

ACH65/35

High Voltage Motor Controllers for Hybrid and Electric Vehicles

Inmotion Technologies is a premier global supplier of AC drives and related products to the vehicle industry. With experience from a large installed base of high voltage inverters for hybrid vehicles currently in operation around the world, Inmotion now launches its second generation high power motor controllers.

ACH high voltage motor controllers are designed for use in large hybrid or fully electric vehicles. The ACH is designed for voltage levels from 100 V to 750 V, with continuous power levels of up to 300 kVA. With a rugged design, the ACH is the ideal choice for both on-highway and off-highway applications.



Size M 35M30
65M30



Size L 35L70
65L50

PRODUCT FEATURES

- **Best in class quality and reliability**, achieved through superior design and world class manufacturing processes, backed up by field experience
- **Rugged IP6K9K design** suitable for the demanding environment of electric vehicles
- 4-quadrant, synchronous or asynchronous AC motor control, with **speed, torque and DC-voltage control modes**
- **Field proven control SW platform** used for on-highway and off- highway vehicles
- Software quality is assured through development and review processes designed for compliance with **Automotive SPICE®**
- ISO 26262 ASIL C torque supervision
- CAN communication, **J1939** and/or **CANopen** with support for diagnostics and software download
- With **continuous power levels up to 300 kVA**, the ACH is ideally suited for hybrid as well as fully electric vehicle applications
- Nominal voltage 350 V/650 V. **Fully operational** from **100-450 V/100-750 V** bus voltage
- Liquid (WEG) cooled

Continues

PRODUCT FEATURES (continued)

- **Automatic protection** against overheating and over-voltage
- Redundant Discharge of DC-capacitors
- **Internal EMI filtering** of the dc-bus eliminates interference with other electronic equipment and allows **parallel operation** of several ACH controllers
- Powerful standard firmware features as well as **extensive software configurability** ensures optimal system functionality
- Designed for a working life in excess of 60 000 hours
- Extensive and powerful event handling and data logging simplifies troubleshooting and **minimizes vehicle down time**
- Hazardous Voltage Interlock Loop (HVIL) for personal safety
- Optional adapter kit for pre-assembly of shielded high voltage cables

OPTIONAL ADAPTER KIT



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

Part number for AC and DC adapter kit Inmotion: 84J01100B01

The adapter kit consists of:

- AC adapter plate
- DC adapter plate
- Cable glands (suitable for shielded 50 or 70 mm² 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 ¹	> 98 %
Logic supply voltage	9-28 V

¹ 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) @ 20l/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 ² [ARMS]	Cont. current ³ [ARMS]	Peak power ⁴ [kVA]	Cont. power ⁴ [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

² 60 sec rating at 4 kHz switching frequency and 25°C ambient temperature

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

⁴ 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]		