

## ACH65/35

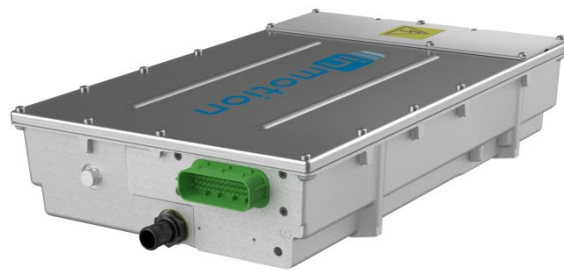
# High voltage motor controllers for hybrid and electric vehicles

The ACH family of high voltage inverters is an ideal choice for your large hybrid or fully electrical vehicles. All models are available with CAN bus communication. With Inmotion's customizable proprietary PLASMA software platform, an ACH offers compliance to demanding functional safety requirements. The rugged design of the ACH ensures a reliable performance without the need for maintenance, whether your vehicles go on the road or off-road.

Inmotion is a long-term, global supplier of electric motors, motor controllers and auxiliary equipment for commercial vehicles. Our "In-region, for-region" manufacturing strategy brings our production facilities closer to yours. This gives you higher quality at a lower cost and shorter lead time. We work in close cooperation with you to integrate and configure our flexible standard products to your specific needs. We help you to realize reliable and efficient vehicles for emission-free transport solutions.



**Size M** ACH 35M30  
ACH 65M30



**Size L** ACH 35L70  
ACH 65L50

### ACH is a flexible standard platform

- **Continuous power** levels up to **300 kVA** make the ACH ideally suited **for hybrid and fully electric** vehicle applications
- **Nominal voltage 350 V/650 V. Fully operational** from **100-450 V/100-750 V** bus voltage
- **4-quadrant, synchronous or asynchronous AC motor control**, with **speed, torque and DC voltage control modes**
- Standard firmware with **extensive configurability** ensures optimal system functionality
- Application software **can be configured by you** or by Inmotion
- **Internal DC EMC filter** with **common mode and differential mode** reduces high frequency electromagnetic interference and eliminates DC bus oscillations
- **The DC EMC filter** allows for **free cable lengths** and **parallel operation** of **several ACH controllers** and **auxiliary equipment**
- **Vector control**, adjustable for different motor types

### Safe operation for personnel and equipment

- Hazardous Voltage Interlock Loop (**HVIL**) for **personal safety**
- Redundant **discharge** of **DC capacitors** for **personal safety**
- **Automatic protection** against **overheating** and **over-voltage**

- CAN communication, **J1939** and/or **CANopen** with support for **diagnostics** and **software download**
- Personal safety in compliance with **ISO 26262 ASIL C**

#### Maximize operating time by minimizing service time

- **Working life** in excess of **60 000 hours**
- Liquid (WEG) **cooled**
- Optional adapter kit for **pre-assembly** of shielded high voltage cables **saves time** and **ensures high quality**
- **Software quality** is assured through development and review processes in compliance with **Automotive SPICE®**
- Extensive and powerful **event handling** and **data logging** simplify troubleshooting and **minimize vehicle down time**
- **Best in class quality and reliability**, achieved through **superior design, world class manufacturing** processes and **field experience**

#### For on-road and off-road vehicles alike

- Rugged **IP6K9K** design withstands close-range high pressure, high-temperature spray downs
- **Field proven control software** platform for on-road and off-road vehicles

#### OPTIONAL ADAPTER KIT

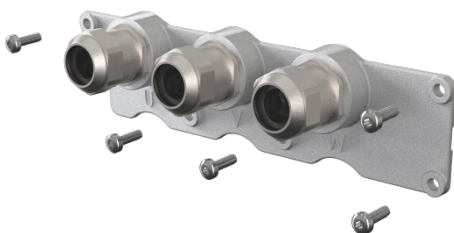


ACH with optional adapter kit and cables (cables not included)

**Part number:** Contact Inmotion

#### The adapter kit consists of:

- AC adapter plate
- DC adapter plate
- Cable glands (suitable for shielded 50 or 70 mm<sup>2</sup> cables)
- Built-in magnets for HVIL-switches
- Screws for mounting



**AC adapter plate** with cable glands and mounting screws



**DC adapter plate** with cable glands and mounting screws

## GENERAL

Compatible motor types	Induction machines, PMAC, Sync. reluctance
Motor feedback types	Resolver or incremental encoder/analog (sin-cos)
Communication	CAN (J1939, CANopen)
Switching frequency	1, 2, 4 and 6 kHz, (6 and 8 kHz with de-rating)
Fundamental frequency	0 - 599 Hz
Control mode	Torque, speed or dc voltage control
Efficiency <sup>1</sup>	> 98 %
Logic supply voltage	9-28 V

<sup>1</sup> At nominal DC voltage, running at rated continuous current

## CONNECTIONS

Logic connector	TYCO MCP family
Power connectors	M8 cable lugs

## TEMPERATURE AND COOLING

Nominal WEG coolant temp/flow	60 °C (140 °F) @ 20 l/min
Pressure drop (ACH35M30 & ACH65M30)	< 30 kPa @ 20 l/min (WEG 50 %/50 % @ 60 °C (140 °F))
Ambient operating temperature	-40 °C to 85 °C (-40 °F to 185 °F)
Storage temperature	-40 °C to 85 °C (-40 °F to 185 °F)

## ELECTRICAL SAFETY AND PROTECTION

Protection class	IP6K9K (cleaning and liquid agent resistant)
Hazard voltage interlock loop (HVIL) discharge protective earth	According to R100
High voltage safety	According to ECE R100
EMC	According to ECE R10

## FUNCTIONAL SAFETY

Torque supervision	ISO 26 262 ASIL C
Motor torque off (MTO)	ISO 13849

## RATINGS

	ACH35	ACH65
Nominal DC voltage	350 V	650 V
Shutdown voltage	490 V	880 V
Full current available at	100 – 450 V	100 – 750 V
Current de-rating	< 100 V 450 – 470 V	< 100 V 750 – 800 V

## MODELS

Model	Nominal voltage [V DC]	Peak current <sup>1</sup> [ARMS]	Cont. current <sup>2</sup> [ARMS]	Peak power <sup>3</sup> [kVA]	Cont. power <sup>3</sup> [kVA]
35M30	350	320	225	137	96
35L70		700	400	299	153
65M30	350	320	225	137	96
	650			255	179
65L50	350	500	375	214	161
	650			398	299

<sup>1</sup> 60 sec rating at 4 kHz switching frequency and 25°C ambient temperature

<sup>2</sup> 1 h rating at 4 kHz switching frequency, 60°C coolant temperature, 85°C ambient temperature and 18 l/min coolant flow

<sup>3</sup> At nominal DC bus voltage

## I/O SUMMARY

	Resolver version [No.]	Encoder version [No.]
General digital inputs	2	2
Hardware ID	2	2
Resolver interface	1	-
Encoder interface	-	1
Sensor supply	-	1
Logic supply/unit enable	1	1
Motor torque off/Digital input	2	2
HVIL (IN/OUT)	2	2
High side out/Low side out	1	1
Motor temperature sensor	2	2
CAN Main interface	1	1
CAN Auxiliary interface	1	1

## WEIGHT AND DIMENSIONS

	Size M	Size L
Weight [kg]	21	25
Dimensions [mm]		