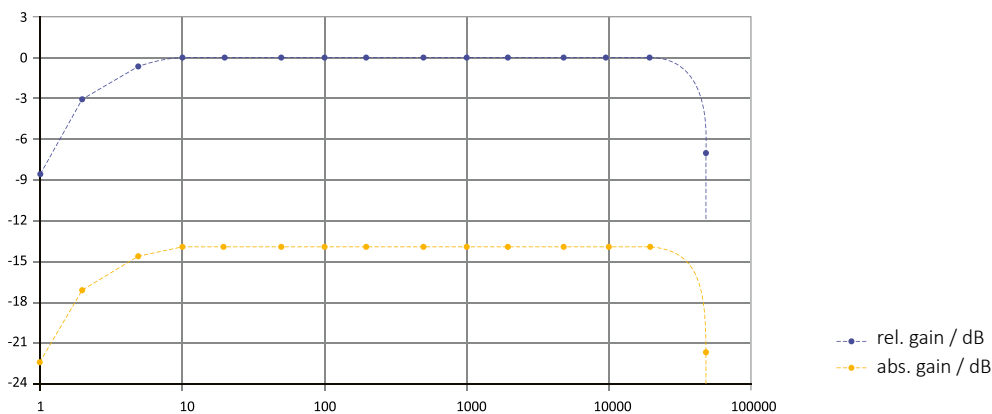
OPERATING CONDITIONS						
Parameter		Min	Typ	Max	Unit	Remarks
Power	12 V	5.0	12	12.6	V	voltages at the MDR68 connector must be guaranteed to be within these limits
	SWITCH_0 V	0.0		12.6	V	
	SENSOR_6 V	5.2	6	6.7	V	
	5 V	4.7	5	5.3	V	
Sensor supply (front)	3 mA	2.2	2.7	3.1	mA	at center contact of each BNC connector, short-circuit-proof
BNC inputs	IN to SENSOR_0 V	2		22	V	with current sources switched on
	IN to SENSOR_0 V	- 10		10	V	with current sources switched off
Analog outputs	OUT+ to OUT-	- 2		2	V	analog outputs are DC-biased at 2.5 V
	OUT+ to SENSOR_0 V	1.5	2.5	3.5	V	
	OUT- to SENSOR_0 V	1.5	2.5	3.5	V	
/DETECT		0		0.7	V	internally connected to 0 V
IS_SERIAL_IN	low	0		2.4	V	connects to IS_SERIAL_OUT at the DMCADC4xx
	high	3.6		5	V	
IS_SERIAL_OUT	low	0		0.4	V	connects to IS_SERIAL_IN at the DMCADC4xx
	high	2.2		5	V	
Temperature	low high	0		40	°C	the air surrounding the adapter box must be within these limits
Relative humidity		10		80	%	not to be operated until condensation is evaporated



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ELECTRICAL CHARACTERISTICS*					
Parameters	Min	Typ	Max	Unit	Condition
Full-scale input-voltage	6.0	6.8	8.0	V _{eff}	@ current sources switched on/off
AC input-resistance	9.9	10	10.1	kΩ	between BNC inputs and SENSOR_0 V
Input referred noise @ current sources switched off		17	25	μV _{eff}	inputs connected to 50 Ω resistors, 20 Hz – 20 kHz-weighted
@ current sources switched on		17	28	μV _{eff}	
Dynamic performance					full-scale input related to noise @ current sources switched off
Signal to noise ratio (A-weighted) (20 Hz – 20 kHz-weighted)	111	115		dB(A)	
(20 Hz – 40 kHz-weighted)	109	112		dB	
(20 Hz – 80 kHz-weighted)	106	109		dB	
Signal to noise ratio (A-weighted) (20 Hz – 20 kHz-weighted)	110	115		dB(A)	
(20 Hz – 40 kHz-weighted)	108	112		dB	
(20 Hz – 80 kHz-weighted)	105	109		dB	
(20 Hz – 80 kHz-weighted)	102	105		dB	
Total harmonic distortion + noise @ current sources switched off		- 73	- 66	dB	most distorted channel @ input 1 kHz, - 3 dB, 20 Hz – 20 kHz-weighted
@ current sources switched on		- 62	- 60	dB	
Accuracy Output referred offset-error		1	15	μV	worst channel @ inputs connected to 50 Ω resistors
Input referred offset-error		6	73	μV	
Channel separation Crosstalk @ 1 kHz (800 Hz – 1250 Hz-weighted)		- 121	- 110	dB	most disturbed channel related to driven channel @ input- 3 dB
Crosstalk @ 10 kHz (8 kHz – 15 kHz-weighted)		- 107	- 100	dB	
Power supply current (12 V)		5	20	mA	@ inputs connected to 50 Ω resistors
(SENSOR_6 V)		671	700	mA	
(5 V)		2	20	mA	
Power consumption (12 V)		0.06	0.25	W	supply currents from above, voltages measured on the board
(SENSOR_6 V)		4.36	5.00	W	
(5 V)		0.01	0.11	W	
(total)		4.43	5.36	W	

FREQUENCY RESPONSE*



* together with DMCADC450 card



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THEORY OF OPERATION

Signals entering the ADCA400 are passing ESD-protections and line inductors where high-frequency-components are removed that the following amplifiers cannot damp sufficiently.

Each of six switches can connect a group of four inputs to low noise 3 mA current regulators operating from a filtered 6 V to 24 V step up voltage converter.

Symmetrical-output-amplifiers are used to level from single-ended 7 Veff input- to differential 1.4 Veff output-voltage range allowing for disturbance tolerant connection to DMCADC4xx analog measurement cards by connecting the MDR68 connectors with a symmetrical mccabAR1xx cable.

Capacitors set the lower end of the frequency range to 1.6 Hz and the upper end to 150 kHz resulting in a 2 Hz to 50 kHz frequency range together with an DMCADC450 card at 192 kHz sampling frequency.

/DETECT connects to 0 V to inform the measurement card that a device is present.

A microcontroller communicates with the AD card via optically decoupled IS_SERIAL_IN and IS_SERIAL_OUT and provides for reading and writing of the nonvolatile configuration and calibration memory as well as for monitoring the three supply-voltages.

A green front-panel-LED is connected to a 5 mA current source and can be switched on and off from the DMCADC4xx using SWITCH_0 V.

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