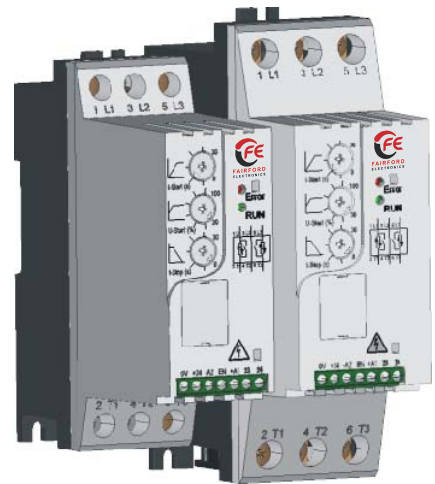


## **PFE - Low-cost Soft Starter for Small AC Induction Motors**

The PFE is the latest development from Fairford Electronics, who have 25 years of experience producing innovative designs in the soft start market.

With ratings from 2.2kW to 22kW, the PFE is ideally placed to support the majority of AC induction motors in use today. This makes the PFE the natural choice for distributors and customers alike.

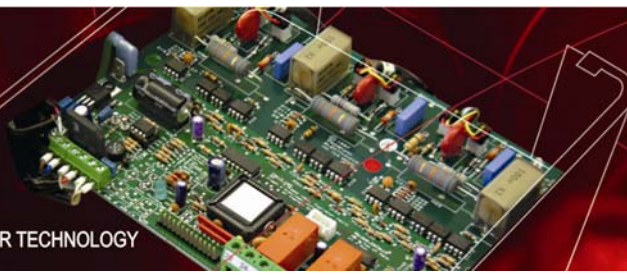
Benefiting from Fairford's excellence in engineering, the PFE combines the quality and reliability you have come to expect. This is one product that ticks all the boxes.



### **Main Features**

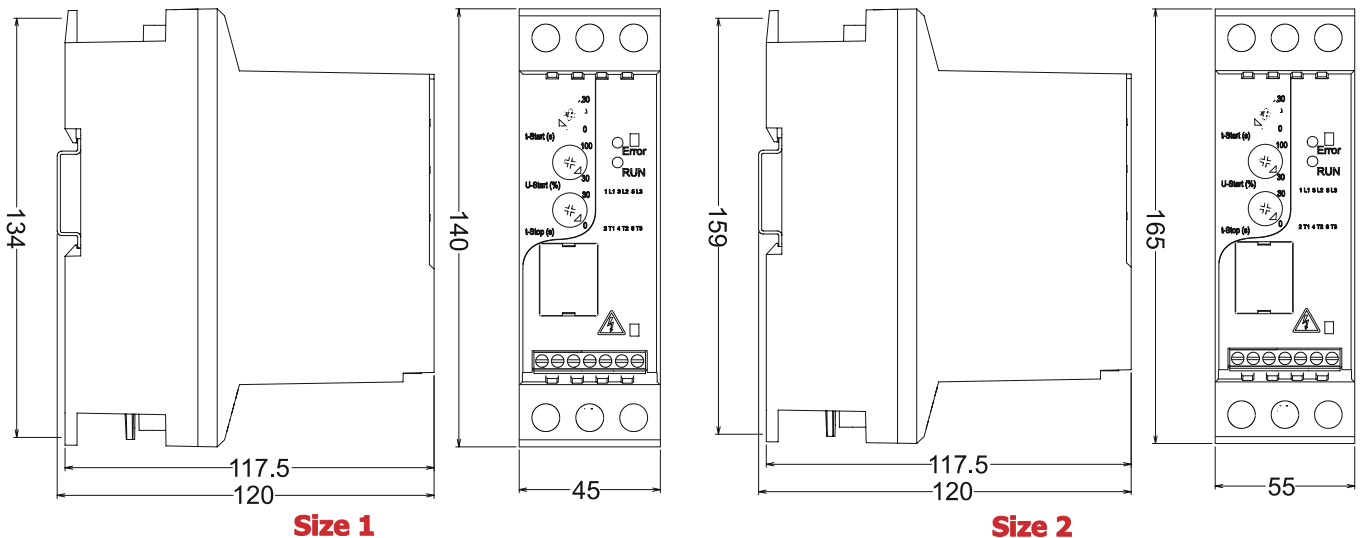
- ✓ Voltage: 230V AC - 460V AC
- ✓ Current: 5 - 41A (460V)
- ✓ Control Voltage: 24VDC
- ✓ Start Time: 1 - 30s
- ✓ Stop Time: 0 - 30s
- ✓ Start Pedestal Voltage: 30% - 100%
- ✓ Standard Duty: IE: AC53B : 3-5: 355
- ✓ Industry Standard 45mm width (up to 16A)
- ✓ DIN Rail Mounting
- ✓ Two Phase Control
- ✓ Internally Bypassed
- ✓ Over Current Protected
- ✓ Designed for: CE, UL, CSA, CCC
- ✓ OEM Labelling/Branding options

Model	Current (I)	Motor kW (400V)	Motor HP (460V)
PFE-02	5	2.2	3
PFE-04	7	3	5
PFE-06	9	4	6
PFE-08	12	5.5	7.5
PFE-10	16	7.5	10
PFE-12	22	11	15
PFE-14	30	15	20
PFE-16	36	18.5	25
PFE-18	41	22	30



<b>Operational Voltage (Ue)</b>	230-460 VAC rms 3-Phase (-15% +10%)
<b>Rated Frequency</b>	50 - 60Hz +/- 2Hz
<b>Index Rating</b>	Standard AC53a: 3-5: 99-10 Class 10A AC53a: 3-12: 99-10
<b>Control Supply</b>	24V DC approx 4VA supplied externally to terminals 0 - 24.
<b>Enable and Start/Soft Stop</b>	24V DC galvanically isolated terminals -A2, EN, +A1
<b>Indication</b>	Multi function LEDs on front panel
<b>Start Time</b>	0 to 30 seconds.
<b>Stop Time</b>	0 to 30 seconds
<b>Start Duty</b>	3 x FLC for 5 seconds at standard rating
<b>Starts / Hour</b>	10 starts per hour or 5 starts + 5 soft stops per hour. Up to 60 Starts/Hr with Optional Fan
<b>Internally bypassed</b>	
<b>Power Terminals</b>	Input 1/L1, 3/L2 & 5/L3 output 2/T1, 4/T2 6/T3. IP20 Rated wire clamping terminals (unit is IP20)
<b>Ambient Temperature</b>	0°C to 40°C. Above 40°C de-rate linearly by 2% of unit FLC per °C to a derate of 40% at 60°C
<b>Transport and Storage</b>	-25°C to +60°C
<b>Altitude</b>	1000m. Above 1000m de-rate linearly by 1% of unit FLC per 100m to a max altitude of 2000m.
<b>Humidity</b>	max. 85% non-condensing, not exceeding 50% at 40°C
<b>IP Rating</b>	IP20
<b>Design Standards</b>	IEC 60947-4-2; EN60947-4-2 "AC Semiconductor Motor Controllers and Starters"

Please Note:  
All dimensions in mm



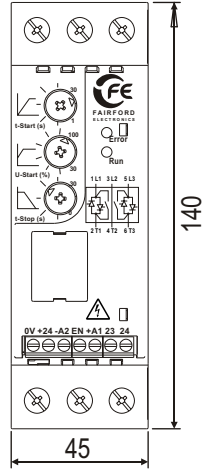
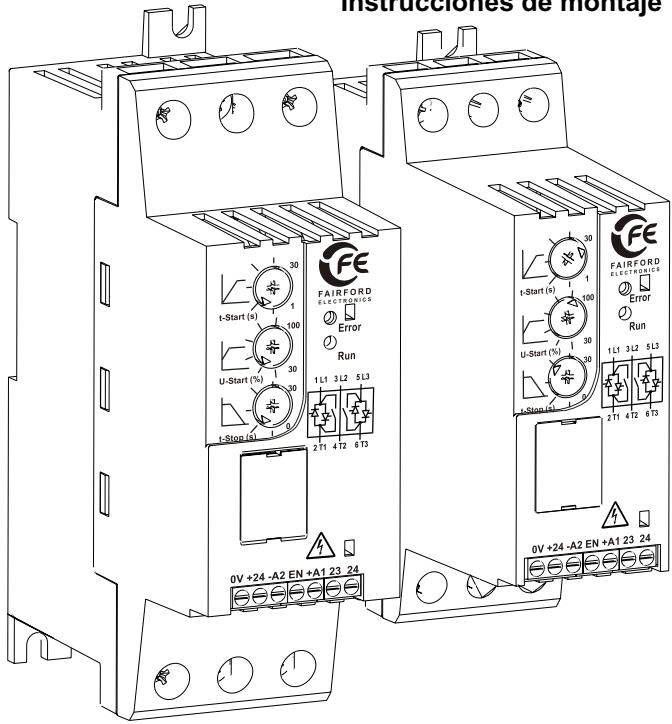
Whilst every effort has been made to ensure that the information provided in this document is accurate actual data and images may change. Fairford Electronics does not accept liability for errors. No warranty, express or implied, is given that the information provided in this document is error free.

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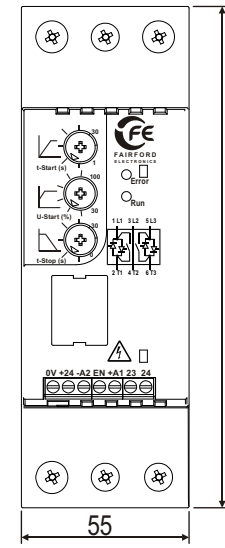
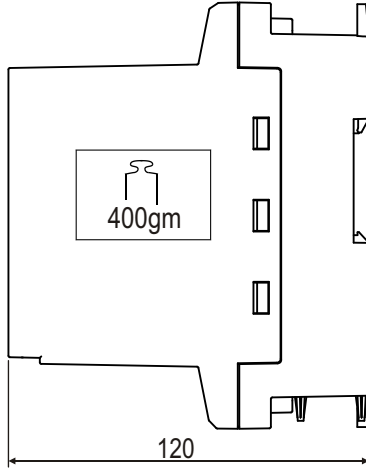
# PFE Digital Soft Starters

M-7G44-F  
090506

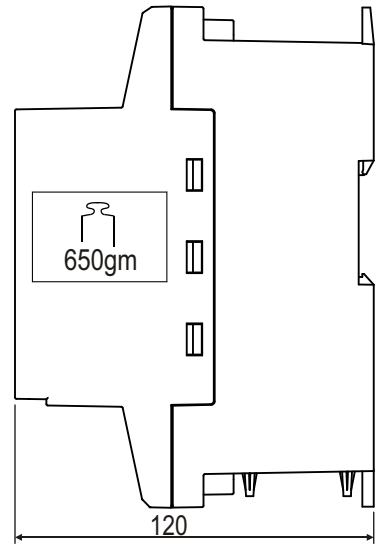
**Installation Instructions**  
**Montageanweisung**  
**Notice d'installation**  
**Istruzioni per il montaggio**  
**Instrucciones de montaje**



Mounting Centres 30mm x 130mm



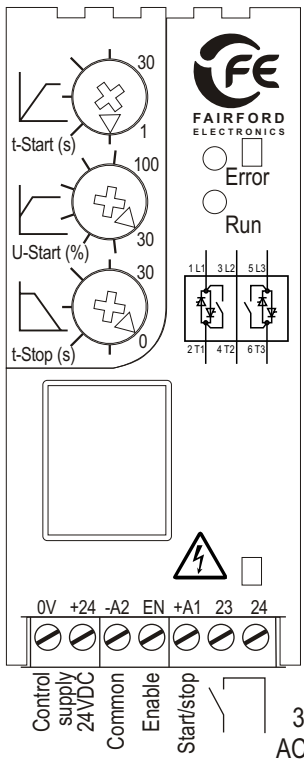
Mounting Centres 40mm x 155mm



This device is suitable for use in industrial environments. EN 55011/22 Class A  
Das Gerät ist für den industriellen Einsatz geeignet EN 55011/22 Klasse A.  
L'appareil a été conçu pour l'emploi en milieu industriel EN 55011/22 classe A.  
L'apparecchio è adatto per uso in ambienti industriali EN 55011/22 Classe A.  
El aparato es adecuado para uso en ambiente industrial EN 55011/22 clase A.

**Size1 5Amp to 16Amp**  
PFE-02 2.2kW @ 400V 5Amp  
PFE-04 3kW @ 400V 7Amp  
PFE-06 4kW @ 400V 9Amp  
PFE-08 5.5kW @ 400V 12Amp  
PFE-10 7.5kW @ 400V 16Amp

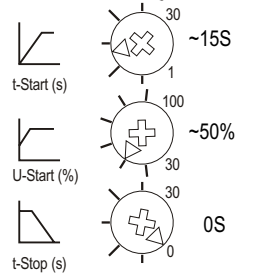
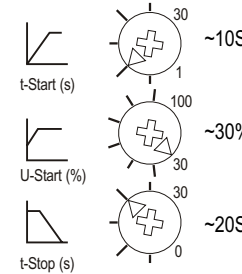
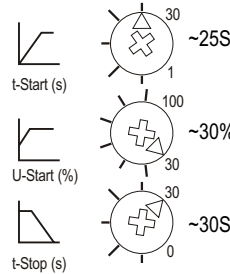
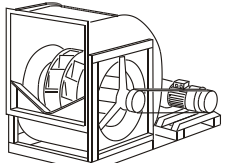
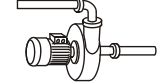
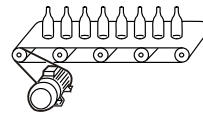
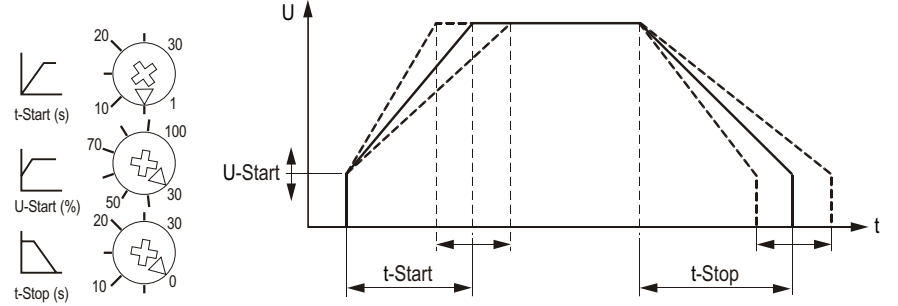
**Size2 22Amp to 41Amp**  
PFE-12 11kW @ 400V 22Amp  
PFE-14 15kW @ 400V 30Amp  
PFE-16 18.5kW @ 400V 36Amp  
PFE-18 22kW @ 400V 41Amp



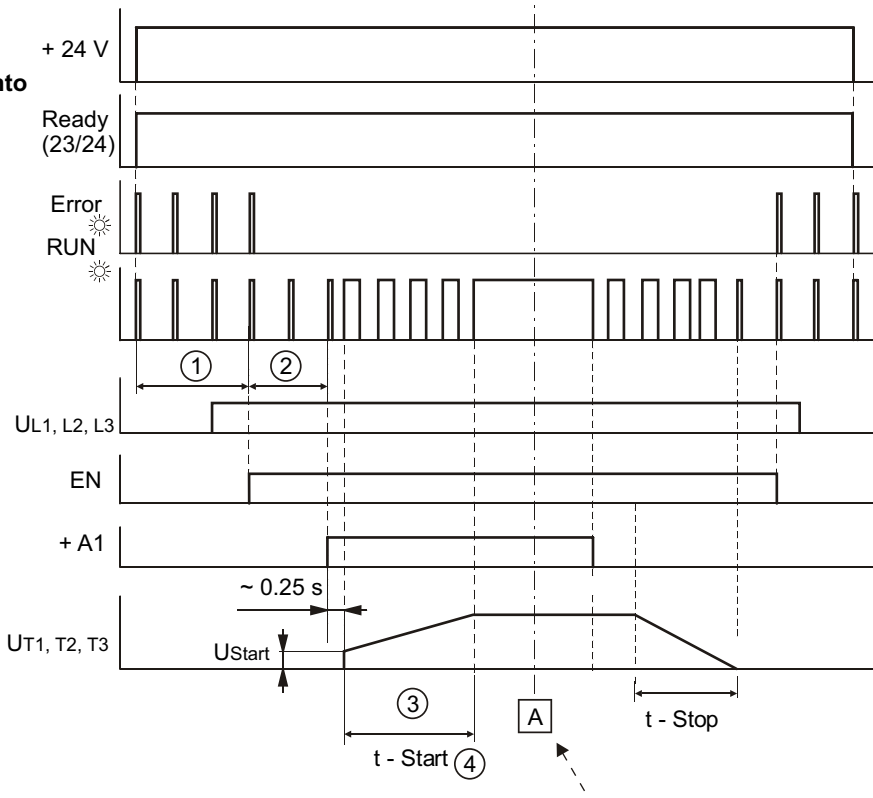
- Not Enabled** LED green+red - LED grün+rot - DEL vert+rouge - LED verde+rosso - LED verde+rojo
- Slow Flash Initialisation - Initialisierung - Initialisation - Inizializzazione - Inicialización
- Run** LED green - LED grün - DEL vert - LED verde - LED verde
- Slow Flash Ready for operation - Betriebsbereit - Prêt à fonctionner - Pronto al funzionamento - En condiciones para funcionamiento
- Quick Flash Starting - in Rampe - en rampe - in rampa - en rampa
- Full On Full volts - vollen Spannung - pleine tension - plena tensión
- Quick Flash Soft-Stop - Soft stop - Arrêt progressif - Soft-Stop - Paro suave

Very quick green flash:- Starting to trip on over current

- Error** Fault LED red - Fehler LED rot - DEL erreur rouge - LED errore rosso - LED error rojo
- |   |                          |   |                      |
|---|--------------------------|---|----------------------|
| 1 | SCR or supply            | 2 | Too hot              |
| 3 | Control supply low volts | 4 | Bypass relay failure |
| 5 | Shearpin (4.4 x l)       | 6 | Overcurrent          |



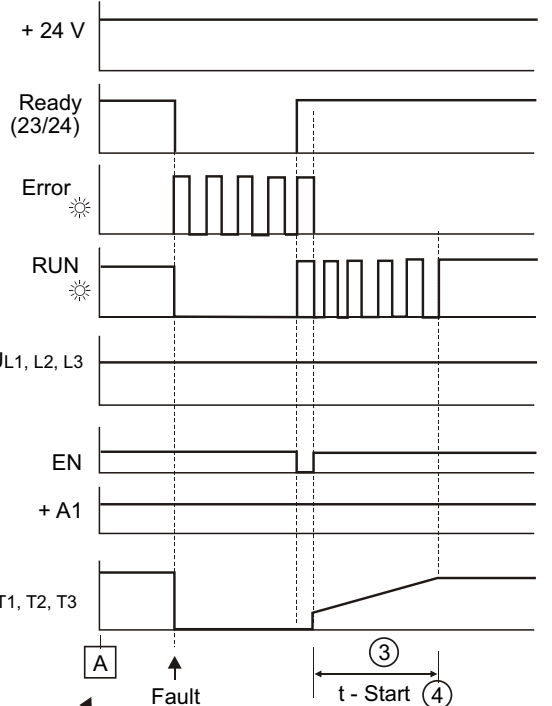
**Operation - Betrieb - Service - Funzionamento**



**Fault - Störung - Défaut - Guasto - Avería**

RUN-LED green - RUN LED grün - DEL RUN verde - LED RUN verde - LED RUN verde - RUN-LED -  
Error-LED red - Error LED rot - DEL erreur rouge - LED errore rosso - LED error rojo

- 1 Initialisation - Initialisierung - Initialisation - Inizializzazione - Inicialización
- 2 Ready for operation - Betriebsbereit - Prêt à fonctionner - Pronto al funcionamiento - En condiciones para funcionamiento
- 3 in ramp - in Rampe - en rampe - in rampa - en rampa
- 4 Top of ramp - Rampenende erreicht - Fin de rampe atteinte - Fine rampa - Fin de rampa



0V, +24 + A1, E, -A2 23, 24			
mm <sup>2</sup> / AWG	mm / inch	Nm / lb.in	mm
1 x 0.5 - 2.5 / 20 - 14	6 / 1/4"	0.4 / 3.5	0.6 x 3.5
2 x 0.5 - 1.5 / 20 - 16			

Melderelais – Signalling relay – Relais à voyant – Relè di segnalazione – Relè de señalización

U	(L)	(R) AC11	I <sub>min</sub>	U <sub>min</sub>
250V AC	0.2A	2.5A	10mA	100V AC
30V DC	0.7A	3A	100mA	5V DC



**DANGER!** Hazardous Voltage. Will cause death or serious injury. Hazardous voltage is also present in the OFF/STOP status of the soft starter when the supply voltage is switched on (Ue).

**GEFAHR!** Gefährliche Spannung. Lebensgefahr oder schwere Verletzungsgefahr. Bei eingeschalteter Versorgungsspannung (Ue) steht auch im AUS-/STOP-Zustand des Softstarters am Ausgang gefährliche Spannung an.

**DANGER!** Tension dangereuse. Danger de mort ou risque de blessures graves. En cas de tension d'alimentation (Ue) enclenchée, la tension dangereuse existe aussi en position d'Arrêt à la sortie du démarreur progressif.

**PERICOLO!** Tensione pericolosa. Può provocare morte o lesioni gravi. Con la tensione di alimentazione (Ue) inserita, anche nello stato OFF/STOP del softstarter è presente tensione pericolosa in uscita.

**¡PELIGRO!** Tensión peligrosa. Puede causar la muerte o lesiones graves. Si la tensión de alimentación está conectada (Ue), existe también en la salida tensión peligrosa con el arrancador suave en estado OFF/ON.

PFE-02 to PFE-10 1 L1, 3 L2, 5 L3 2 T1, 4 T2, 6 T3				
mm <sup>2</sup> / AWG	mm / inch	Nm / lb.in	mm	
1 or 2 x 1 - 4 / 18 - 12	9 / 3/8"	1.3 / 12	1 x 6	PZ2

PFE-12 to PFE-16 1 L1, 3 L2, 5 L3 2 T1, 4 T2, 6 T3				
mm <sup>2</sup> / AWG	mm / inch	Nm / lb.in	mm	
1 or 2 x 2.5 - 10 / 12 - 6	12 / 1/2"	2.5 / 22	1 x 6	PZ2

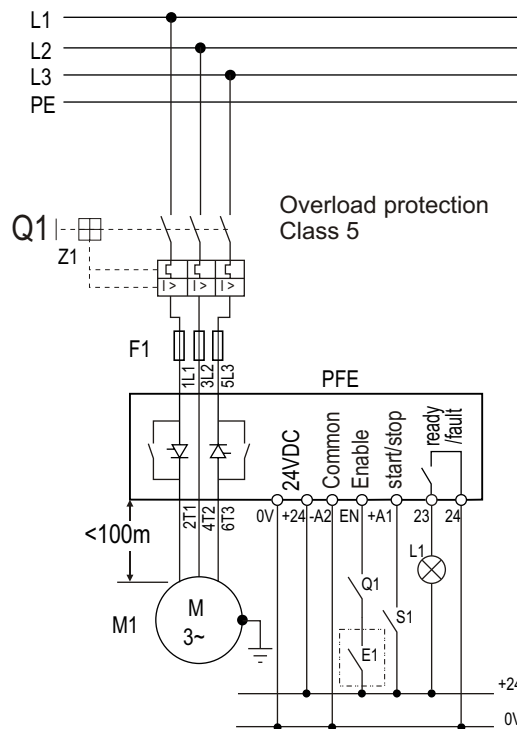
Where several conductors are to be connected, the difference between the wires/cables used must not exceed one DIN Standard size level.

Bei Mehrleiteranschluss darf maximal ein DIN-Normgrößen-Sprung zwischen den verwendeten Leitern liegen.

En cas de raccordement de plusieurs conducteurs, il faut 1 écartement normalisé max. entre les conducteurs.

In caso di collegamento a più conduttori, è ammesso al massimo un salto di grandezza DIN standard fra i conduttori utilizzati.

En caso de conexión de múltiples conductores puede haber como máximo un salto de magnitud normalizada DIN entre los conductores utilizados.



Overload protection Class 5

F1 = Coordination Class 2 Fusing  
PFE-02 to PFE-08 SIBA 2018920-35  
PFE-10 SIBA 2018920-40  
PFE-12 to PFE-18 SIBA 2018920-125

Control Circuit Elements  
E1 = Optional switch to allow trip reset without opening main breaker Q1  
Q1 = Auxiliary contact of main breaker Q1  
S1 = Start/Stop control switch  
L1 = Indicator:-  
On: Ready  
Off: Fault

- Q1 = Cable protection - Leitungsschutz - Protezione di linea - Protección de cable - Protection de câbles
- Z1 = Overload relay - Überlastrelais - Relè termico - Relè de sobrecarga - Relais thermique
- F1 = Semiconductor fuse for type 2 coordination, in addition to Q1  
Halbleitersicherung für Zuordnungsart 2, zusätzlich zu Q1  
Per avere la protezione del semiconduttore in coordinamento di tipo 2, è necessario un fusibile in aggiunta a Q1  
Fusible semiconduttore para tipo de coordinación 2, adicionalmente a Q1  
Fusible pour semi-conducteurs pour coordination de type 2, additionnel à Q1
- PFE = Soft Starter - Halbleiterschütz - Contactor semiconductor - Contattore a semiconduttori - Contacteur à semi-conducteurs
- A1-A2 = Start/Stop - Start/Stopp - Start/Stop - Arranque/Parada - Démarrage/Arrêt



**Electric shock risk. Danger**

Only skilled or instructed persons may carry out the following operations.

**Lebensgefahr durch elektrischen Strom!**

Nur Elektrofachkräfte und elektrotechnisch unterwiesene Personen dürfen die im Folgenden beschriebenen Arbeiten ausführen.

**Tension électrique dangereuse !**

Seules les personnes qualifiées et averties doivent exécuter les travaux ci-après.

**Tensione elettrica: Pericolo di morte!**

Solo persone abilitate e qualificate possono eseguire le operazioni di seguito riportate.

**¡Corriente eléctrica! ¡Peligro de muerte!**

El trabajo a continuación descrito debe ser realizado por personas cualificadas y advertidas.

Rated Impulse withstand Voltage (U<sub>imp</sub>) 2.5kV

Rated Insulation Voltage (U<sub>i</sub>) 500V

Pollution Degree 2

Rated Short Circuit Current (I<sub>q</sub>)\* 10kA

Short Circuit Co-ordination\* Type 2

Ambient Temperature 0°C to 40°C.

Above 40°C de-rate linearly by 2% of unit FLC per °C to a derate of 40% at 60°C

Transport and Storage -25°C to +60°C

Altitude 1000m. 1000-2000m de-rate 1% of unit FLC per 100m to 2000m.

Humidity max. 85% non-condensing, not exceeding 50% at 40°C

IP Rating IP20

Design Standards IEC 60947-4-2; EN60947-4-2

\*AC Semiconductor Motor Controllers and Starters"

\* When protected by recommended semiconductor fuse.

Operational Voltage (U<sub>e</sub>) 230-460 VAC rms 3-Phase (-15% +10%)

Rated Frequency 50 - 60Hz +/- 2Hz

Index Rating

Control Supply U<sub>s</sub>

Enable Control

Start/Stop Control

Auxiliary Circuits relay

Indication

t-Start

U-Start

t-Stop

Start Duty

Starts / Hour

standard

with optional fan

Power Terminals

230-460 VAC rms 3-Phase (-15% +10%)

50 - 60Hz +/- 2Hz **Form Designation** Form 1

Standard (Class5) AC53b: 3-5: 355

Overcurrent = > 3 x I<sub>e</sub> for 5 Seconds

24V DC approx 4VA supplied to terminals 0V - +24V

24V DC galvanically isolated terminals -A2 - EN

24V DC galvanically isolated terminals -A2 - +A1

Ready/Fault - 23/24. 250VAC 2.5A, AC11.

Red = Error - Green = Run LEDs

1 to 30 seconds.

30% - 100%

0 to 30 seconds

3 x FLC for 5 seconds at standard rating

10 starts per hour or 5 starts + 5 soft stops per hour

60 starts per hour or 30 starts + 30 soft stops per hour

Internally bypassed

IP20 Rated wire clamping terminals

EMC EMISSION AND IMMUNITY LEVELS		
ESD immunity	IEC 61000-4-2	4kV contact. 8kV air discharge
R F immunity	IEC 61000-4-6	140dBuV over 0.15-80MHz
R F immunity	EC 61000-4-3	10V/m over 80 -1000MHz
Fast Transient immunity	IEC 61000-4-4	2kV/5kHz
Surge immunity	IEC 61000-4-5	2kV line to ground 1kV line to line
Conducted RF emissions	EN 55011	Class A
Radiated RF emissions	EN 55011	Class A

**FAIRFORD ELECTRONICS LIMITED**

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