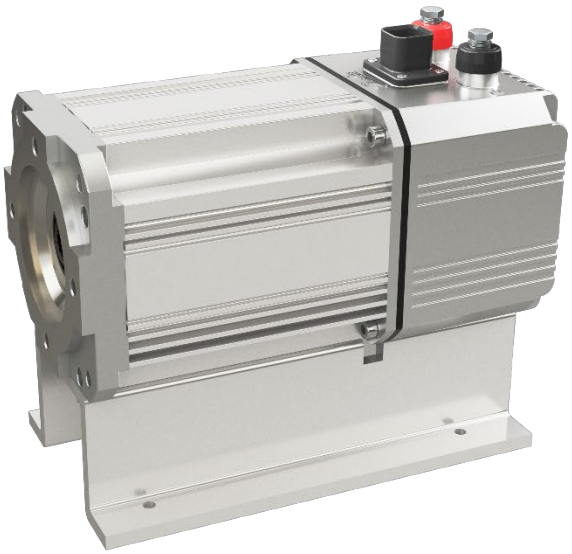
ENGINEERING TOMORROW

Technical Information

ePowerpack

ePowerpack, ED-EP130



Revision date	Change information	Version number
2022/07	Version 1	0101
2024/02	Product type adjusted	0102
2024/07	Product naming unified Gear pump option deleted New options published	0201

Overview

This document is used to introduce the technical information of Danfoss ED-EP130 (hereinafter referred to as EP130) ePowerpack.

Product naming rules

The product model reflects the size and electrical characteristics of the ePowerpack. The following naming conventions are used to indicate the ePowerpack model:

- ED-EP130-T22-24V-4000

Naming code of ePowerpack

Name component	Meaning
ED	Electric drive assembly
EP	ePowerpack
130	Motor outer diameter /mm
T22	Maximum torque /Nm
24	Rated voltage /V
4000	Maximum speed /rpm

Features

EP130 is specially developed for light-load applications. Compared with traditional products on the market, it is more efficient, reliable and compact.

- With built-in permanent magnet synchronous machine (IPM) and motor controller (MCU), it is configured with bottom angle
- Just connect the power cord and CAN bus/analog control line
- The motor speed can be controlled by CAN-bus or analog signal to meet the flow demand
- Freely configurable debugging parameters and power curve
- IP67 rated, no fear of severe working conditions
- It can work at the ambient temperature of -40°~65°.

EP130 uses permanent magnet synchronous motor technology;

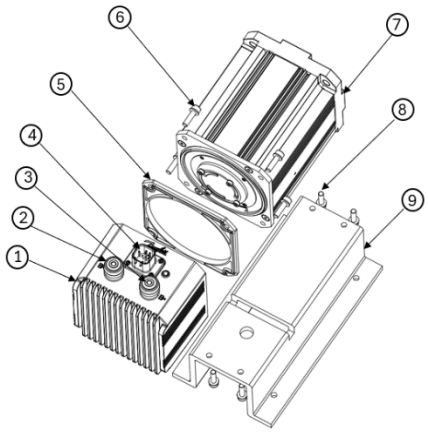
- The magnetic field is generated by the permanent magnet, which avoids generating the magnetic field through the excitation current. It has high power density and low excitation loss.
- Wide operating speed range, supporting efficient operation
- Embedded structure, reliable and stable
- Small starting current and large torque; small torque ripple delivers stable operation
- Compared with the brushed DC motor, the system is maintenance-free, without changing the carbon brush
- Compared with the standard permanent magnet motor, the speed and torque capacity are expanded, and the starting current is small and the torque is large.

Application Scenario

- Scissor lift platform
- Electro-hydraulic actuator (EHA)
- DC power supply ePowerpacks of various types of hydraulic subsystems

General introduction and instructions for use

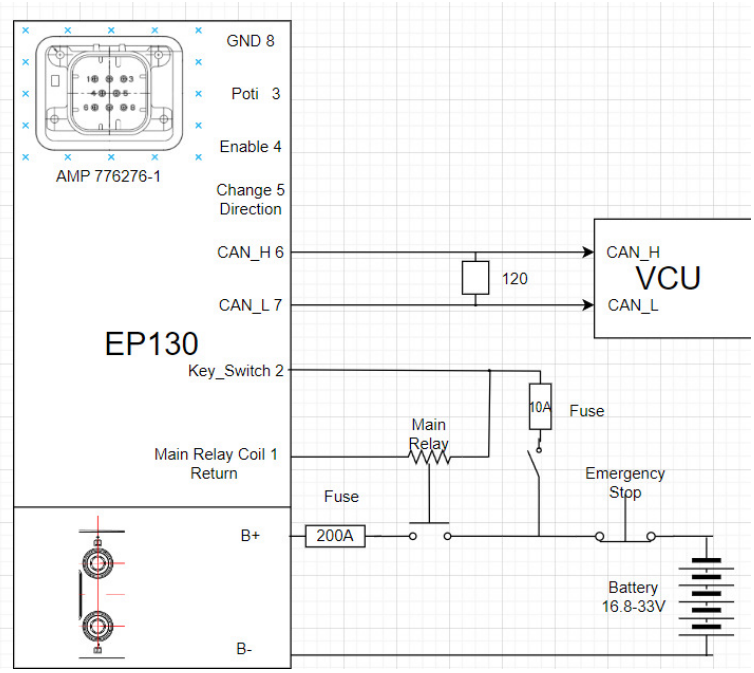
Main components



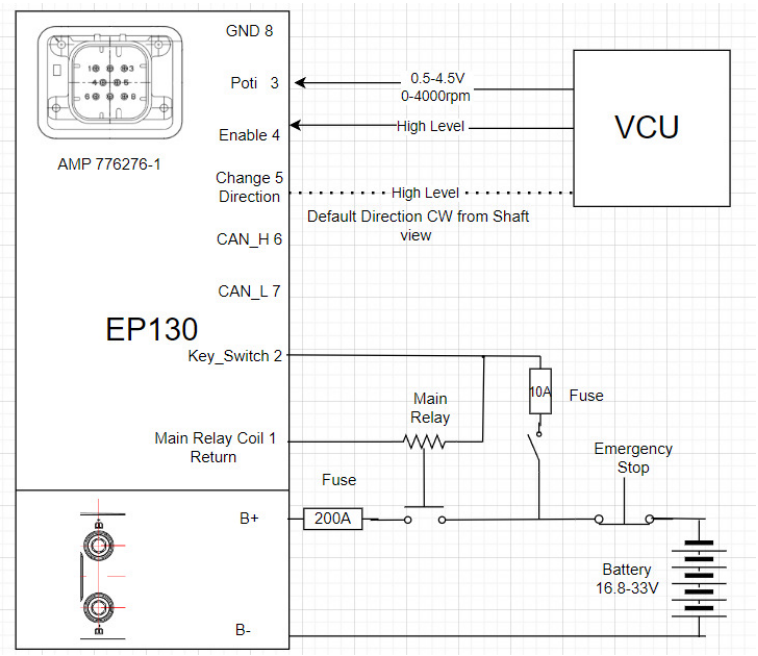
Serial Number	Name of Component
1.	Motor controller body
2.	Battery powered negative terminal B-
3	Battery-powered positive terminal B+
4.	I/O signal interface
5.	Washer
6.	Motor fixing bolt
7.	Motor body
8	Footing fixing bolt
9	Footing

ePowerpack control wiring diagram

EP130 has two typical wiring modes, namely, a typical CAN bus wiring diagram and a typical analog control wiring diagram, as shown in the following figure:



EP130 Typical CAN Bus Wiring Diagram



EP130 Typical Analog Control Wiring Diagram

The controller has two power interface terminals and a signal connector. The power interface terminal is used to provide bus voltage for the controller and is the power source of the whole power system. **I/O** signal connector is used for low-voltage signal transmission such as key switch power supply and CAN communication instruction.

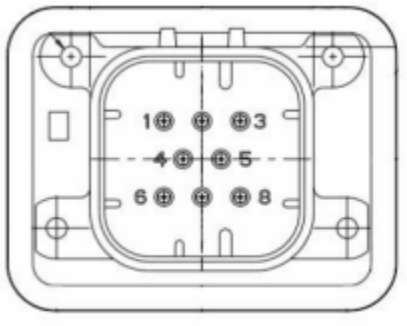
The controller uses double MCU master control chip control system, MCU1 is used for motor control, and MCU2 is used for functional safety detection and vehicle information interaction, which improves the real-time performance of motor control and system security. The control system is configured with two strategies: overcurrent hardware protection and software protection, which has higher timeliness than the conventional single software protection strategy, thus reducing the failure rate of electronic control of the motor. The isolated CAN circuit is adopted to reduce the influence of external interference on the controller system.

Power interface terminal post:

- B+ battery powered positive terminal
- B- battery powered negative terminal
- For B+ and B-, the recommended wire diameter is 35mm², and the M6 bolt torque is 7~8 Nm.

I/O signal interface:

EP130 uses 8 Pin AMP 776276-1 connector, and the pin diagram is shown below.



See the Pin Information Configuration Table for the pin definition

Number of pins	Type	Name	Description
1	Input	Main Relay Coil Driver	Main relay drive (connected to the negative end of the relay drive)
2	Input	Key Switch	Key input switch
3	Input	Pot Wiper	Analog throttle signal input (0 - 5 V)
4	Input	ENABLE	Enable signal input
5	Input	DIRECTION	Direction signal input
6	/	CAN_H	CAN communication bus high end
7	/	CAN_L	CAN communication bus low end
8	Input	I/O GND	I/O ground reference signal

I/O signal cable

For low-voltage signal input cables, it is recommended to use cables of 0.5mm2 or above, and AMP776286-1 is recommended for corresponding female connectors.

The low-voltage signal wire should be kept away from the power cable as far as possible, and the distance between the two cables should be 100mm as far as possible.

To avoid signal interference, it is recommended not to connect any signal ground wire onto the vehicle frame (even if it is allowed in EN1175-1 that the ground wire of the signal cable can be connected to the vehicle frame in a 24 V system)

When the controller is working, there is a great current flowing on the bus of the motor controller. Even if the power cable with reasonable wire diameter is used, there will be a significant voltage drop between the negative terminal of the battery and the negative terminal of the controller, which means that there may be a voltage difference between the GND reference grounds of different units in the whole control system. Therefore, it is strongly recommended that all the input/output

pins of the sensors provided by the motor controller be directly connected to the corresponding input/output of the controller. The signal wires should not be connected at will, which will result in the instability of the whole system.

In order to avoid electromagnetic interference on CAN bus, it is suggested that twisted pair be used as CAN connecting wire, and CAN wiring should be far away from power cable, and cross at right angles when necessary, instead of parallel wiring.

Tightly connect the controller and the battery together using high quality copper wiring terminals and well-insulated copper wires in accordance with the recommended torque value.

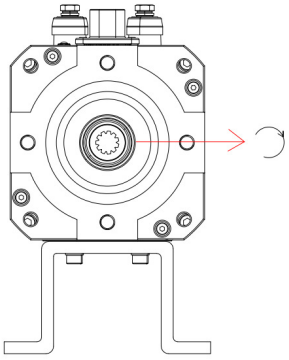
To achieve optimal anti-electromagnetic interference performance, do not cross the battery cable (B+, B-) through the central part of the controller as much as possible.

In case that there are multiple high current electricity-consuming units in the system, please connect the negative end of the electricity-consuming unit to the negative terminal of the battery in a star connection mode.

MCU built-in general software

EP130 software not only supports CANopen protocol control, but also supports analog control mode. The platform has a built-in universal program, and the initial settings are as follows:

- CANopen standard protocol
- External main relay is enabled by default.
- The rotation direction of the motor can be changed through relevant settings, and the default rotation direction is right, as shown below.



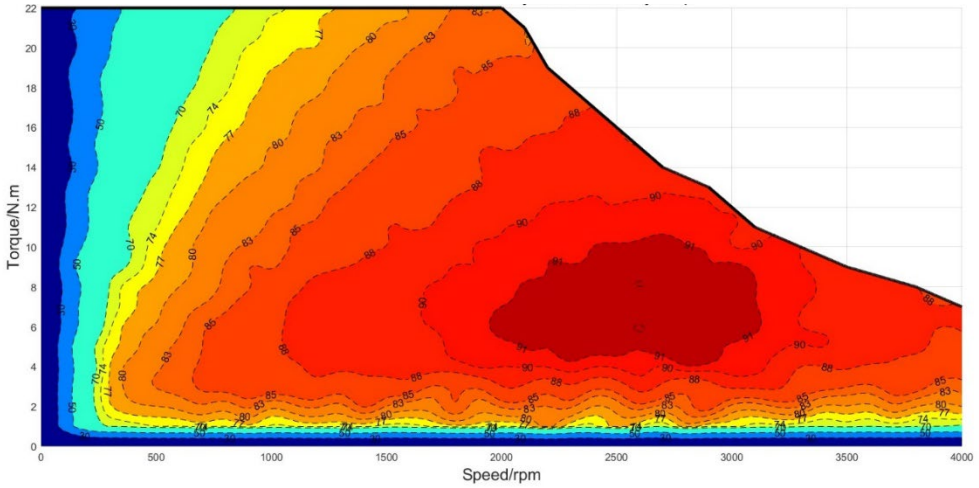
General program can’t meet all application requirements. If you have special requirements, please contact Danfoss representative for more support.

Technical information of published products

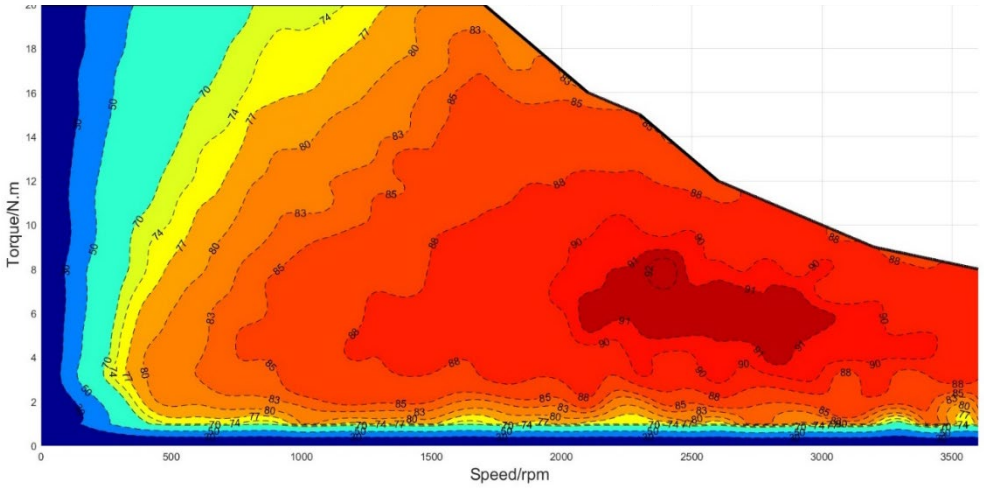
Technical parameters

Technical parameters	ED-EP130 -T22-24-4000	ED-EP130 -T20-24-3600	ED-EP130 -T29-48-4000
Rated voltage (VDC)	24	24	48
Operating voltage (VDC)	16.8-33	16.8-33	38.4-57.6
Bus rated current @ Rated voltage (ADC)	135	92	90
Bus maximum current @ Rated voltage (ADC)	220	180	150
Rated phase current @S2-60min (Arms)	110	65	80
Maximum phase current @S2-30S (Arms)	220	200	200
Rated torque (N.m)	9.6	6.3	13.0
Maximum torque (N.m)	22.0	20.0	29.0
Rated speed (rpm)	3000	3000	3000
Maximum speed (rpm)	4000	3600	4000
Power @S2-60min (kW)	3.0	2.0	4.0
Power @S3-55% (kW)	3.5	2.5	5.0
Control mode	Speed	Speed	Speed
Speed request	CAN /Throttle	CAN /Throttle	CAN /Throttle
Cooling method	Natural cooling	Natural cooling	Natural cooling
Weight (kg)	13.5 kg	11.3 kg	13.5 kg
Overall dimension L x W x H (mm)	269*138*232.5	224*138*232.5	269*138*232.5

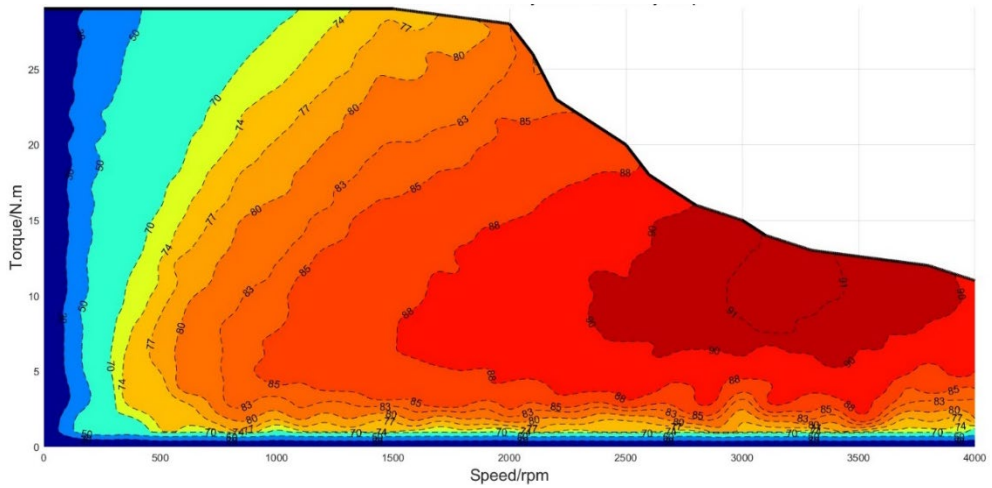
Efficiency Diagram



ED-EP130-T22-24-4000 Efficiency Diagram

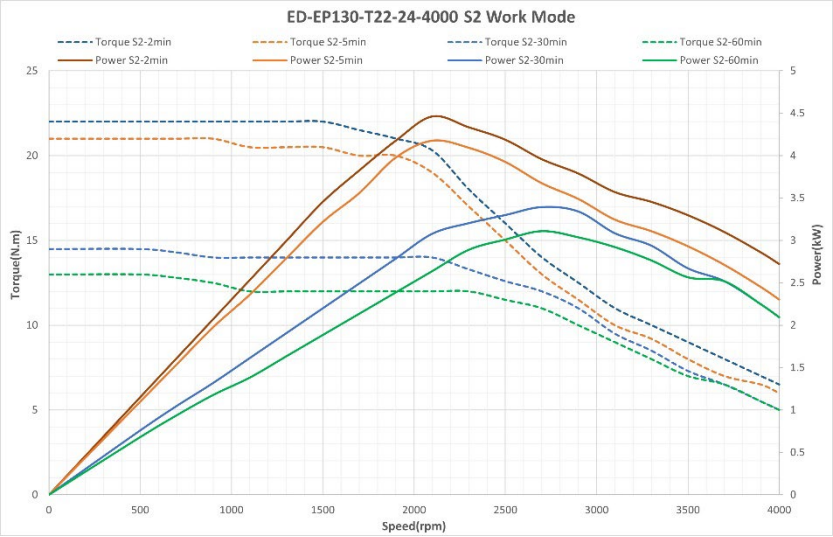


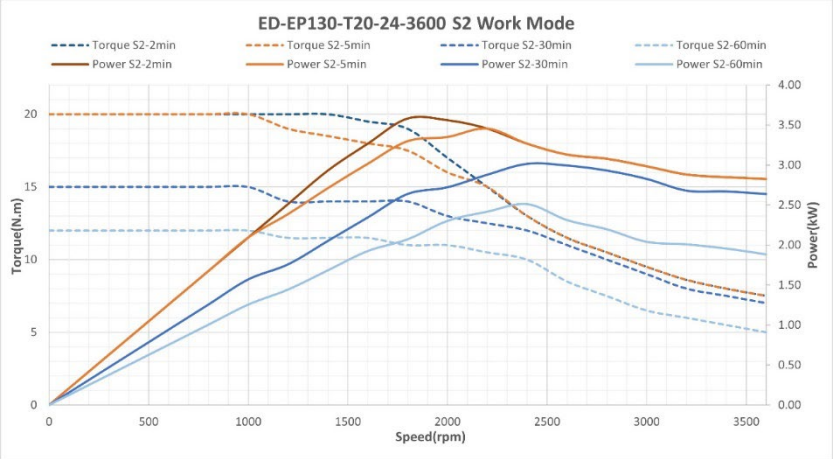
ED-EP130-T20-24-3600 Efficiency Diagram

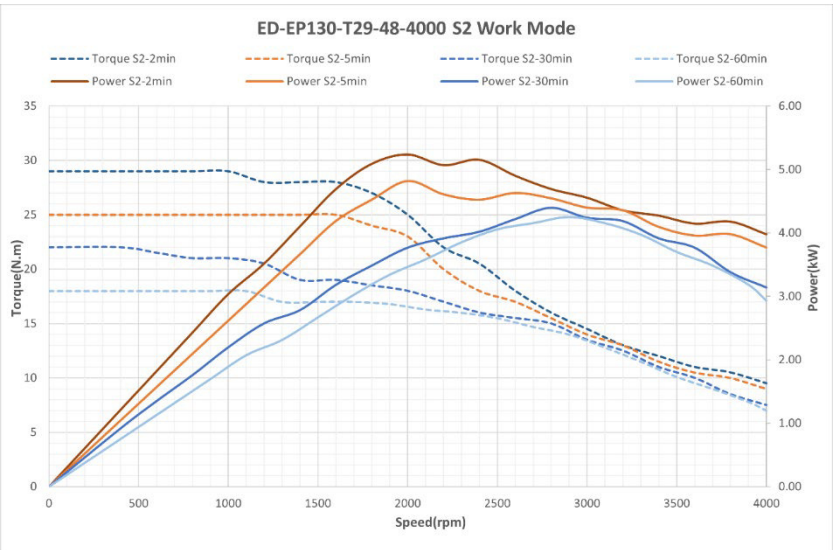


ED-EP130-T29-48-4000 Efficiency Diagram

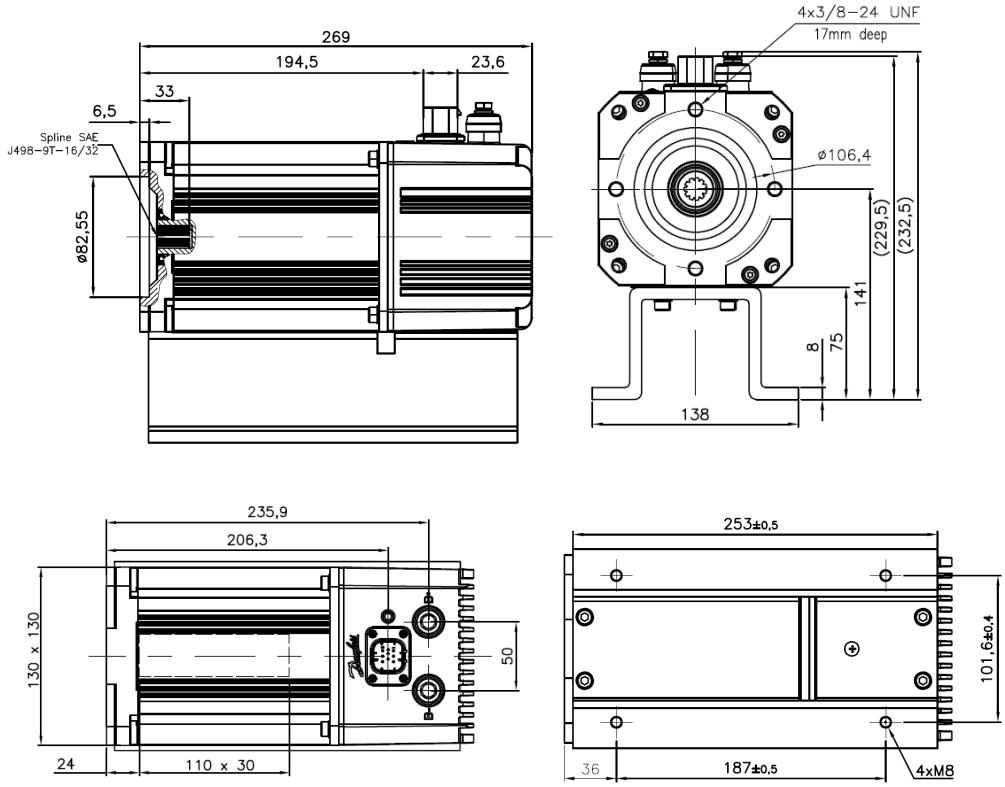
External characteristic curves under different working systems



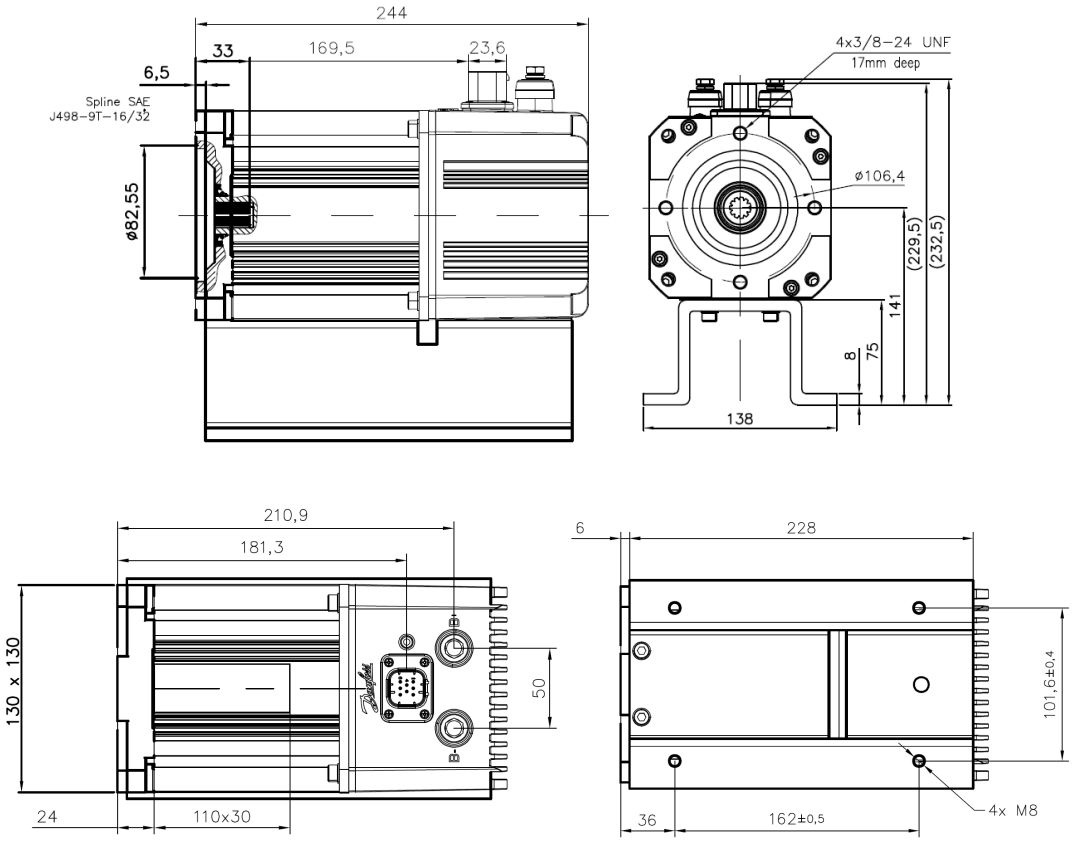




Dimensions:



ED-EP130-T22-24-4000, ED-EP130-T29-48-4000



ED-EP130-T20-24-3600