

Active Marker Controller 6



Overview

The AMC6 is used to control and synchronize up to six active IR markers within ART tracking systems. Synchronization with the tracking cameras is provided via optical IR sync using modulated flash.



The housed version is intended for external installation and is powered via Mini-USB at 5 V. An integration version without housing is available for installation into customer-specific devices and active targets.

The AMC6 is intended for custom active-marker applications and must be installed and operated within the specified electrical and operating limits.

Safety notes

Observe the following precautions when installing and operating the AMC6:

- Do not operate the AMC6 with more than six IR LEDs unless explicitly approved for the intended configuration. Operation outside the specified limits may result in reduced LED brightness, excessive heat generation or damage to the device.
- When using the integration version, observe the correct supply polarity. The AMC6 board is not protected against reverse polarity or short circuits at the power input or LED output.
- When using external video sync, standard video-sync cabling rules apply. Do not use star wiring and terminate the synchronization line with a 75 Ω resistor after the last synchronized device.
- When powered via USB, observe the available USB power. A USB 2.0 connection provides a maximum of 2.5 W.
- For USB cable lengths exceeding 5 m, use an active USB extension.

Connections

Housed version

Power input

Mini-USB-B, 5 V

LED outputs

Two 2-pin Binder 711 connectors. Each connector supplies one set of three parallel-connected LED boards.

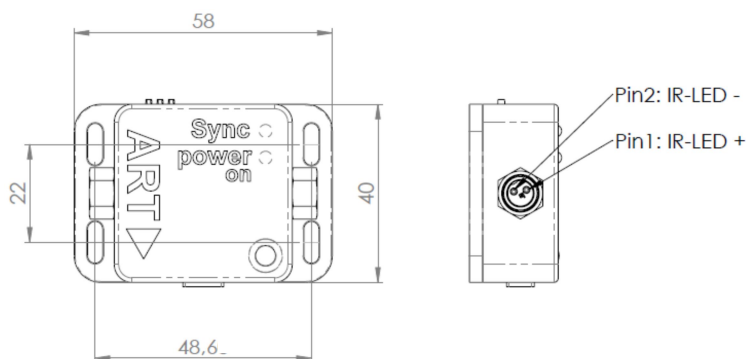
Optical synchronization

Synchronization is received by the integrated TSOP7000 sensor via modulated flash from the ART tracking cameras.

Status indicators

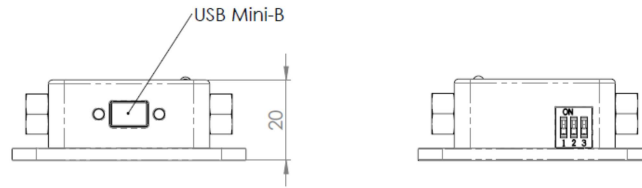
Sync-status LED and power-on LED.

Pin	Function
Pin 1	IR-LED +
Pin 2	IR-LED -



Configuration switches

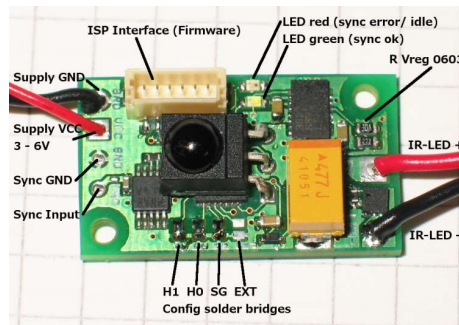
Three DIP switches for setting the flash duration and sync-group operation.



Integration version Pinout

Connection	Function
Supply GND	power supply / battery minus
Supply VCC	power supply / battery plus, 3 - 6 V DC
Sync GND	ground of external synchronization source
Sync Input	external video/TTL synchronization signal (video VSYNC signal)
IR-LED +	anode of IR LED(s)
IR-LED -	cathode of IR LED(s)

The input voltage does not affect LED brightness.



LED Connection

The AMC6 supports up to six high-power IR LEDs. The LEDs are connected in parallel to the IR-LED output. Observe the correct polarity when connecting the LEDs:

IR-LED +: LED anode

IR-LED -: LED cathode

For the housed version, two output connectors are provided. Each connector is intended for one set of three parallel-connected LED boards.

Use only LED configurations specified or approved for the AMC6. Do not connect more than six LEDs in total.

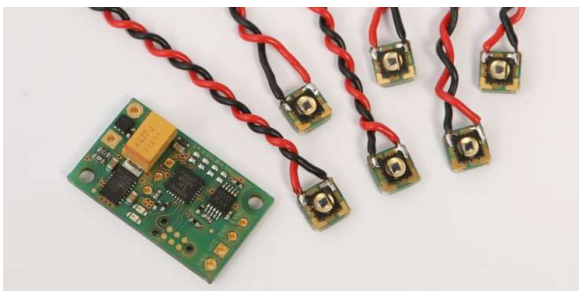


Figure 1: 3 parallel-connected LED boards per output connector



Synchronization

Optical IR synchronization

The AMC6 can be synchronized optically by receiving the modulated flash from the ART tracking cameras via the integrated TSOP7000 sensor.

All ART tracking camera systems support modulated flash synchronization. Activating modulated flash on multiple cameras can improve synchronization robustness and reception at the AMC6.

External video / TTL synchronization

The integration version can alternatively be synchronized using an external video or TTL synchronization signal. Connect the synchronization signal to Sync Input and the corresponding ground to Sync GND.

When using video synchronization, standard video-sync cabling rules apply. Avoid star wiring and terminate the synchronization line with a 75 Ω resistor after the last synchronized device.

Synchronization frequency: 10 - 500 Hz

Sync-group operation: 1 or 3 sync groups

Configuration

Housed version

The housed version is configured using three DIP switches on the enclosure.

DIP switches 1 and 2 select the flash duration. DIP switch 3 selects the sync-group operation.

DIP switch 1	DIP switch 2	Flash duration
off	off	50 μ s
off	on	100 μ s
on	off	150 μ s
on	on	200 μ s

DIP switch 3	Sync-group operation
off	1 sync group
on	3 sync groups

Integration version

The integration version is configured using solder bridges on the AMC6 board.

Solder bridge	Function
H1 / H0	flash duration
SG	sync-group operation
EXT	synchronization source

H1	H0	Flash duration
open	open	50 μ s
open	connected	100 μ s
connected	open	150 μ s
connected	connected	200 μ s

SG	Sync-group operation
open	1 sync group
connected	3 sync groups
EXT	Synchronization source
open	optical IR synchronization
connected	external video/TTL synchronization (TSOP7000 disabled)

Power supply

Housed version

The housed version is powered via Mini-USB-B at 5 V.

Integration version

The integration version requires a DC supply voltage of 3 - 6 V and may also be operated from a suitable battery supply.

The supply voltage does not affect the LED output voltage or LED brightness within the specified operating range. The LED output is regulated to approximately 2.9 V. During the flash phase, the typical current is approximately 500 mA per connected SFH 4716AS LED.

When powering the AMC6 via USB 2.0, observe the maximum available USB power of 2.5 W. For USB cable lengths exceeding 5 m, use an active USB extension.

Current consumption

Current consumption depends mainly on synchronization frequency, flash duration and the selected sync-group operation.

The following values are measured reference values for six SFH 4716AS LEDs operated from a 3.6 V supply.

1 sync group

Flash duration	60 Hz	120 Hz	240 Hz	300 Hz	500 Hz
50 µs	9 mA	11 mA	17 mA	20 mA	29 mA
100 µs	12 mA	16 mA	24 mA	29 mA	45 mA
150 µs	15 mA	22 mA	34 mA	40 mA	64 mA
200 µs	20 mA	28 mA	44 mA	53 mA	85 mA

3 sync groups

Flash duration	60 Hz	120 Hz	240 Hz	300 Hz	500 Hz
50 µs	13 mA	22 mA	39 mA	47 mA	74 mA
100 µs	20 mA	39 mA	72 mA	88 mA	141 mA
150 µs	30 mA	55 mA	94 mA	118 mA	207 mA
200 µs	40 mA	73 mA	127 mA	157 mA	273 mA

These values are reference measurements and may vary with supply voltage, LED type and component tolerances.

First Start

Before switching on the AMC6, verify that all connections and configuration settings are correct.

1. Connect the IR LEDs and verify the correct polarity.
2. Select the required flash duration and sync-group operation.
3. For the integration version, select the required synchronization source.
4. Connect the power supply.
5. Start DTRACK and activate **modulated flash** on at least one tracking camera.
6. Do not enable **automatic exposure control** when using the AMC6. Automatic exposure adjustment may reduce the camera exposure time below the selected AMC6 flash duration, resulting in incomplete or unreliable marker detection. Make sure that the camera exposure time is not shorter than the selected AMC6 flash duration.
7. Start the measurement.
8. Verify the AMC6 status indicators.
9. Check in DTRACK that the active markers are detected correctly.

Activating modulated flash on multiple tracking cameras can improve synchronization robustness, particularly when the AMC6 optical synchronization receiver does not have a reliable line of sight to a single camera.

Using External Synchronization

- External video/TTL synchronization is available for the integration version only.
- External synchronization is not supported by DTRACK4.
- When using DTRACK3, the AMC6 and the Controller must be connected to the same synchronization source. Connect the external synchronization signal to the Controller's Synccard3 Ext.In trigger input and to the AMC6 Sync Input.
- For video synchronization, avoid star wiring and terminate the synchronization line with 75 Ω after the last device.
- When using TTL synchronization, observe the permissible cable length and signal level. Excessive cable length or voltage drop may prevent reliable detection of the TTL synchronization signal.

Troubleshooting

Symptom	Possible cause / action
AMC6 does not power on	Check the power supply and connector. For the integration version, verify supply voltage and polarity.
Sync-status LED is red	Check whether modulated flash has been activated on at least one tracking camera. Verify that the TSOP7000 has sufficient optical reception from a tracking camera. Activating modulated flash on multiple cameras can improve synchronization robustness.
No synchronization with optical IR sync	Verify that modulated flash is enabled on at least one tracking camera. Make sure the TSOP7000 has sufficient optical reception from a tracking camera. Activating modulated flash on multiple cameras can improve synchronization robustness.
Markers are not detected although synchronization is present	Verify the selected AMC6 flash duration and camera exposure time. Do not use automatic exposure control . The camera exposure time must not be shorter than the selected AMC6 flash duration.
Marker detection is weak or unstable	Check all connections. Verify that all LEDs operate correctly. Check the selected flash duration and synchronization settings.
No synchronization with external video sync	Verify the EXT configuration and the connection to the common synchronization source. Avoid star wiring and terminate the video synchronization line with 75 Ω after the last device.
No or unstable synchronization with external TTL sync	Check the signal level directly at the AMC6 Sync Input. Excessive cable length or voltage drop may reduce the signal below a reliable TTL level. Reduce the cable length or improve the signal distribution if necessary.
External synchronization does not work with DTRACK4	External synchronization is not supported by DTRACK4. Use optical IR synchronization via modulated flash.



External synchronization does not work with DTRACK3

Verify that the Controller and AMC6 are connected to the same synchronization source and that the Controller Ext.In. trigger input is connected correctly.

Unexpectedly high current consumption

Check synchronization frequency, flash duration and sync-group setting. Current consumption increases with frequency, flash duration and operation in all three sync groups.

AMC6 or connected components become unusually warm

Disconnect the power supply and verify the LED configuration and electrical connections. Do not operate more than six LEDs or configurations outside the specified limits.

Technical limits

- The AMC6 is specified for operation with up to six high-power IR LEDs connected in parallel. Operation with more than six LEDs is outside the specified operating range.
- The LED output voltage is approximately 2.9 V. The typical current during the flash phase is approximately 500 mA per connected SFH 4716AS LED.
- Synchronization is supported from 10 to 500 Hz.
- Available flash durations are 50, 100, 150 and 200 µs.
- Operation is possible with either one sync group or all three sync groups.
- The integration version requires a supply voltage of 3 - 6 V DC. The housed version is powered via Mini-USB-B at 5 V.
- External video/TTL synchronization is available only with the integration version.
- External synchronization is not supported by DTRACK4.
- When using USB 2.0 power, the available power is limited to 2.5 W. Cable lengths above 5 m require an active USB extension.
- The operating temperature range is 0 - 35 °C and the permitted relative humidity is 5 - 85 % non-condensing.