

GMDR-2 M4A

Ground MDR ARINC429 system



HEIM DATaRec® 4 GMDR



Technical Specifications

The HEIM DATaRec® 4 Ground MDR ARINC429 systems are data acquisition, recording and playback systems with built-in signal boards for ARINC429 applications. Functionally, the GMDR fully compares with a MDR mainframe and can be populated with GMDR-/MDR-type interface modules to meet the most different application requirements. A user interface is provided by two displays on the front.

**GMDR-2 M4A
(SHS505-33002)**

**Ground MDR system with
integrated signal boards
28 ARINC 429 input Data channels
28 ARINC 429 output Data channels**

GMDR with the following integrated ARINC429 signal boards. Each signal board is an independent signal part with separate channels. Signal boards are named with an abbreviation code:

ABB = ARINC 429 (A), no assembly options (B), no additional functions (B).

APB = ARINC 429 outputs (A), play (P) and no additional functions (B).

The technical specifications for these signal boards can be seen in the sections for each signal board type.

Number of Channels	28 ARINC 429 input Data channels
	28 ARINC 429 output Data channels

Data format	IRIG 106 Chapter 10 compliant
Storage device	Internal: 1 x media slot for 2.5" Data Express® DE50 drive enclosures External: via eSATA (on rear panel)
Module slots	1 slot for GMDR-/MDR-type interface modules; all modules can be exchanged by the customer
Supported signal types for record	PCM serial MIL 1553B buses ARINC 429 buses STANAG 3910 CAN buses Serial data, asynchronous and synchronous IEEE 1394 (Firewire) Different bandwidth analog data, voice Ethernet network communication Video (SD and HD) Discrete Others on request



Supported signal types for replay

- PCM serial
- MIL 1553B buses
- ARINC 429 buses
- Voice
- Ethernet network communication
- Compressed HD video
- Others on request

Bit rate 240 Mbit/s

Standard interfaces

Voice

- Channels 2 input single ended headset channels
2 single ended head set monitor, replay outputs
- Sampling rate max. 25 kS/s selectable in steps
- Sampling to BW ratio 2.22
- High pass filter 300 Hz selectable
- Resolution 8 bit / 16 bit
- Dynamic range 48 dB / 70 dB
- Input Range 1 Vrms, 1 Vpeak
0.1 Vrms, 0.1 Vpeak
10 mVrms, 10 mVpeak
- Input coupling AC
- Input impedance 10 kΩ
- Output Range max. 1 Vpeak
- Output coupling AC

Ethernet channel

- Channels 2 ports
- Input format 10 / 100 / 1000 Mbit/s Ethernet bus communication
- Functions UDP broadcast, PTP (Precision Time Protocol; time code sync. IEEE 1588-2002 / IEEE 1588-2008), FTP server download function, remote control

Serial

- Channels 1 channel remote
1 channel GPS (NMEA)
- Interface standards RS232 / RS422

Setup/Control/Remote

- Interfaces Ethernet, RS232, RS422
- Contact Remote (CR) 6 discrete inputs
- CR Input level high 4.7 V- 36 V
- CR Input level low 0 V - 3.5 V
- CR Input impedance min 25 kΩ
- CR Status output 6 open collector
- CR Output current max. 60 mA, max. 36 V (short circuit protected)

Time coding

- Input Standard codes IRIG A, B, G, 1 pps / 10 pps, GPS time code, PTP (Precision Time Protocol; IEEE 1588-2002 (slave) / IEEE 1588-2008 (slave))
- Input accuracy
 - IRIG A ±5 μs
 - IRIG B ±20 μs
 - IRIG G ±2 μs
 - 1 pps / 10 pps ±0.2 μs
- Signal level
 - IRIG A, B, G 0.2 Vpp ...20 Vpp
 - GPS (NMEA) RS232 / RS422 standard
 - 1 pps / 10 pps TTL
 - Input impedance IRIG A, B, G: 25 kΩ
- Output
 - Standard codes IRIG A, B, G, 1 pps / 10 pps; GPS replay as RS232, PTP (Precision Time Protocol; IEEE 1588-2002 time master version 1 / IEEE 1588-2008 time master version 2)
 - Output accuracy 2×10^{-5} s (standard)
 - Signal level 2 Vpp on 75 Ω (IRIG A, B, G), RS232 (NMEA), TTL (1 pps / 10 pps)
 - Output impedance 75 Ω (IRIG A, B, G)
 - Synchronization 1 pps / 10 pps output with 1 μs accuracy
- Build-in GPS receiver (optional)
 - Receiver type 50 channels
GPS L1 frequency C/A code
Galileo open service L1 frequency
 - Max. speed < 600 m/s
 - Max. navigation update rate 4 Hz
 - Velocity accuracy 0.1 m/s
 - Heading accuracy 0.5 degrees
 - Dynamics < 4 g
 - Horizontal position < 2.5 m autonomous
 - Accuracy > 2.0 m SBAS
 - Power for active antenna 5.0 V
- Real time clock (RTC) time accuracy
 - Power on state ±1 ppm (< +25 °C)
±4 ppm
10 ppb (with optional High Precision Oscillator)
 - Power off state ±2 ppm (0 ...+25 °C)
±4 ppm

Additional Functions

Data integrity	The built-in power supply system provides for a clean shut down if power is lost during recording, avoiding data corruption.
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Signal board type ABB, ARINC 429 input

Operating mode	Record (no E to E)
Input signal	ARINC 429
Signal level	ARINC 429 standard
Functions	Bus monitor Bus analysis
Bus recording	Complete bus
Bus speed identification	Automatic
Bus load identification	Bus load computed and displayed
Time stamping	Time stamps for all messages, exact response time recording

Signal board type APB, ARINC 429 output

Operating mode	Playback (complete bus communication reconstructed)
Output signal	ARINC 429 high speed or low speed bus
Signal level	ARINC 429 standard
Playback mode	Total bus
Bus load identification	Bus load computed and displayed
Time accuracy	5 microsecond

General

Supply voltage	
Nominal input voltage	100 ... 240 V AC
Input voltage range	90 ... 264 V AC
Input voltage frequency	48 ... 62 Hz
Input current	2.4 ... 1.0A max.
Power consumption	
Standby	max. 1W
Power on	max. 40W (without signal modules and without storage media)
Connectors	
Power	AC power
Time, voice, synch	HD-D-Sub 26 pin female
Remote	HD-D-Sub 26 pin female
Rear eSATA	Host (e. g. for external storage media)
LAN1 (front)	RJ45
LAN2 (rear)	RJ45
Communication interfaces	
Displays	2 x 3.2" LCD color active matrix;
Status indicators	3 x LED, for system, time and media status
Buttons	9 lighting buttons for basic functions and menu navigation
Dimensions	
all variants	482.6 x 44.4 x 398.6 mm (w x h x d)
Weight	6.9 kg

Environmental specifications

Temperature	in accordance with standard IEC DIN EN60068-2-14Nb operating -15°C ... +55°C storage -20°C ... +70°C
Humidity	0 ... 93% relative, non-condensing
Safety & Health	EU-Directive 2014/35/EU (Low Voltage Directive) DIN EN 60950-1
Electromagnetic compatibility (EMC)	EU-Directive 2014/30/EU (EMC)
EMC - Emissions	DIN EN 55032 DIN EN 61000-3-2 DIN EN 61000-3-3
EMC - Immunity	DIN EN 61000-6-2 DIN EN 61000-4-2 DIN EN 61000-4-3 DIN EN 61000-4-4 DIN EN 61000-4-5 DIN EN 61000-4-6

Notes

Performance varies depending on the installation environment. The values shown were measured using an appropriately designed test system with a default setup under nominal conditions of temperature, voltage, ... Performance is significantly influenced by storage medium type, signal module configuration, power supplies and cabling. The bit rate of a MMRG8/MMRG8A module in a GMDR-12 is up to 150 Mbit/s. For higher bit rates an appropriate hybrid module can be used (e. g. MMMMM-7777-AAAA). The max. burst bit rate of the limited Chapter 10 Data channels of a METH2A and METH2A-RP module in a GMDR-12 is up to 80 Mbit/s.

The features and capabilities of the MDR product line as well as the range of its pertaining items are continuously evolving. Before being able to utilize new features, functions or modules the firmware of the MDR system has to be updated to the latest firmware version.

Take ESD precautions when handling MDR modules. Always ensure to use only cables with the correct pin out for the interface module! The use of cables with wrong pin assignment may result in damage to the connected hardware.

Definitions

Specifications with limiting symbols (<, >, ≤, ≥, ±, min, max, etc.) or a domain (...) represent performance within a range of values. Specifications named as "typical" represent performance met by approximately more than 80% of the specification basis (channels, produced devices, ...). Specifications without limits are nominal values or values within standard tolerances (e. g. dimensions, ...).

Number of channels: Some module/signal board types can provide additional Data channels (e.g. for filtering, converting, scaling etc). Therefore the number of channels is divided into Physical I/Os and Data channels.

Physical I/O channels are related to the connected signals (signal groups or mixed/merged signals).

Data channels allow to process the signals of the Physical I/O channels (e. g. filtering, converting, scaling...) Depending on the module/signal board type the number of Data channels can be higher than the number of Physical I/O channels.

Per module/signal board, the Physical I/O channels can be assigned to one or more of the available Data channels of this module (for different processing of the signals).

Safran Data Systems GmbH

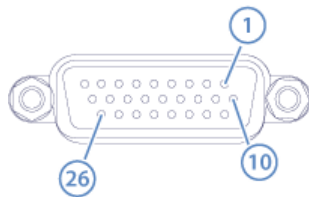
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Connector Pin out

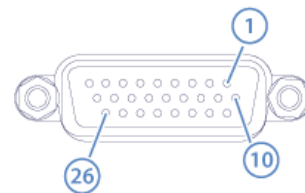
Time/voice/synch (D-Sub type, HD 26-pin female)

Pin	Description
	IRIG interface
8	IRIG analog time code input
7	IRIG analog time code output
9	IRIG analog signal ground
	PPS interface
17	1/10 PPS input
16	1/10 PPS output
18	1/10 PPS signal ground
	Serial GPS (NMEA) interface
22	GPS RS422 serial data receiver input -, symmetrical signal
21	GPS RS422 serial data receiver input +, symmetrical signal
20	GPS RS422 transmitter output +
19	GPS RS422 transmitter output -
25	GPS RS232 receiver input
24	GPS RS232 transmitter output
23	GPS RS232/RS422 common signal ground
	Voice interface
2	Voice line input 1
3	Voice line input 2
1	Voice line input ground
11	Voice line output 1
12	Voice line output 2
10	Voice line output ground
	Synchronisation interface
15	Synchronous 1 I/O+
6	Synchronous 1 I/O-
13	Synchronous 2 I/O+
4	Synchronous 2 I/O-
5	Synchronous configuration input
14	Synchronous common ground
26	Common cable shield (case)



Remote/media (D-Sub type, HD 26-pin female)

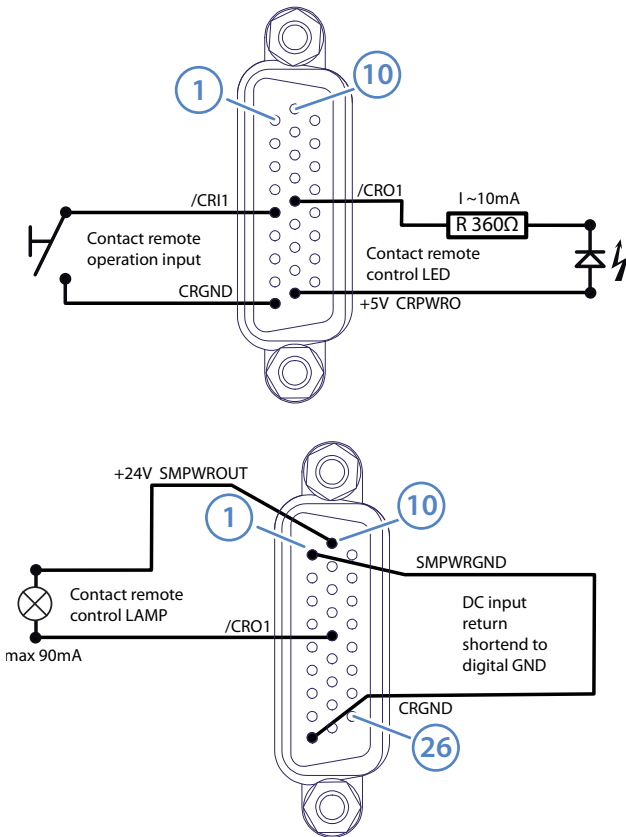
Pin	Description
	Power supply interface
10	Power supply output (24 V DC / 400 mA)
1	Power supply ground (isolated from signal ground)
19	Power supply shield (case)
	Serial remote interface
20	RS422 receive input pair +
21	RS422 receive input pair -
11	RS422 transmit output pair +
12	RS422 transmit output pair -
2	RS232 receive input
3	RS232 transmit output
13	RS232/RS422 common signal ground
4	RS232/RS422 common cable shield (case)
	Contact remote interface
5	C-REM input 1 (record)
6	C-REM input 2 (erase)
7	C-REM input 3 (declassify)
8	C-REM input 4 (self-test)
16	C-REM input 5 (enable)
17	C-REM input 6 (event)
14	C-REM open collector output 1 (record status)
15	C-REM open collector output 2 (erase status)
22	C-REM open collector output 3 (declassify status)
23	C-REM open collector output 4 (self-test status)
24	C-REM open collector output 5 (critical error status)
25	C-REM open collector output 6
18	C-REM Power output +5 V DC / 1 A
9	C-REM I/O common signal ground
26	C-REM I/O cable shield (case)



Specification of the contact remote interface
All outputs are open drain signals, active low. For example when record is running, the record output will be pulled to ground with a current limit of 90 mA. When record is not running the pin is floating. An external pullup resistor should be provided with a maximum voltage of 50V.

The input pins are also low active and should be pulled to GND to activate them. When left open, an internal current source (0.5 mA limit) will pull the pins to 5.0 V. The function will be activated if the corresponding pin is pulled below 3.0 V. This should be done using a switch, relay, open drain FET or similar. The inputs can also tolerate higher voltages of up to 35 V (direct connection to 28 V aircraft power is possible).

Example for contact remote wiring

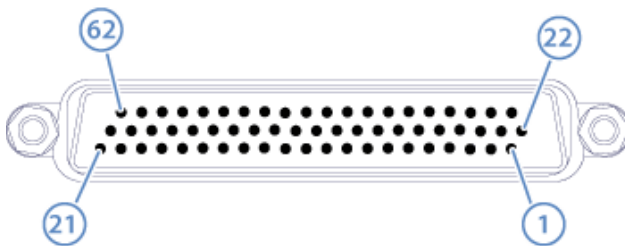


ARINC429 input (HD-DSUB 62 Pin Male Plug (CTZ37-62P1 from FCT))

Pin Nr.	Description
22	Signal ground
1	ARR 2 ARINC 429 IN B-
43	ARR 1 ARINC 429 IN B-
23	ARR 2 ARINC 429 IN A+
2	ARR 3 ARINC 429 IN B-
44	ARR 1 ARINC 429 IN A+
24	ARR 3 ARINC 429 IN A+
3	ARR 4 ARINC 429 IN B-
45	ARR 7 ARINC 429 IN B-
25	ARR 4 ARINC 429 IN A+
4	ARR 5 ARINC 429 IN B-
46	ARR 7 ARINC 429 IN A+
26	ARR 5 ARINC 429 IN A+
5	ARR 6 ARINC 429 IN B-
47	ETP1_7 ARINC 429 receive error output on ARR 1 ...7
27	ARR 6 ARINC 429 IN A+
6	ARR 9 ARINC 429 IN B-
48	ARR 8 ARINC 429 IN B-
28	ARR 9 ARINC 429 IN A+
7	ARR 10 ARINC 429 IN B-
49	ARR 8 ARINC 429 IN A+
29	ARR 10 ARINC 429 IN A+
8	ARR 11 ARINC 429 IN B-
50	ARR 14 ARINC 429 IN B-
30	ARR 11 ARINC 429 IN A+
9	ARR 12 ARINC 429 IN B-
51	ARR 14 ARINC 429 IN A+
31	ARR 12 ARINC 429 IN A+
10	ARR 13 ARINC 429 IN B-
52	ETP8_14 ARINC 429 receive error output on ARR 8 ...14
32	ARR 13 ARINC 429 IN A+
11	ARR 16 ARINC 429 IN B-
53	ARR 15 ARINC 429 IN B-
33	ARR 16 ARINC 429 IN A+
12	ARR 17 ARINC 429 IN B-
54	ARR 15 ARINC 429 IN A+
34	ARR 17 ARINC 429 IN A+
13	ARR 18 ARINC 429 IN B-
55	ARR 21 ARINC 429 IN B-
35	ARR 18 ARINC 429 IN A+
14	ARR 19 ARINC 429 IN B-
56	ARR 21 ARINC 429 IN A+
36	ARR 19 ARINC 429 IN A+
15	ARR 20 ARINC 429 IN B-
57	ETP15_21 ARINC 429 receive error output on ARR 15 ...21

37	ARR 20 ARINC 429 IN A+
16	ARR 23 ARINC 429 IN B-
58	ARR 22 ARINC 429 IN B-
38	ARR 23 ARINC 429 IN A+
17	ARR 24 ARINC 429 IN B-
59	ARR 22 ARINC 429 IN A+
39	ARR 24 ARINC 429 IN A+
18	ARR 25 ARINC 429 IN B-
60	ARR 28 ARINC 429 IN B-
40	ARR 25 ARINC 429 IN A+
19	ARR 26 ARINC 429 IN B-
61	ARR 28 ARINC 429 IN A+
41	ARR 26 ARINC 429 IN A+
20	ARR 27 ARINC 429 IN B-
62	ETP22_28 ARINC 429 receive error output on ARR 22 ...28
42	ARR 27 ARINC 429 IN A+
21	Do not connect

49	ARP 8 ARINC 429 OUT A+
29	ARP 10 ARINC 429 OUT A+
8	ARP 11 ARINC 429 OUT B-
50	ARP 14 ARINC 429 OUT B-
30	ARP 11 ARINC 429 OUT A+
9	ARP 12 ARINC 429 OUT B-
51	ARP 14 ARINC 429 OUT A+
31	ARP 12 ARINC 429 OUT A+
10	ARP 13 ARINC 429 OUT B-
52	Do not connect
32	ARP 13 ARINC 429 OUT A+
11	ARP 16 ARINC 429 OUT B-
53	ARP 15 ARINC 429 OUT B-
33	ARP 16 ARINC 429 OUT A+
12	ARP 17 ARINC 429 OUT B-
54	ARP 15 ARINC 429 OUT A+
34	ARP 17 ARINC 429 OUT A+
13	ARP 18 ARINC 429 OUT B-
55	ARP 21 ARINC 429 OUT B-
35	ARP 18 ARINC 429 OUT A+
14	ARP 19 ARINC 429 OUT B-
56	ARP 21 ARINC 429 OUT A+
36	ARP 19 ARINC 429 OUT A+
15	ARP 20 ARINC 429 OUT B-
57	Do not connect
37	ARP 20 ARINC 429 OUT A+
16	ARP 23 ARINC 429 OUT B-
58	ARP 22 ARINC 429 OUT B-
38	ARP 23 ARINC 429 OUT A+
17	ARP 24 ARINC 429 OUT B-
59	ARP 22 ARINC 429 OUT A+
39	ARP 24 ARINC 429 OUT A+
18	ARP 25 ARINC 429 OUT B-
60	ARP 28 ARINC 429 OUT B-
40	ARP 25 ARINC 429 OUT A+
19	ARP 26 ARINC 429 OUT B-
61	ARP 28 ARINC 429 OUT A+
41	ARP 26 ARINC 429 OUT A+
20	ARP 27 ARINC 429 OUT B-
62	Do not connect
42	ARP 27 ARINC 429 OUT A+
21	Do not connect



ARINC429 output (HD-DSUB 62 Pin Male Plug (CTZ37-62P1 from FCT))

Pin Nr.	Description
22	Do not connect
1	ARP 2 ARINC 429 OUT B-
43	ARP 1 ARINC 429 OUT B-
23	ARP 2 ARINC 429 OUT A+
2	ARP 3 ARINC 429 OUT B-
44	ARP 1 ARINC 429 OUT A+
24	ARP 3 ARINC 429 OUT A+
3	ARP 4 ARINC 429 OUT B-
45	ARP 7 ARINC 429 OUT B-
25	ARP 4 ARINC 429 OUT A+
4	ARP 5 ARINC 429 OUT B-
46	ARP 7 ARINC 429 OUT A+
26	ARP 5 ARINC 429 OUT A+
5	ARP 6 ARINC 429 OUT B-
47	Do not connect
27	ARP 6 ARINC 429 OUT A+
6	ARP 9 ARINC 429 OUT B-
48	ARP 8 ARINC 429 OUT B-
28	ARP 9 ARINC 429 OUT A+
7	ARP 10 ARINC 429 OUT B-

