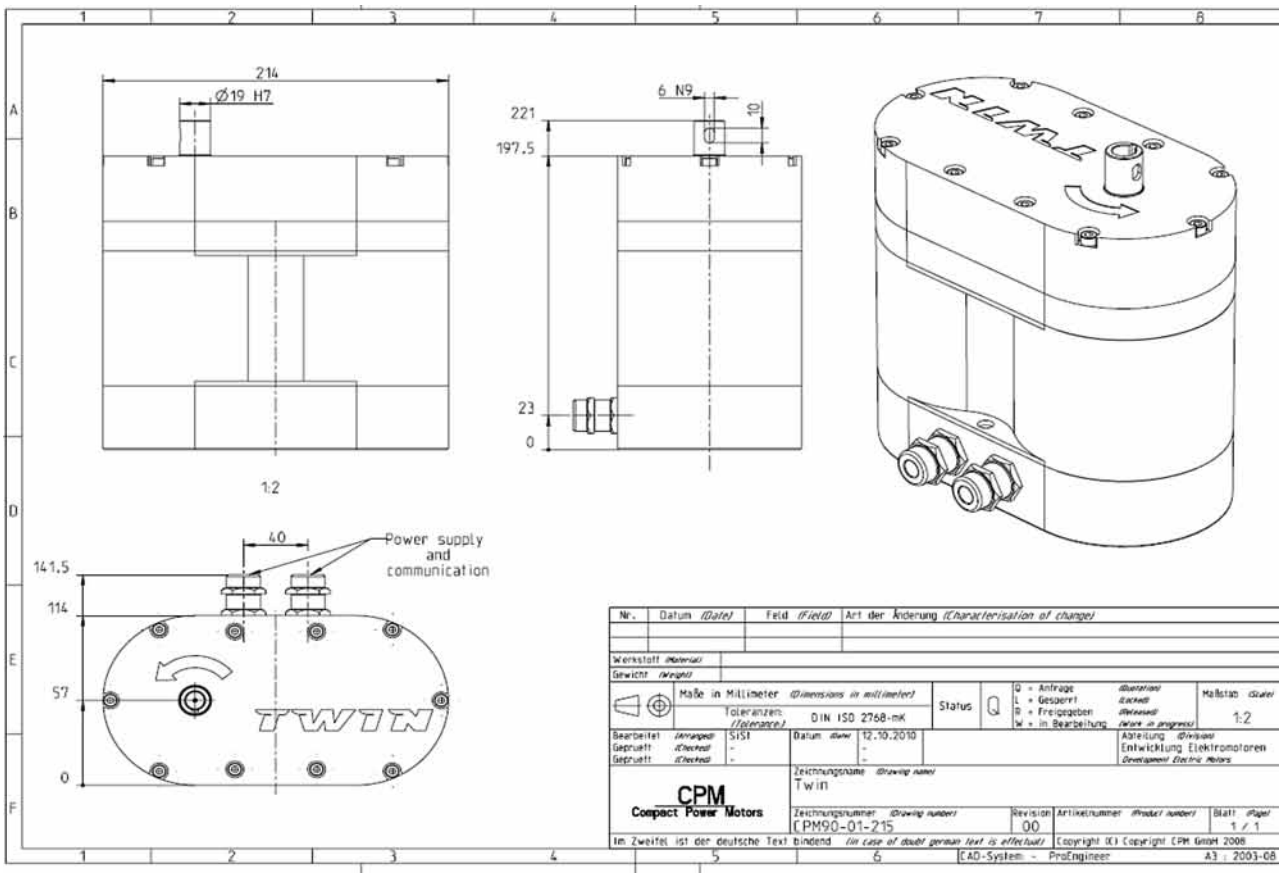
Power Pack 48V-CPM90-Twin45-6000-L (E1)

CPM
COMPACT POWER MOTORS

6 kW (12 kW peak), nominal voltage 48 V, 6000 rpm, 30 Nm
Application: Light electric vehicles (65 km/h)

– air cooled –

Dimensions



Main data Power Pack

1	Nominal power	W	6000
2	Peak power	W	12000
3	Weight	kg	8
4	Voltage	V	48
5	Idle speed w/o flux weakening	1/min	4500
6	Top speed w/flux weakening	1/min	6000
7	Peak torque	Nm	30
8	Resistance phase-phase (20°C)	mOhm	23
9	Winding inductance phase-phase	µH	70
10	Torque constant	mNm/A	75
11	Speed constant	min^{-1}/V	94
12	Rotor moment of inertia	gcm^2	13000
13	Thermal resistance coil-housing	K/W	0.35 – 0.25*

* 0.35 at 0 rpm, 0.25 at 4800 rpm, requires aluminium housing to cover rotor, for details see **"CPM 90 integration guide"**

Main data integrated power electronics			
1	Power MOSFET type	/	BSC060N10NS3 G
	Max. voltage V_{DS}	V	100
2	Max. supply current (continuous)	A	200
	Max. supply current (pulse 10 sec)	A	300
3	Max. phase current (continuous)	A	360
	Max. phase current (pulse 10 sec)	A	450
4	Max continuous phase current for lifetime – 10000 h (45°C/85°C) – 40000 h (45°C/85°C)	 A A	 350/100 350/230

Specification

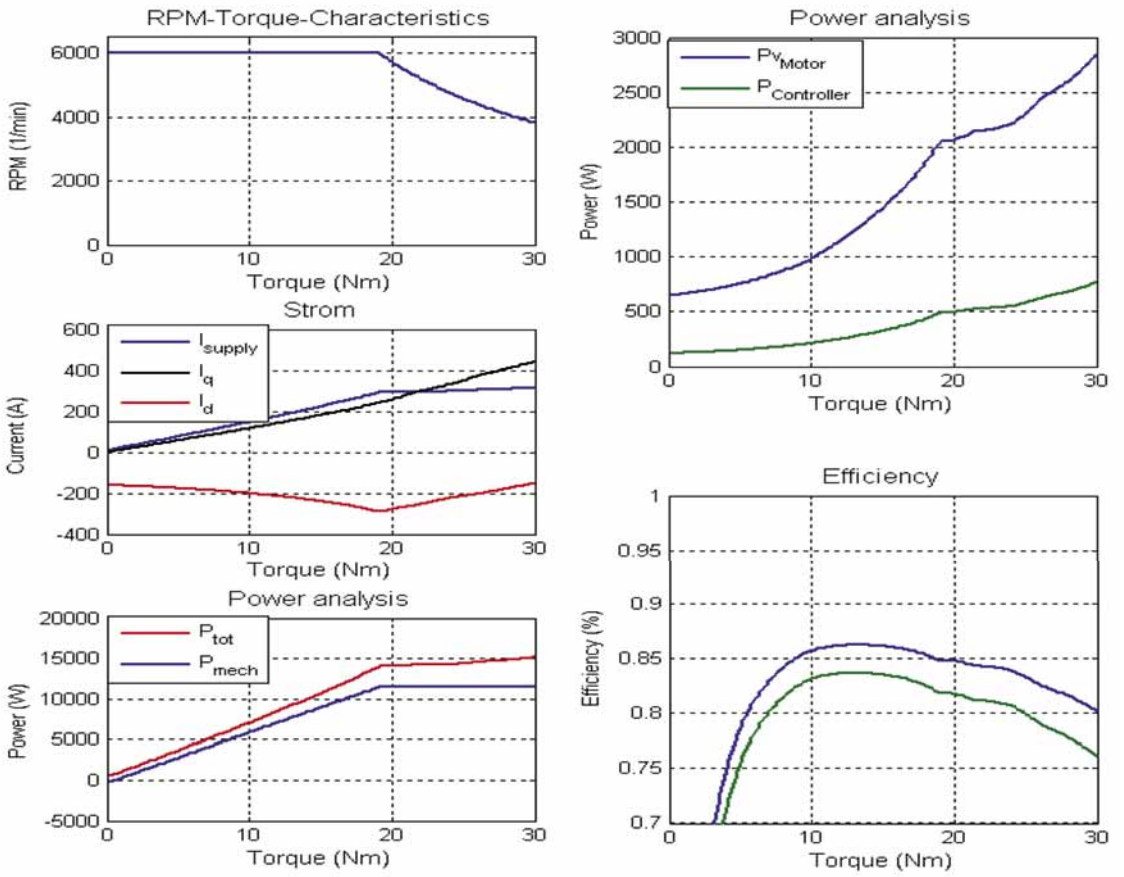
- Max. housing temperature: 85°C
- Ambient temperature: -40 to 80°C
- Max. coil temperature: 180°C (temperature class H)
- Max. load:
  - axial: 100 N,
  - radial (10 mm from rotor): 500 N
- Max. torque load on shaft-rotor connection: 50 Nm
- Compliance with UL94V0 standard
- Norms: EN60664-1, EN61000-X-X EMV, ECE-R-100
- IP 55, IP 67 upon request

Controller/sensor

- Control:
  - Field oriented sinus commutation
  - Space vector modulation (13.5 % higher performance as compared to sinus commutation)
  - Adaptive flux weakening control
  - Torque control with speed limitation
  - Power/battery current control
  - Recuperation and downhill protection
- Specific software and electronic hardware solutions for
  - E-mobility without recuperation
  - E-mobility with recuperation with system protection (recuperation at battery at full SOC, downhill)
  - APU control
- Comprehensive monitoring (i. e. motor temperature, pcb temperature, etc.) and emergency switch-off function
- Interfaces:
  - CAN
  - 3 digital and 2 analog I/O
- High resolution angular sensor (absolute position of rotor)
- CPM motion workbench software for parameterization, debugging and data logging
- **Optional:** Integrated module for soft-start and supply power disconnection

Power pack characteristics at max torque / max. power *

M45-12n48V, TempC: 80°C, TempR: 60°C, U:48 Spule: n:12 n_P:2P, Rcu_{Ph-Ph}: 28.4mOhm

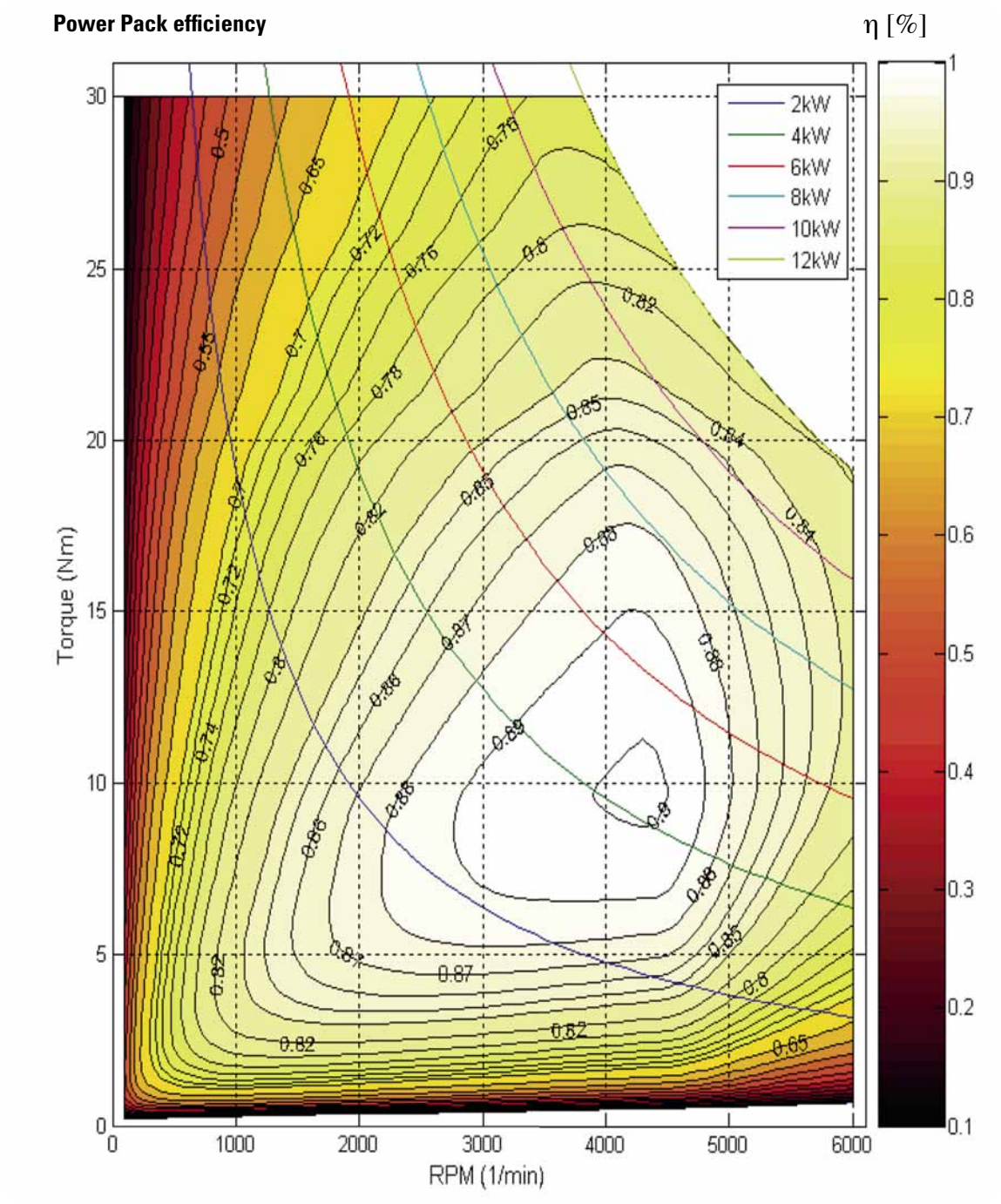


Legend:

I_{supply}	A	Current from energy source (battery, power supply)
I_q	A	Torque determining current
I_d	A	Flux weakening current
P_{tot}	W	Power input motor and electronics
P_{mech}	W	Mechanical power output motor
Pv_{Motor}	W	Power loss motor
$P_{Controller}$	W	Power loss electronics
eta_{total}	%	Total efficiency (motor + electronics + wire)
eta_{Motor}	%	Efficiency motor

*Note:
The characteristics have been determined under warm conditions at a coil temperature of 80°C, a rotor temperature of 60°C, tested in conjunction with our proprietary CPM controller. Due to tolerances the performance data may deviate +/-5 % from the specified data due to production tolerances.

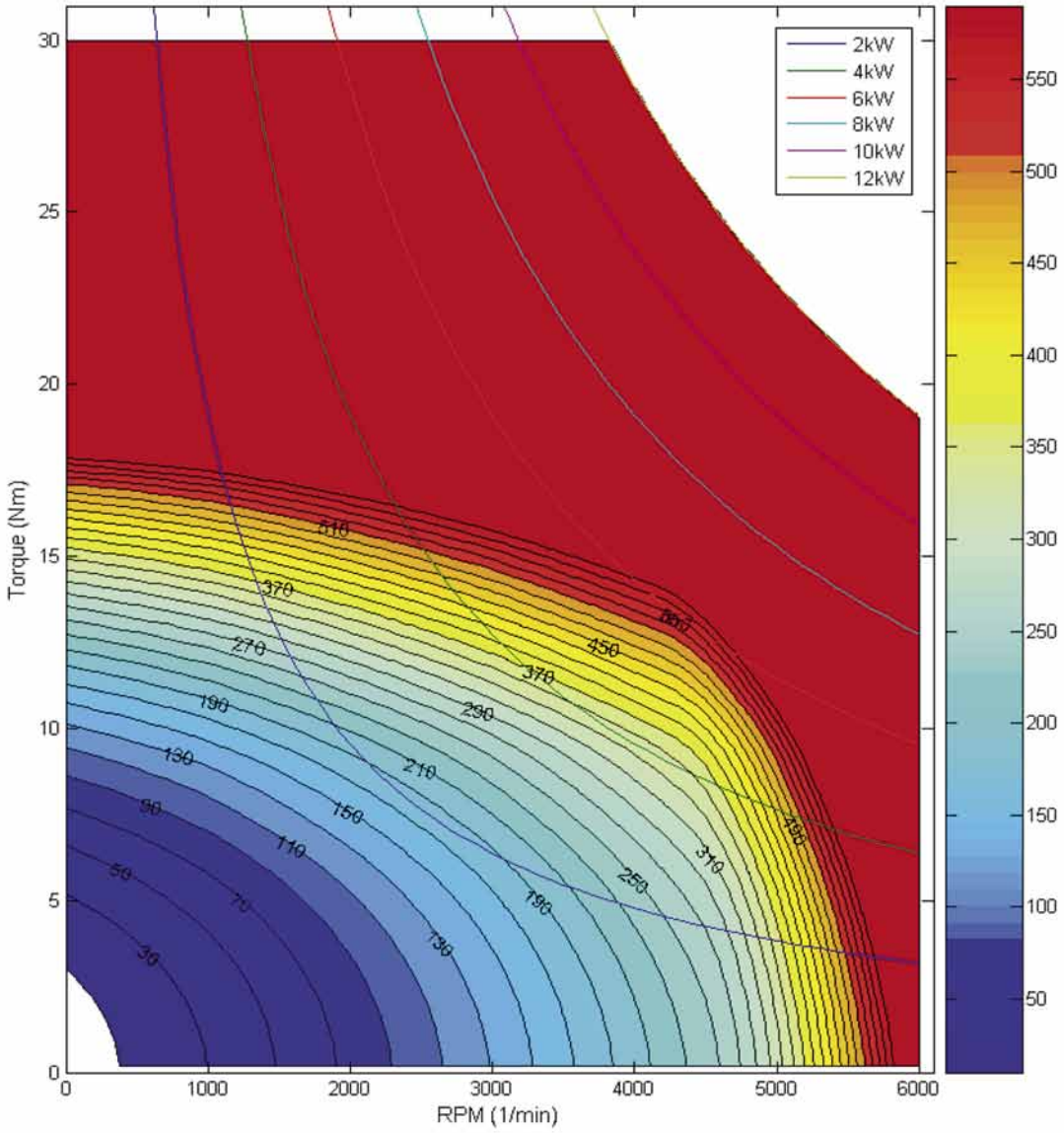
Power Pack efficiency map*



*Note:
The efficiency map has been determined based on measurements under warm conditions at a coil temperature of 80°C and a rotor temperature of 60°C tested in conjunction with our proprietary CPM controller. The performance data may deviate from the specified data due to production tolerances.

Power Pack thermal limits*

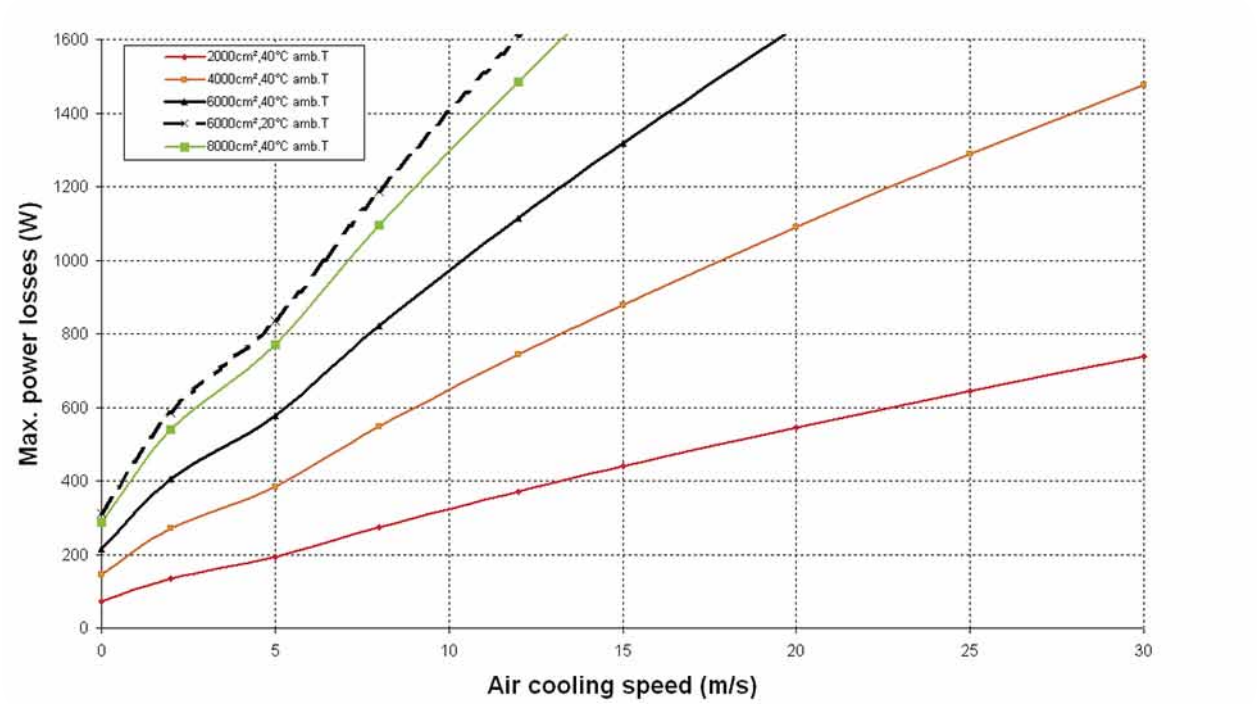
Power losses at continous power/operational limits (W)



*Note:
Taking into account the thermal resistance at 4800 rpm, specified on page 1, a maximum coil temperature of 160°C and a housing temperature of 85°C (max. temperature of integrated electronics for max. power). AT lower housing temperatures a higher continuous power can be reached, at higher housing temperatures the power pack is still operational, but with reduced power.

Thermal design suggestions*

Air cooling limits dependent of housing surface



*Note:
Surface is specified as effective surface exposed to air flow
Suggested surface: 6000 cm² + use of baffle plates for efficient use of vehicle air flow, it is strongly suggest to oversize surface to achieve better cooling conditions for motor and controller