



External fan (F) IC416 TEBC

Typical cases of use are drive units which are controlled by a **frequency inverter**, which are under full torque at low speeds for long periods of time, or drive units in cyclical operation with high switching frequencies (operating mode S4). The external fan is integrated into the fan cowl of the three-phase motor.

For the dimensions of the extension, please refer to ⇒ C36-37.

Care must be taken that the external fan is connected separately from the three-phase motor. The motor should also be equipped with a temperature sensor to protect it against failure of the external fan.

Type suffix **F** = External fan with protection class IP66 with separate terminal box (⇒ A50 Cable glands)

External fan are suitable for 50 Hz and 60 Hz, it is to noted the specified voltage (note the type plate from external fan).

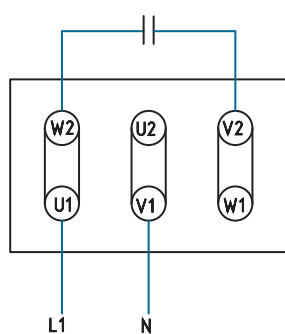
For single phase operation			For three-phase operation		
Steinmetz circuit	230V - 277V	50 + 60 Hz	Star circuit	346V - 525V	50 Hz
			Delta circuit	200V - 303V	50 Hz
			Star circuit	380V - 575V	60 HZ
			Delta circuit	220V - 332V	60 HZ

As standard, external fans for sizes 63 - 90 are connected for single phase operation. For sizes 100 and larger, they are connected for three-phase operation.

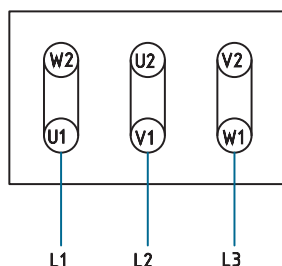
Type	1~, 50 Hz				3~, 50 Hz Δ / Y					
	U_N [V]	I_N [mA]	P_N [W]	n_N [min ⁻¹]	$U_{N\Delta}$ [V]	$I_{N\Delta}$ [mA]	U_{NY} [V]	I_{NY} [mA]	P_N [W]	n_N [min ⁻¹]
63	230 - 277	88 - 106	19 - 27	2830 - 2875	200 - 303	60 - 116	346 - 525	35 - 66	16 - 28	2630 - 2900
71	230 - 277	90 - 104	20 - 27	2768 - 2866	200 - 303	62 - 112	346 - 525	36 - 64	15 - 31	2680 - 2875
80	230 - 277	99 - 107	22 - 29	2625 - 2780	200 - 303	66 - 109	346 - 525	38 - 62	18 - 31	2582 - 2818
90	220 - 277	215 - 293	41 - 65	2885 - 2923	200 - 303	180 - 379	346 - 525	104 - 219	36 - 91	2860 - 2931
100	220 - 277	223 - 282	46 - 66	2820 - 2888	200 - 303	182 - 372	346 - 525	105 - 215	43 - 91	2800 - 2906
112	220 - 277	252 - 284	54 - 71	2705 - 2845	200 - 303	191 - 353	346 - 525	110 - 204	50 - 97	2730 - 2880
132	230 - 277	220 - 281	41 - 61	1450 - 1460	200 - 303	189 - 376	346 - 525	109 - 209	31 - 81	1435 - 1466
160	230 - 277	351 - 446	64 - 93	1438 - 1460	200 - 303	318 - 622	346 - 525	184 - 346	51 - 118	1415 - 1456
180	230 - 277	351 - 446	64 - 93	1438 - 1460	200 - 303	318 - 622	346 - 525	184 - 346	51 - 118	1415 - 1456
200	230 - 277	351 - 446	64 - 93	1438 - 1460	200 - 303	318 - 622	346 - 525	184 - 346	51 - 118	1415 - 1456
225	-	-	-	-	200 - 400	490 - 1100	346 - 525	290 - 350	142 - 285	1330 - 1455
250	-	-	-	-	200 - 400	490 - 1100	346 - 525	290 - 350	142 - 285	1330 - 1455

External fans cool the motor regardless of the motor speed and with appropriate circuitry also when the motor is switched off.

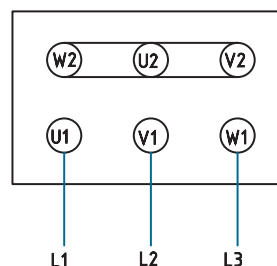
Circuit diagrams for external fans



Single phase operation
Steinmetz circuit
230V - 277V 50 + 60Hz



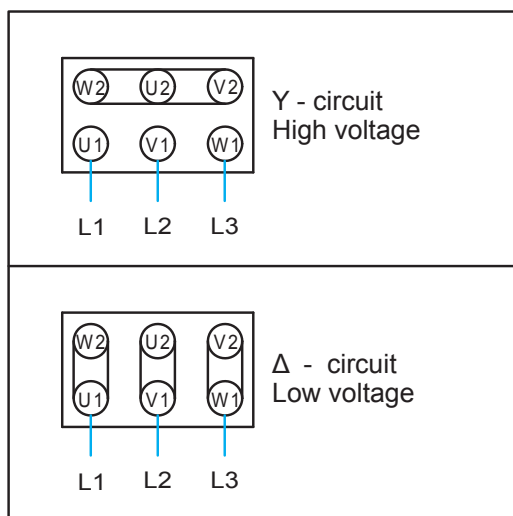
Three-phase operation
Delta circuit Δ
200V - 303V 50Hz
220V - 332V 60Hz



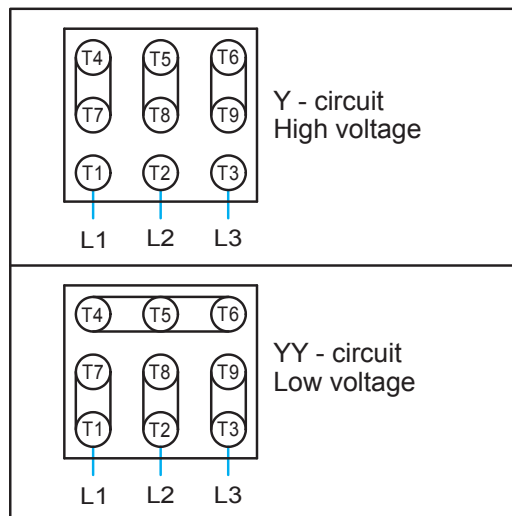
Three-phase operation
Star circuit Y
346V - 525V 50Hz
380V - 575V 60Hz



Three-phase motor

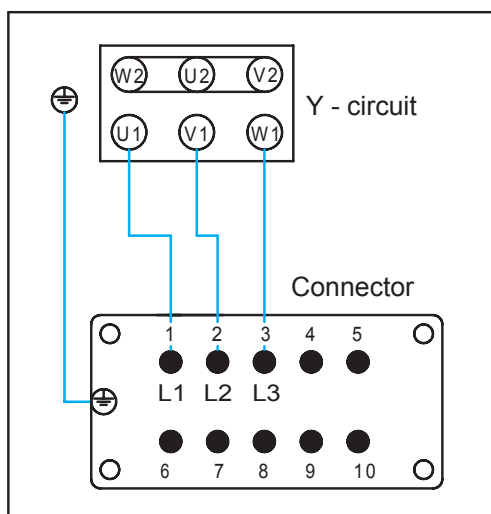


Three-phase motor NEMA (230 / 460V)

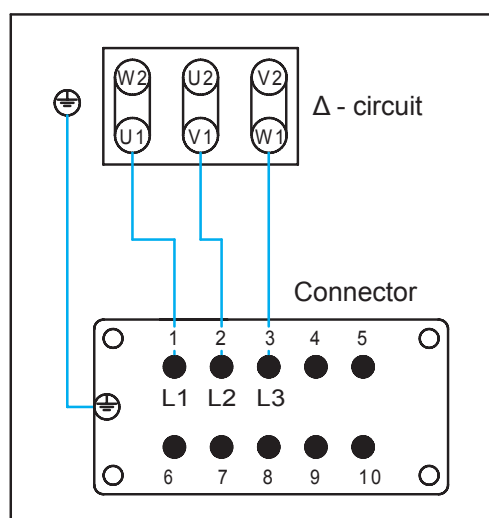


with motor plug connector (MS)

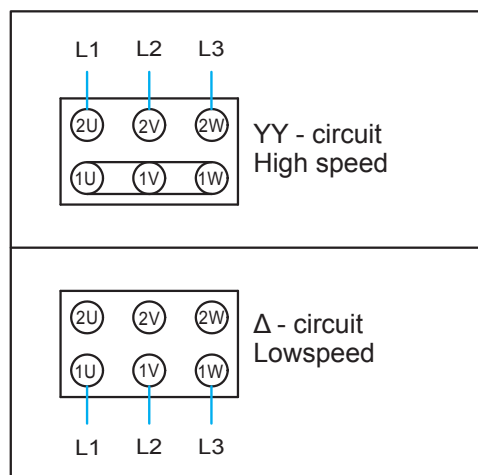
400 V - Star circuit Y



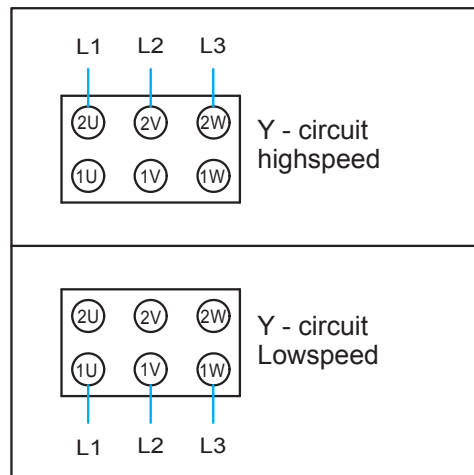
400 V - Delta circuit Δ



Three-phase motor, switchable pole Dahlander pole switching



Three-phase motor, switchable pole separated windings





Thermal motor protection

A good selection of the motor protects it against overheating due to the application or ambient conditions. Factors which may cause the motor to overheat are e.g. high ambient temperatures, restricted flow of cooling air and low motor speeds as a result of inverter operation. NORD can supply two heat protection components for an extra charge

- **TW** = Bimetal temperature sensor
- **TF** = Thermistor temperature sensor

These are used to directly monitor the temperature of the windings with full utilisation of the motor power.

Three (one in each line) series-connected temperature sensors or thermistors are located at the hottest parts of the windings. Their connections are made to 2 terminals in the terminal box.

⚠ For frequency inverter operation, heavy starting, switched operation, high ambient temperatures restricted cooling etc. the use of a temperature sensor or thermistor is urgently recommended.

Thermostat (TW)

(Other common designations: thermal opener, Klixon, bi-metal opener)

The temperature sensor is and encapsulated, miniature bi-metal switch, which is normally designed as an opener.

It must be connected so that the self-holding of the motor circuit breaker is interrupted when the switching temperature is reached. The circuit breaker then triggers and switches the motor off.

The temperature sensor only closes its contacts again after there has been a considerable reduction in temperature.

Triggering temperature: 155° C

Nominal current: 1.6 A at 250 V

Switch version: opener (terminals TB1 + TB2)

Also available as 2 x **TW** for warning and shut-down!

Temperature sensor (TF)

(Other common designations: Thermistor, thermistor temperature sensor, PTC thermistor)

The resistance of the temperature sensor increases suddenly by almost 10 x when the nominal triggering temperature is reached.

The thermistor temperature sensor can only fulfil its protective function if it is connected to a triggering device!

A triggering device evaluates the increase in resistance and switches the drive unit off.

Triggering temperature: 155° C

Max. voltage 30 V

Terminals TP1 + TP2

Also available as 2 x **TF** for warning and shut-down.

E.g.: 130°C = **Warning** , 155°C = **Shut-down**

NORD Three-phase motors

Standard NORD three-phase motors are self-cooled (with fan)

- Cooling type IC411 as per EN 60034-6

Overview of cooling types:

Designation	English abbreviation
IC410 without fan	TENV
IC411 Self-ventilated	TEFC
IC416 Externally ventilated	TEBC

For installation with restricted air supply, the following minimum distances must be complied with:

Length of motor + protective cover (LS) minus length of motor (L)
⇒ C24

For foot-mounted motors (version IM B3) **size 63** the feet are cast onto the housing. In this case, there is only one possible location for the 2nd terminal box (opposite to the feet). (⇒ C24 and above).

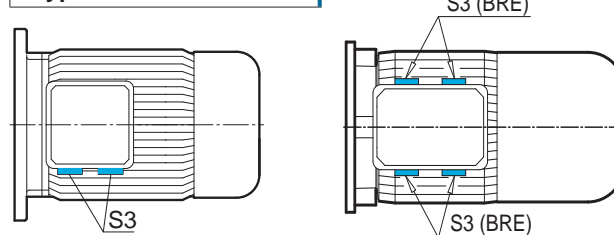
Please ask in case of series requirement for terminal box position 1 or 3.

With **size 71 - 180** the feet are screwed on. Here, the terminal box location 2 is the standard version, however locations 1 or 3 are possible.

⚠ According to the version, if possible the cable gland into the terminal box should enter from below!

Cable glands

Standard motor	Brake motor
Type 63 - 200	Type 63 - 132
Brake motor	
Type 160 - 200	



Type	S3	S3 (BRE)
63	M20 x 1,5	M20 x 1,5
71	M20 x 1,5	M20 x 1,5
80	M25 x 1,5	M25 x 1,5
90	M25 x 1,5	M25 x 1,5
100	M32 x 1,5	M32 x 1,5
112	M32 x 1,5	M32 x 1,5
132	M32 x 1,5	M32 x 1,5
160	M40 x 1,5	M40 x 1,5
180	M40 x 1,5	M40 x 1,5
200	M40 x 1,5	M40 x 1,5



PTC-Thermistor (Triple PTC resistor)

Design:

The PTC resistors used in NORD motors are a subassembly of 3 single resistors connected in series.

The resistors are made of barium titanate. The resistors are coated and isolated with a shrinkable tube.

Diameter of single resistor : $d \leq 3 \text{ mm}$

Resistance R at 25°C : $\leq 300 \Omega$

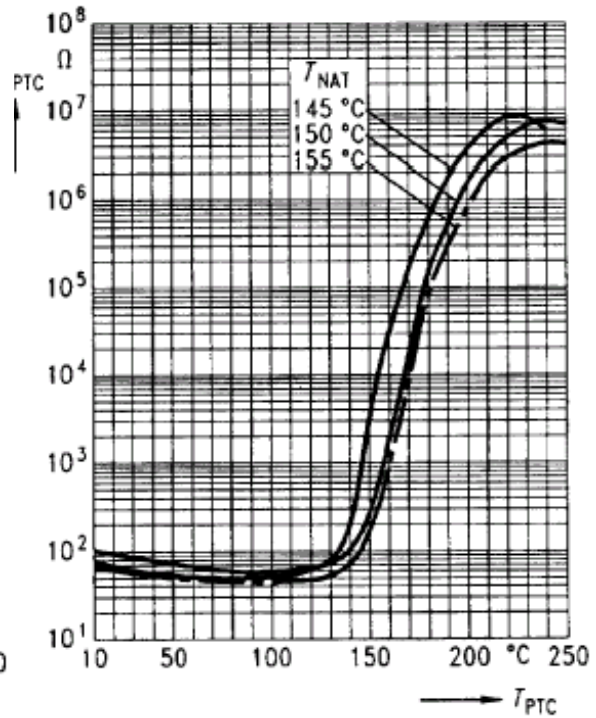
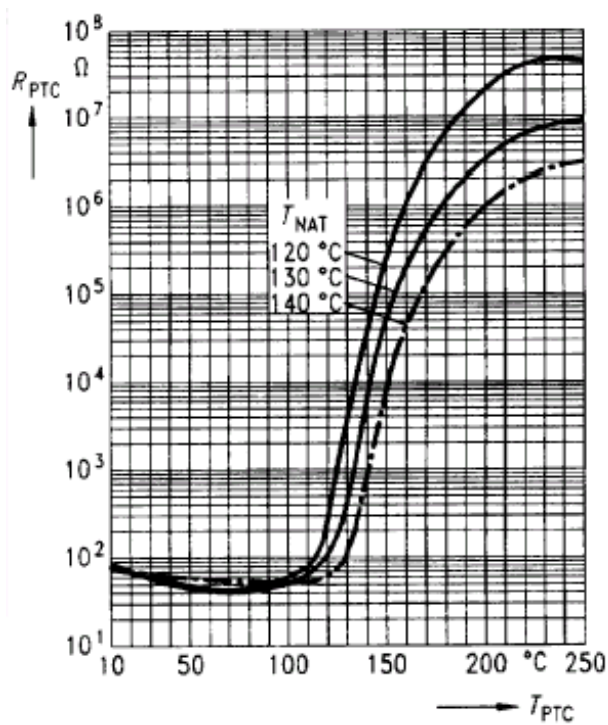
Colour-Code : NAT* 130°C \Rightarrow blue/blue
NAT* 155°C \Rightarrow blue/black

Test voltage : max. 30 V (do not exceed !)

R/T diagrams for single resistors. Multiply resistance figures listed by 3 to get total resistance of triple PTC thermistor.

NAT* 120°C,130°C,140°C

NAT* 145°C,150°C,155°C



* NAT = rated triggering temperature