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GB SOFT STARTER
Instruction manual
ADXT...

WARNING!

- Carefully read the manual before the installation or use.
- This equipment is to be installed by qualified personnel, complying to current standards, to avoid damages or safety hazards.
- Before any maintenance operation on the device, remove all the voltages from measuring and supply inputs and short-circuit the CT input terminals.
- The manufacturer cannot be held responsible for electrical safety in case of improper use of the equipment.
- Products illustrated herein are subject to alteration and changes without prior notice. Technical data and descriptions in the documentation are accurate, to the best of our knowledge, but no liabilities for errors, omissions or contingencies arising there from are accepted.
- A circuit breaker must be included in the electrical installation of the building. It must be installed close by the equipment and within easy reach of the operator. It must be marked as the disconnecting device of the equipment: IEC/EN 61010-1 § 6.11.3.1.
- Clean the device with a soft dry cloth; do not use abrasives, liquid detergents or solvents.


ATTENTION !

- Lire attentivement le manuel avant toute utilisation et installation.
- Ces appareils doivent être installés par un personnel qualifié, conformément aux normes en vigueur en vigueur en matière d'installations, afin d'éviter de causer des dommages à des personnes ou choses.
- Avant toute intervention sur l'instrument, mettre les entrées de mesure et d'alimentation hors tension et court-circuiter les transformateurs de courant.
- Le constructeur n'assume aucune responsabilité quant à la sécurité électrique en cas d'utilisation impropre du dispositif.
- Les produits décrits dans ce document sont susceptibles d'évoluer ou de subir des modifications à n'importe quel moment. Les descriptions et caractéristiques techniques du catalogue ne peuvent donc avoir aucune valeur contractuelle.
- Un interrupteur ou disjoncteur doit être inclus dans l'installation électrique du bâtiment. Celui-ci doit se trouver tout près de l'appareil et l'opérateur doit pouvoir y accéder facilement. Il doit être marqué comme le dispositif d'interruption de l'appareil : IEC/EN 61010-1 § 6.11.3.1.
- Nettoyer l'appareil avec un chiffon doux, ne pas utiliser de produits abrasifs, détergents liquides ou solvants.


ACHTUNG!

- Dieses Handbuch vor Gebrauch und Installation aufmerksam lesen.
- Zur Vermeidung von Personen- und Sachschäden dürfen diese Geräte nur von qualifiziertem Fachpersonal und unter Befolgung der einschlägigen Vorschriften installiert werden.
- Vor jedem Eingriff am Instrument die Spannungszufuhr zu den Messeingängen trennen und die Stromwandler kurzschließen.
- Bei zweckwidrigem Gebrauch der Vorrichtung übernimmt der Hersteller keine Haftung für die elektrische Sicherheit.
- Die in dieser Broschüre beschriebenen Produkte können jederzeit weiterentwickelt und geändert werden. Die im Katalog enthaltenen Beschreibungen und Daten sind daher unverbindlich und ohne Gewähr.
- In die elektrische Anlage des Gebäudes ist ein Ausschalter oder Trennschalter einzubauen. Dieser muss sich in unmittelbarer Nähe des Geräts befinden und vom Bediener leicht zugänglich sein. Er muss als Trennvorrichtung für das Gerät gekennzeichnet sein: IEC/EN 61010-1 § 6.11.3.1.
- Das Gerät mit einem weichen Tuch reinigen, keine Scheuermittel, Flüssigreinerer oder Lösungsmittel verwenden.


ADVERTENCIA

- Leer atentamente el manual antes de instalar y utilizar el regulador.
- Este dispositivo debe ser instalado por personal cualificado conforme a la normativa de instalación vigente a fin de evitar daños personales o materiales.
- Antes de realizar cualquier operación en el dispositivo, desconectar la corriente de las entradas de alimentación y medida, y cortocircuitar los transformadores de corriente.
- El fabricante no se responsabilizará de la seguridad eléctrica en caso de que el dispositivo no se utilice de forma adecuada.
- Los productos descritos en este documento se pueden actualizar o modificar en cualquier momento. Por consiguiente, las descripciones y los datos técnicos aquí contenidos no tienen valor contractual.
- La instalación eléctrica del edificio debe disponer de un interruptor o disyuntor. Este debe encontrarse cerca del dispositivo, en un lugar al que el usuario pueda acceder con facilidad. Además, debe llevar el mismo marcado que el interruptor del dispositivo (IEC/EN 61010-1 § 6.11.3.1).
- Limpiar el dispositivo con un trapo suave; no utilizar productos abrasivos, detergentes líquidos ni disolventes.


UPOZORNĚNÍ

- Návod se pozorně pročtěte, než začnete regulátor instalovat a používat.
- Tato zařízení smí instalovat kvalifikovaní pracovníci v souladu s platnými předpisy a normami pro předcházení úrazů osob či poškození věcí.
- Před jakýmkoli zásahem do přístroje odpojte měřicí a napájecí vstupy od napětí a zkratujte transformátory proudu.
- Výrobce nenese odpovědnost za elektrickou bezpečnost v případě nevhodného používání regulátoru.
- Výrobky popsané v tomto dokumentu mohou kdykoli projít úpravami či dalším vývojem. Popisy a údaje uvedené v katalogu nemají proto žádnou smluvní hodnotu.
- Spínač či odpojovač je nutno zabudovat do elektrického rozvodu v budově. Musí být nainstalované v těsné blízkosti přístroje a snadno dostupné pracovníku obsluhy. Je nutno ho označit jako vypínači zařízení přístroje: IEC/EN 61010-1 § 6.11.3.1.
- Přístroj čistěte měkkou utěrkou, nepoužívejte abrazivní produkty, tekutá čistidla či rozpouštědla.


AVERTIZARE!

- Cititi cu atenție manualul înainte de instalare sau utilizare.
- Acest echipament va fi instalat de personal calificat, în conformitate cu standardele actuale, pentru a evita deteriorări sau pericole.
- Înainte de efectuarea oricărei operațiuni de întreținere asupra dispozitivului, îndeplățiți toate tensiunile de la intrările de măsurare și de alimentare și scurtcircuitați bornele de intrare CT.
- Producătorul nu poate fi considerat responsabil pentru siguranța electrică în caz de utilizare incorectă a echipamentului.
- Produsele ilustrate în prezentul sunt supuse modificărilor și schimbărilor fără notificare anterioară. Datele tehnice și descrierile din documentație sunt precise, în măsura cunoștințelor noastre, dar nu se acceptă nicio răspundere pentru erorile, omisiunile sau evenimentele neprevăzute care apar ca urmare a acestora.
- Trebuie inclus un disjunctiv în instalația electrică a clădirii. Acesta trebuie instalat aproape de echipament și într-o zonă ușor accesibilă operatorului. Acesta trebuie marcat ca fiind dispozitivul de deconectare al echipamentului: IEC/EN 61010-1 § 6.11.3.1.
- Curățați instrumentul cu un material textil moale și uscat; nu utilizați substanțe abrazive, detergenți lichizi sau solvenți.


ATTENZIONE!

- Leggere attentamente il manuale prima dell'utilizzo e l'installazione.
- Questi apparecchi devono essere installati da personale qualificato, nel rispetto delle vigenti normative impiantistiche, allo scopo di evitare danni a persone o cose.
- Prima di qualsiasi intervento sullo strumento, togliere tensione dagli ingressi di misura e di alimentazione e cortocircuitare i trasformatori di corrente.
- Il costruttore non si assume responsabilità in merito alla sicurezza elettrica in caso di utilizzo improprio del dispositivo.
- I prodotti descritti in questo documento sono suscettibili in qualsiasi momento di evoluzioni o di modifiche. Le descrizioni ed i dati a catalogo non possono pertanto avere alcun valore contrattuale.
- Un interruttore o disgiuntore va compreso nell'impianto elettrico dell'edificio. Esso deve trovarsi in stretta vicinanza dell'apparecchio ed essere facilmente raggiungibile da parte dell'operatore. Deve essere marchiato come il dispositivo di interruzione dell'apparecchio: IEC/EN 61010-1 § 6.11.3.1.
- Pulire l'apparecchio con panno morbido, non usare prodotti abrasivi, detergenti liquidi o solventi.


UWAGA!

- Przed użyciem i instalacją urządzenia należy uważnie przeczytać niniejszą instrukcję.
- W celu uniknięcia obrażeń osób lub uszkodzenia mienia tego typu urządzenia muszą być instalowane przez wykwalifikowany personel, zgodnie z obowiązującymi przepisami.
- Przed rozpoczęciem jakichkolwiek prac na urządzeniu należy odłączyć napięcie od wejść pomiarowych i zasilania oraz zewrzeć zaciski rozkładnika prądowego.
- Producent nie przyjmuje na siebie odpowiedzialności za bezpieczeństwo elektryczne w przypadku niewłaściwego użytkowania urządzenia.
- Produkty opisane w niniejszym dokumencie mogą być w każdej chwili udoskonalone lub zmodyfikowane. Opisy oraz dane katalogowe nie mogą mieć w związku z tym żadnej wartości umownej.
- W instalacji elektrycznej budynku należy uwzględnić przełącznik lub wyłącznik automatyczny. Powinien on znajdować się w bliskim sąsiedztwie urządzenia i być łatwo osiągalny przez operatora. Musi być oznaczony jako urządzenie służące do wyłączenia urządzenia: IEC/EN 61010-1 § 6.11.3.1.
- Urządzenie należy czyścić miękką szmatką, nie stosować środków ściernych, płynnych detergentów lub rozpuszczalników.


警告!

- 安装或使用前，请仔细阅读本手册。
- 本设备只能由合格人员根据现行标准进行安装，以避免造成损坏或安全危害。
- 对设备进行任何维护操作前，请移除测量输入端和电源输入端的所有电压，并短接 CT 输入端。
- 制造商不负责因设备使用不当导致的电气安全问题。
- 此处说明的产品可能会有变更，恕不提前通知。我们竭力确保本文件中技术数据和说明的准确性，但对于错误、遗漏或由此产生的意外事件概不负责。
- 建筑电气系统中必须装有断路器。断路器必须安装在靠近设备且方便操作人员触及的地方。必须将断路器标记为设备的断开装置：IEC/EN 61010-1 § 6.11.3.1
- 请使用柔软的干布清洁设备；切勿使用研磨剂、洗涤剂或溶剂。


ПРЕДУПРЕЖДЕНИЕ!

- Прежде чем приступать к монтажу или эксплуатации устройства, внимательно ознакомьтесь с содержанием настоящего руководства.
- Во избежание травм или материального ущерба монтаж должен осуществляться только квалифицированным персоналом в соответствии с действующими нормативами.
- Перед проведением любых работ по техническому обслуживанию устройства необходимо обесточить все измерительные и питающие входные контакты, а также замкнуть накоротко входные контакты трансформатора тока (ТТ).
- Производитель не несет ответственность за обеспечение электробезопасности в случае ненадлежащего использования устройства.
- Изделия, описанные в настоящем документе, в любой момент могут подвергнуться изменениям или усовершенствованиям. Поэтому каталожные данные и описания не могут рассматриваться как действительные с точки зрения контрактов.
- Электрическая сеть здания должна быть оснащена автоматическим выключателем, который должен быть расположен вблизи оборудования в пределах доступа оператора. Автоматический выключатель должен быть маркирован как отключающее устройство оборудования: IEC/EN 61010-1 § 6.11.3.1.
- Очистку устройства производить с помощью мягкой сухой ткани, без применения абразивных материалов, жидких мощных средств или растворителей.


DIKKATI!

- Montaj ve kullanımdan önce bu el kitabını dikkatlice okuyunuz.
- Bu aparatlar kişilere veya nesnelere zarar verme ihtimaline karşı yürürlükte olan sistem kurma normlarına göre kalifiye personel tarafından monte edilmelidir.
- Aparata (cihaz) herhangi bir müdahalede bulunmadan önce ölçüm girişlerindeki genilimi kesip akım transformatorlerinede kısa devre yaptırınız.
- Uretici aparatın hatalı kullanımından kaynaklanan elektriksel güvenliği ait sorumluluk kabul etmez.
- Bu dokümanda tarif edilen ürünler her an evrimlere veya değişimlere açıktır. Bu sebeple katalogdaki tarif ve değerler herhangi bir bağlayıcı değeri haiz değildir.
- Binanın elektrik sisteminde bir anahtar veya şalter bulunmalıdır. Bu anahtar veya şalter operatörün kolaylıkla ulaşabileceği yakın bir yerde olmalıdır. Aparat (cihaz) devreden çıkartma görevi yapan bu anahtar veya şalterin markası: IEC/EN 61010-1 § 6.11.3.1.
- Aparatı (cihaz) sıvı deterjan veya solvent kullanılarak yumuşak bir bez ile siliniz aşındırıcı temizlik ürünleri kullanmayınız.


UPOZORENJE!

- Prije instalacije ili korištenja uređaja, pažljivo pročitate upute.
- Ovaj uređaj mora instalirati, u skladu s važećim normama, obučena osoba kako bi se izbjegle štete ili sigurnosne opasnosti.
- Prije bilo kakvog zahvata na uređaju otpojite napajanje s mjernih i napajajućih ulaza i kratko spojite ulazne stezaljke strujnog transformatora.
- Proizvođač ne snosi odgovornost za električnu sigurnost u slučaju nepravilnog korištenja opreme.
- Ovdje prikazan uređaj predmet je stalnog usavršavanja i promjena bez prethodne najave. Tehnički podaci i opisi u ovim uputama su točni, ali ne preuzimamo odgovornost za možebitne nenamjerne greške.
- U električnu instalaciju zgrade mora biti instaliran prekidač. On mora biti instaliran blizu uređaja i na dohvata ruke operatera, te označen kao rastavljivač u skladu s normom IEC/EN/BS 61010-1 § 6.11.3.1.
- Uređaj čistite s mekom, suhom krpom bez primjene abraziva, tekućina, otapala ili deterdženta.




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1. ABOUT THIS MANUAL

 **WARNING.** Indicates a hazard that may cause personal injury or death.

 **CAUTION.** Indicates a hazard that may damage the equipment or installation.

 **NOTE.** Provides helpful information.


1.1 Disclaimer

The examples and diagrams in this manual are included solely for illustrative purposes.

The information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or consequential damages resulting from the use or application of this equipment.

2. CAUTION STATEMENTS

Caution statements cannot cover every potential cause of equipment damage but can highlight common causes of damage. It is the installer's responsibility to read and understand all instructions in this manual prior to installing, operating or maintaining the equipment, to follow good electrical practice including applying appropriate personal protective equipment and to seek advice before operating this equipment in a manner other than as described in this manual.

 **NOTE.** ADXT is not user serviceable. The unit should only be serviced by authorised service personnel. Unauthorised tampering with the unit will void the product warranty.

FOR YOUR SAFETY

- The STOP function of the soft starter does not isolate dangerous voltages from the output of the starter. The soft starter must be disconnected by an approved electrical isolation device before accessing electrical connections.
- Soft starter protection features apply to motor protection only. It is the user's responsibility to ensure safety of personnel operating machinery.
- The soft starter is a component designed for integration within an electrical system; it is therefore the responsibility of the system designer/user to ensure the system is safe and designed to comply with relevant local safety standards.

2.1 Electrical shock risk

WARNING – ELECTRICAL SHOCK HAZARD

The voltages present in the following locations can cause severe electric shock and may be lethal:

- AC supply cables and connections
- Output cables and connections
- Many internal parts of the starter

SHORT CIRCUIT

The ADXT is not short circuit proof. After severe overload or short circuit, the operation of the ADXT should be fully tested by an authorised service agent.

GROUNDING AND BRANCH CIRCUIT PROTECTION

It is the responsibility of the user or person installing the ADXT to provide proper grounding and branch circuit protection according to local electrical safety codes.

2.2 Unexpected operation

WARNING – ACCIDENTAL STARTS

In some installations, accidental starts may pose an increased risk to safety of personnel or damage to the machines being driven. In such cases, it is recommended that the power supply to the soft starter is fitted with an isolating switch and a circuit-breaking device (eg power contactor) controllable through an external safety system (eg emergency stop, fault detector).

WARNING – STARTER MAY START OR STOP UNEXPECTEDLY

ADXT will respond to control commands from various sources, and could start or stop unexpectedly. Always disconnect the soft starter from mains voltage before accessing the starter or load.

WARNING – DISCONNECT MAINS BEFORE ACCESSING STARTER OR LOAD

The soft starter has built-in protections which can trip the starter in the event of faults and thus stop the motor. Voltage fluctuations, power cuts and motor jams may also cause the motor to trip. The motor could restart after the causes of shutdown are rectified, which may be dangerous for personnel. Always disconnect the soft starter from mains voltage before accessing the starter or load.

CAUTION – MECHANICAL DAMAGE FROM UNEXPECTED RESTART

The motor could restart after the causes of shutdown are rectified, which may be dangerous for certain machines or installations. In such cases, it is essential that appropriate arrangements are made against restarting after unscheduled stops of the motor.

3 MODEL SELECTION

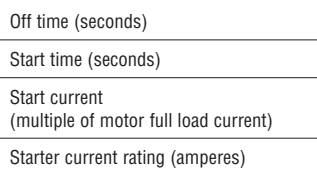
3.1 Soft starter sizing

The soft starter must be the correct size for the motor and the application. Select a soft starter that has a current rating at least equal to the motor's full load current (nameplate) rating, at the start duty. The soft starter's current rating determines the maximum motor size it can be used with.

The rating depends on the number of starts per hour, the length and current level of the start, and the amount of time the soft starter will be off (not passing current) between starts. The soft starter's current rating is only valid when used in the conditions specified in the AC53 code. The current rating may be higher or lower in different operating conditions.

AC53b format (bypassed current rating)

80 A : AC-53 3.5 - 15 : 345



3.2 Current ratings

3.2.1 IEC ratings

All ratings are calculated at altitude of 1000 metres and ambient temperature of 40 °C.

In-line installation

	3.0-10:350	3.5-15:345	4.0-10:350	4.0-20:340	5.0-5:355
ADXT0034	42	34	34	27	31
	3.0-10:590	3.5-15:585	4.0-10:590	4.0-20:580	5.0-5:595
ADXT0060	64	62	60	50	53
ADXT0084	105	86	84	68	76
ADXT0104	115	107	104	86	95
ADXT0126	135	129	126	103	115
ADXT0139	184	143	139	115	127
ADXT0165	200	170	165	138	150
ADXT0187	229	194	187	157	170
ADXT0230	250	244	230	200	202
ADXT0311	397	322	311	262	288
ADXT0410	410	410	410	379	400
ADXT0506	550	526	505	427	462
ADXT0554	580	578	554	469	507

Inside delta installation

	3.0-10:350	3.5-15:345	4.0-10:350	4.0-20:340	5.0-5:355
ADXT0034	63	51	51	41	47
	3.0-10:590	3.5-15:585	4.0-10:590	4.0-20:580	5.0-5:595
ADXT0060	96	93	90	75	80
ADXT0084	158	129	126	102	114
ADXT0104	173	161	156	129	143
ADXT0126	203	194	189	155	173
ADXT0139	276	215	209	173	191
ADXT0165	300	255	248	207	225
ADXT0187	344	291	281	236	255
ADXT0230	375	366	345	300	303
ADXT0311	596	484	466	393	433
ADXT0410	615	615	615	568	600
ADXT0506	825	789	758	640	694
ADXT0554	870	868	832	704	760

3.2.2 NEMA motor ratings

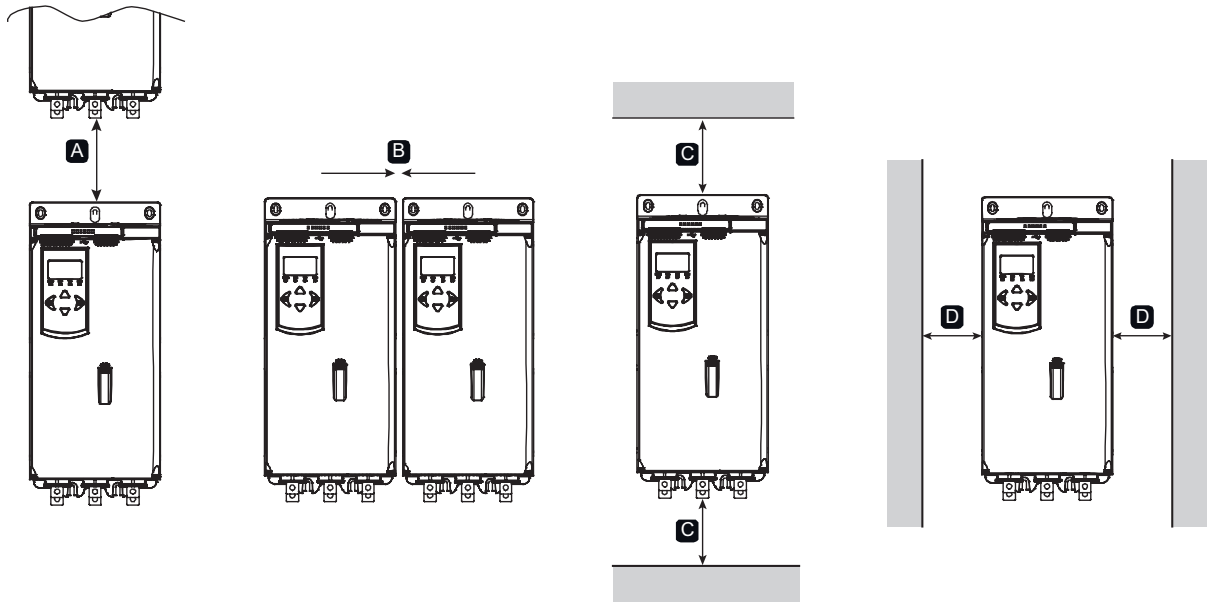
All ratings are calculated at altitude of 1000 metres and ambient temperature of 50 °C.

In-line installation

	Normal 350%, 30s, 4 starts per hour			Heavy 450%, 30s, 4 starts per hour		
	A	HP @480VAC	HP @600VAC	A	HP @480VAC	HP @600VAC
ADXT0034	28	20	25	22	15	20
ADXT0060	52	40	40	40	25	30
ADXT0084	77	60	60	52	40	50
ADXT0104	81	60	75	65	50	60
ADXT0126	99	75	100	77	60	75
ADXT0139	124	100	100	96	75	75
ADXT0165	131	100	125	104	75	100
ADXT0187	156	125	150	124	100	100
ADXT0230	195	150	200	156	125	150
ADXT0311	261	200	250	203	150	200
ADXT0410	377	300	350	302	250	300
ADXT0506	414	350	450	321	250	300
ADXT0554	477	400	500	361	300	350

1736 GB 09 24

4. INSTALLATION CLEARANCES



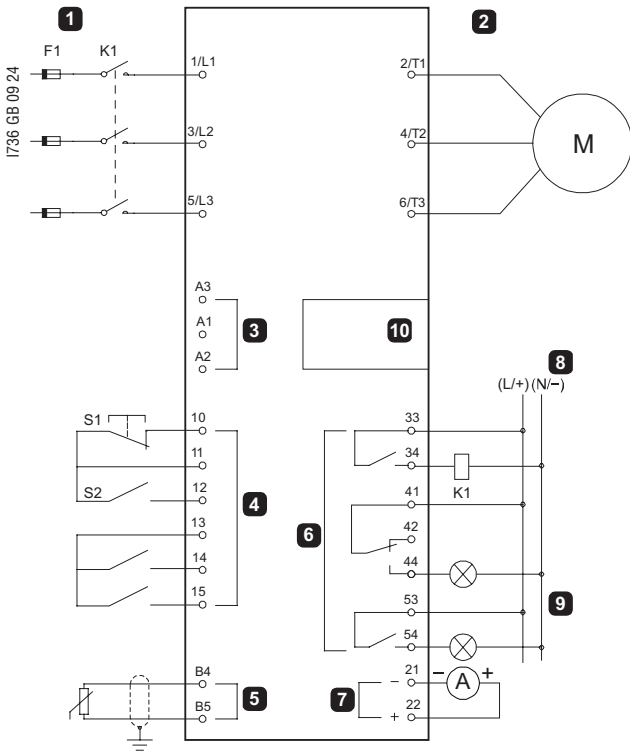
Between soft starters		Solid surfaces	
A	B	C	D
> 100mm (3.9 inch)	> 10mm (0.4 inch)	> 100mm (3.9 inch)	> 10mm (0.4 inch)

5. WIRING DIAGRAM

The soft starter must be installed with a line contactor (AC3 rated). Auxiliary supply voltage must be supplied from the input side of the contactor. The line contactor is controlled by the line contactor output (terminals 33, 34).

⚠ WARNING. Do not apply mains voltage to the starter until all wiring is complete.

⚠ WARNING. Always apply control voltage before (or with) mains voltage.



Item	Description
1	Three-phase supply (mains voltage)
2	Motor
3	Auxiliary supply voltage
4	Digital inputs
5	Motor thermistor input
6	Relay outputs
7	Analog output
8	Control voltage (external equipment)
9	Pilot lamps
10	Communication card expansion port
K1	Line contactor
F1	Fuses or circuit breaker

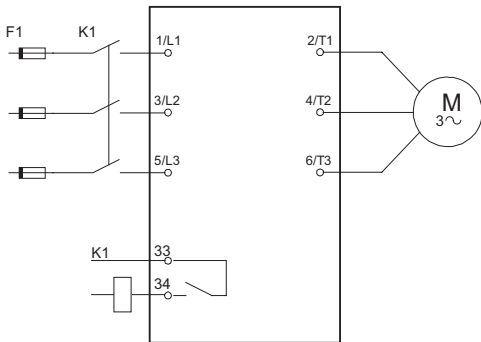
Terminals	Description
10, 11 (S1)	Reset
11, 12 (S2)	Start/Stop
13, 14	Programmable input A (default = Input Trip)
13, 15	Programmable input B (default = Input Trip)
B4, B5	Motor thermistor input
33, 34	Line contactor output
41, 42, 44	Relay output A (default = Run)
53, 54	Relay output B (default = Run)
21, 22	Analog output

5.1 Motor connection

The ADXT can be connected to the motor in-line or inside delta (also called three-wire and six-wire connection). When connecting in inside delta, enter the motor full load current (FLC) for parameter 1B. The ADXT will automatically detect whether the motor is connected in-line or inside delta and will calculate the correct inside delta current level.

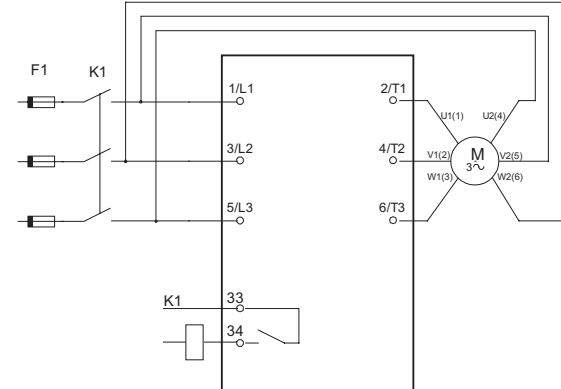
NOTE. If the soft starter is not correctly detecting the motor connection, use parameter 20F Motor Connection.

In-line installation



Symbol	Description
F1	Fuses or circuit breaker
K1	Line contactor
33, 34	Line contactor output

Inside-delta installation



Symbol	Description
F1	Fuses or circuit breaker
K1	Line contactor
33, 34	Line contactor output

⚠ WARNING. When connecting the ADXT in inside delta configuration, always install a main contactor or shunt trip circuit breaker.

NOTE. When connecting in inside delta, enter the motor full load current (FLC) for parameter 1B. The ADXT will automatically detect whether the motor is connected in-line or inside delta and will calculate then correct inside delta current level.

6. EARTH TERMINATIONS

ADXT do not require a protective earth connection. All internal conductive parts are fully enclosed by a non-conductive outer case.

7. SHORT CIRCUIT PROTECTION DEVICES

Fuses may be installed to protect the soft starter or the installation.

Type 1 coordination

Type 1 coordination requires that, in the event of a short circuit on the output side of a soft starter, the fault must be cleared without risk of injury to personnel. There is no requirement that the soft starter must remain operational after the fault. HRC fuses can be used for Type 1 coordination according to IEC 60947-4-2 standard.

Type 2 coordination

Type 2 coordination requires that in the event of a short circuit on the output side of a soft starter, the fault must be cleared without risk of injury to personnel or damage to the soft starter. Semiconductor fuses for Type 2 circuit protection are additional to HRC fuses or MCCBs that form part of the motor branch circuit protection.

⚠ CAUTION. DC Brake: A high brake torque setting can result in peak currents up to motor DOL being drawn while the motor is stopping. Ensure protection fuses installed in the motor branch circuit are selected appropriately.

⚠ CAUTION. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

7.1 IEC coordination with short circuit protection devices

These fuses were selected based on start current of 300% FLC for 10 seconds.

Soft starter	Nominal rating (A) 300%, 10s	SCR I ² t (A ² s)	Type 1 coordination 480VAC, 65kA	Type 2 coordination 690VAC, 65kA
ADXT0034	42	7200	63NHG000B	170M3013
ADXT0060	64	15000	100NHG000B	170M3014
ADXT0084	105	80000	160NHG00B	170M3015
ADXT0104	115	80000	160NHG00B	170M3015
ADXT0126	135	125000	160NHG00B	170M3016
ADXT0139	184	320000	250NHG2B	170M3020
ADXT0165	200	320000	250NHG2B	170M3020
ADXT0187	229	320000	315NHG2B	170M3020
ADXT0230	250	320000	315NHG2B	170M3021
ADXT0311	397	202000	400NHG2B	170M6009
ADXT0410	410	320000	425NHG2B	170M6010
ADXT0506	550	781000	630NHG3B	170M6012
ADXT0554	580	781000	630NHG3B	170M6012

7.2 UL coordination with short circuit protection devices

Standard fault short circuit

Suitable for use on a circuit capable of delivering up to the stated fault current, 600 VAC maximum, when protected by any UL listed fuses or circuit breakers sized according to the NEC.

Soft starter	Nominal rating (A) 300%, 10s	3 cycle short circuit rating @600VAC
ADXT0034	42	5kA
ADXT0060	64	10kA
ADXT0084	105	
ADXT0104	120	
ADXT0126	135	
ADXT0139	184	18kA
ADXT0165	200	
ADXT0187	229	
ADXT0230	250	
ADXT0311	397	
ADXT0410	410	30kA
ADXT0506	550	
ADXT0554	580	

High fault short circuit

Suitable for use on a circuit capable of delivering up to the stated fault current, when protected by the specified circuit breaker or by a fuse of the stated class and rating.

Soft starter	Nominal rating (A) 300%, 10s	@480VAC			@600VAC								
		Fault current 65kA			Nominal rating (A) 350%, 30s	Fault current 35kA		Fault current 100kA					
		Circuit breaker	Fuse rating (A, max)	Fuse class		Circuit breaker	Fuse rating (A, max)	Fuse class					
ADXT0034	42	P5ME3PH0100UL	50	Any (J, T, K-1, RK1, RK5)	30	P5ME3PH0100UL	60	Any (J, T, K-1, RK1, RK5)					
ADXT0060	64		80						70	P5ME3PH0250UL	200		
ADXT0084	105	P5ME3PH0250UL	125	J, T, K-1, RK1	250								
ADXT0104	115		125			120	P5ME3PH0400UL					300	
ADXT0126	135		150										144
ADXT0139	184	200	164	400									
ADXT0165	200	225			212	P5ME3PH0600UL	500						
ADXT0187	229	250							279	900A max	700		
ADXT0230	250	P5ME3PH0400UL	300	J, T	L								
ADXT0311	397	P5ME3PH0600UL	450			Any (J, T, K-1, RK1, RK5)	404					1000A max	800
ADXT0410	410		450	495	1200A max			900					
ADXT0506	550		600						495	1200A max	1000		
ADXT0554	580		600										

8. LINE CONTACTOR OR CIRCUIT BREAKER

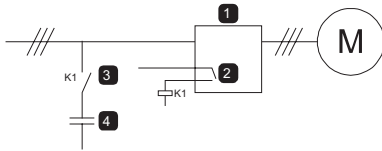
A line contactor or circuit breaker must be installed with the soft starter.

- A line contactor must be installed to protect the soft starter from voltage disturbances on the network, while stopped. Select a contactor with an AC3 rating greater than or equal to the full load current rating of the connected motor. Use the line contactor output (terminals 33, 34) to control the line contactor.
- Use a shunt trip circuit breaker to isolate the motor circuit in the event of a soft starter trip. The shunt trip mechanism must be powered from the supply side of the circuit breaker or from a separate control supply.

⚠ WARNING. When connecting the ADXT in inside delta configuration, always install a line contactor or shunt trip circuit breaker.

9. POWER FACTOR CORRECTION

To use the ADXT to control power factor correction, connect the PFC contactor to a programmable relay set to Run. When the motor reaches full speed, the relay will close and power factor correction will be switched in. Do not use the soft starter relay output to directly switch in power factor correction.



1	Soft starter
2	Programmable output (set = Run)
3	Power factor correction contactor
4	Power factor correction

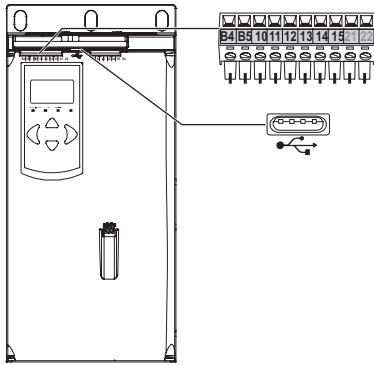
⚠ CAUTION. Power factor correction capacitors must be connected to the input side of the soft starter. Connecting power factor correction capacitors to the output side will damage the soft starter.

10. INPUTS

⚠ CAUTION. The control inputs are powered by the soft starter. Do not apply external voltage to the control input terminals.

📄 NOTE. Cables to the control inputs must be segregated from mains voltage and motor cabling.

Input terminals



Terminals	Description
B4, B5	Motor thermistor input
10, 11	Reset input
11, 12	Start/stop input
13, 14	Programmable input A (default: Input Trip NO)
13, 15	Programmable input B (default: Input Trip NO)

Motor thermistor

Motor thermistors can be connected directly to the ADXT. The soft starter will trip when the resistance of the thermistor circuit exceeds approximately 3.6 k Ω or falls below 20 Ω . The thermistors must be wired in series. The thermistor circuit should be run in screened cable and must be electrically isolated from earth and all other power and control circuits.

📄 NOTE. The thermistor input is disabled by default, but activates automatically when a thermistor is detected. If thermistors have previously been connected to the ADXT but are no longer required, use the Thermistor Reset function to disable the thermistor. Thermistor Reset is accessed via the Setup Tools.

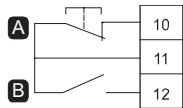
Reset/starter disable

The reset input (terminals 10, 11) is normally closed by default. The ADXT will not perform a start if the reset input is open. The display will show "Not Ready". If the reset input opens while the ADXT is running, the starter will remove power and allow the motor to coast to stop.

📄 NOTE. The reset input can be configured for normally open or normally closed operation. Use parameter 71 Reset/Enable Logic.

Start/stop

The ADXT requires two-wire control.



Input	Description
A	Reset
B	Start/Stop

⚠ WARNING. If the start input is closed when control voltage is applied, the soft starter will attempt to start. Check that the start/stop input is open before applying the auxiliary supply voltage.

📄 NOTE. The ADXT will only accept commands from the control inputs if parameter 1A Command Source is set to Digital Input.

Programmable inputs

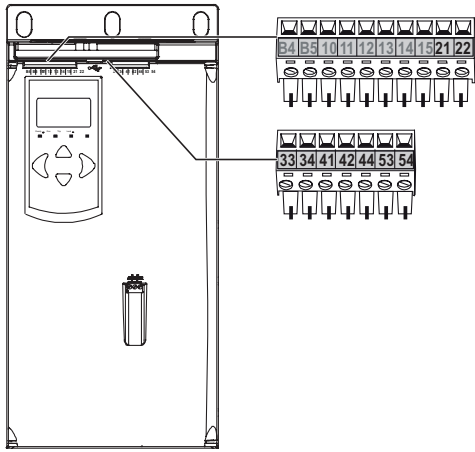
The programmable inputs (terminals 13, 14 and 13, 15) allow external equipment to control the soft starter. The operation of the programmable inputs is controlled by parameters 7A-7H.

USB port

The USB port can be used to upload a configuration file or download parameter settings and event log information from the starter.

11. OUTPUTS

Output terminals



Terminals	Description
21, 22	Analog output
33, 34	Line contactor output
41, 42, 44	Relay output A (default = Run)
53, 54	Relay output B (default = Run)

Analog output

The ADXT has an analog output (terminals 21, 22), which can be connected to associated equipment to monitor motor performance. The operation of the analog output is controlled by parameters 9A-9D.

Line contactor output

The line contactor output (terminals 33, 34) closes as soon as the soft starter receives a start command and remains closed while the soft starter is controlling the motor (until the motor starts a coast to stop, or until the end of a soft stop).

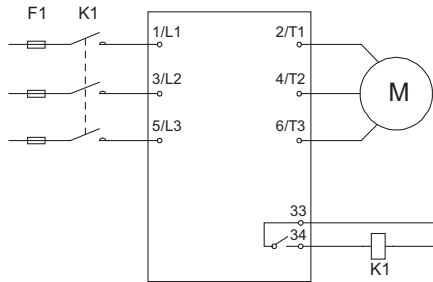
The line contactor output will also open if the soft starter trips.

The line contactor output can also be used to control a shunt trip circuit breaker.

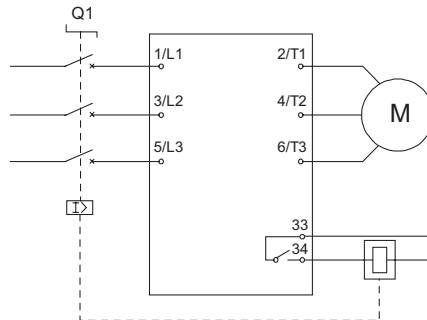
NOTE. Use parameter 20H Shunt Trip Mode to configure the soft starter for use with a line contactor or circuit breaker.

- For use with a line contactor, use the default setting of “Disable”
- For use with a circuit breaker, set 20H to “Enable”

Soft starter installed with line contactor



Soft starter installed with a shunt relay and circuit breaker



Symbol	Description
F1	Fuses
K1	Line contactor
Q1	Circuit breaker

CAUTION. Some electronic contactor coils are not suitable for direct switching with PCB mount relays. Consult the contactor manufacturer/supplier to confirm suitability.

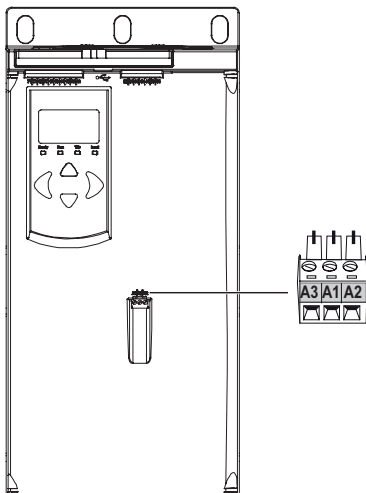
Programmable Outputs

The programmable outputs (terminals 41, 42, 44 and 53, 54) can report the status of the starter, or can be used to control associated equipment.

The operation of the programmable outputs is controlled by parameters 8A-8F.

12. AUXILIARY SUPPLY VOLTAGE

Auxiliary supply voltage terminals



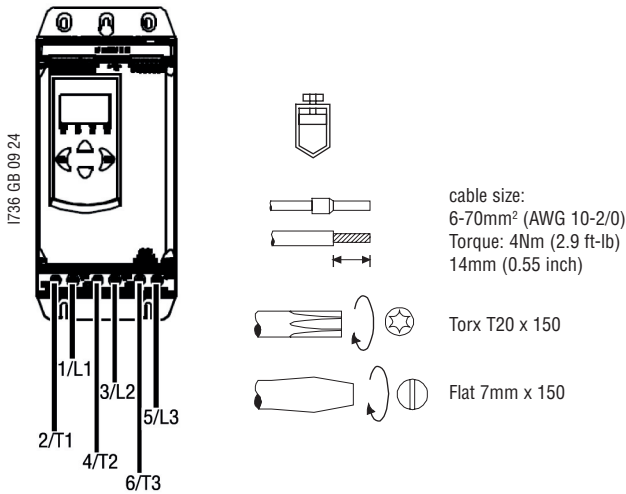
Terminals	Auxiliary supply
A1, A2	For ADXT...24: 24VAC/DC For ADXT... (not ADXT...24): 110...120VAC
A2, A3	For ADXT... (not ADXT...24): 220...240VAC

Install supplementary or branch overcurrent protection on the control circuit supply (terminals A1, A2, A3), in accordance with the electrical code applicable at the installation location.

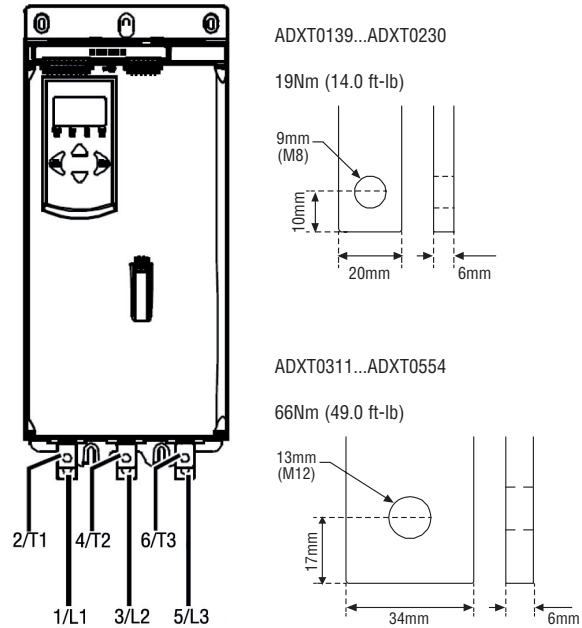
13. POWER TERMINATIONS

The power input and output terminals are at the bottom of the unit.

ADXT0034...ADXT0126



ADXT0139...ADXT0554



- Models ADXT0034...ADXT0126 use cage clamps. Use only copper stranded or solid conductors, rated for 75°C or higher.
- Models ADXT0139...ADXT0554 use busbars at the bottom of the unit. Use copper or aluminum conductors, stranded or solid, rated for 60°C/75°C.



NOTE. If the installation requires large diameter cables, it is possible to complete each termination with two smaller cables, one on each side of the busbar.



NOTE. Some units use aluminium busbars. When connecting power terminations, we recommend cleaning the surface contact area thoroughly (using an emery or stainless-steel brush) and using an appropriate jointing compound to prevent corrosion.

Wiring connectors

Select a connector according to the wire size, material and your application requirements.

A compression connector is recommended for models ADXT0139...ADXT0554.

Soft starter	Example connector – aluminium cable	Example connector – copper cable
ADXT0139	61162	60150
ADXT0165	61165	60156
ADXT0187	61171	60165
ADXT0230	61171	60165
ADXT0311	61165	60156
ADXT0410	61165	60162
ADXT0506	61178	60171
ADXT0554	61178	60171

14. SETUP

14.1 Command source

The ADXT can be started and stopped via the digital inputs, remote keypad, communication network or scheduled auto-start/stop. The command source can be set via the Setup Tools, or using parameter 1A Command Source.

14.2 Setup procedure overview

1. Mount the soft starter (refer to Installation clearance and Wiring diagram sections).
 2. Connect control wiring (refer to Start/stop section).
 3. Apply the auxiliary supply voltage to the soft starter.
 4. Configure your application:
 - a) Press the button MENU/SAVE to open the Menu.
 - b) Go to the Quick Setup Menu and press the button MENU/SAVE.
 - c) Scroll through the list to find your application, then press the button MENU/SAVE to begin the configuration process (refer to the Quick setup section).
 5. If your application is not listed in Quick Setup:
 - a) Press the button EXIT/RESET to return to the Menu.
 - b) Use ▼ to scroll to Main Menu and press the button MENU/SAVE.
 - c) Scroll to Motor Details and press the button MENU/SAVE, then press ▼ then the button MENU/SAVE to edit parameter 1B Motor Full Load Current.
 - d) Set parameter 1B to match the motor's full load current (FLC).
 - e) Press the button MENU/SAVE to save the setting.
 6. Close the Menu by pressing repeatedly the button EXIT/RESET.
 7. (Optional) Use the built-in simulation tools to check that the control wiring is connected correctly.
 8. Power off the soft starter.
 9. Connect the motor cables to starter output terminals 2/T1, 4/T2, 6/T3.
 10. Connect mains supply cables to starter input terminals 1/L1, 3/L2, 5/L3 (refer to Power terminations section).
- The soft starter is now ready to control the motor.

For the parameters setup refer to the Setup tools section.

15. QUICK SETUP

The Quick Setup Menu makes it easy to configure the ADXT for common applications. The ADXT guides you through the most common installation parameters and suggests a typical setting for the application. You can adjust each parameter to suit your exact requirements.

All other parameters remain at default values. To change other parameter values or review the default settings, refer to the complete manual I736.

Always set parameter 1B Motor Full Load Current to match the motor's nameplate full load current.

Application	Start Mode	Start Ramp Time (s)	Initial Current (%)	Current Limit (%)	Adaptive Start Profile	Stop Mode	Stop Time (s)	Adaptive Stop Profile
Pump centrifugal	Adaptive control	10	200	500	Early acceleration	Adaptive control	15	Late deceleration
Pump bore		3	200	500			3	
Pump hydraulic	Constant current	2	200	350	Not available	Coast to stop	Not available	Not available
Fan damped		2	200	350				
Fan undamped		2	200	450				
Compressor screw		2	200	400				
Compressor recip		2	200	450				
Conveyor		5	200	450				
Bow thruster		5	100	400				
Bandsaw		2	200	450				



NOTE. The Adaptive Start and Stop Profile settings only apply when using Adaptive Control. The settings are ignored for all other start and stop modes.

16. SETUP TOOLS

Setup Tools includes options to load or save parameters to a backup file, set the starter's network address, check the status of the inputs and outputs, reset the thermal models or test operation using the Run Simulation.

To access the Setup Tools, press MENU/SAVE to open the Menu then select Setup Tools.

16.1 Set date and time

To set the date and time:

1. Press MENU/SAVE to open the menu then select Setup Tools.
2. Scroll to Set Date & Time.
3. Press the MENU/SAVE button to enter edit mode.
4. Press the MENU/SAVE and EXIT/RESET buttons to select which part of the date or time to edit.
5. Use the ▲ and ▼ buttons to change the value.
6. Press MENU/SAVE after the last digit to save the setting. When the action has been completed, the screen will briefly display a confirmation message, then return to the previous menu level.

16.2 Command source

The ADXT can be started and stopped via the digital inputs, remote keypad, communication network, smart card or scheduled auto-start/stop. The command source can be set via the Setup Tools, or using parameter 1A Command Source.

If the remote keypad is installed, the LOCAL/REMOTE button provides shortcut access to the Command Source function in Setup Tools.

16.3 Commissioning

Commissioning lets the starter be started and stopped via the local keypad. Use the ▲ and ▼ buttons to select a function, then press MENU/SAVE to send the selected command to the starter. The available functions are:

- Quick stop (coast to stop)/Reset
- Start
- Stop

16.4 Run simulation

The run simulation simulates a motor starting, running and stopping to confirm that the soft starter and associated equipment have been installed correctly.



NOTE

The soft starter must be disconnected from mains voltage.
The simulation is only available when the soft starter is in Ready state.

To use the run simulation:

1. Press MENU/SAVE to open the menu then select SetupTools.
2. Scroll to Run Simulation and press MENU/SAVE.
3. Apply a start command from the selected command source. The ADXT simulates its pre- start checks and closes the main contactor relay. The Run LED flashes.



NOTE

If mains voltage is connected, an error message is shown.

4. Press MENU/SAVE. The ADXT simulates starting.
5. Press MENU/SAVE. The ADXT simulates running.
6. Apply a stop command from the selected command source. The ADXT simulates stopping. The Run LED flashes.
7. Press MENU/SAVE. The Ready LED flashes and the main contactor relay opens.
8. Press MENU/SAVE. The ADXT activates then deactivates each programmable output.
9. Press MENU/SAVE to return to the Setup Tools.

Run Simulation Ready Apply Start Signal

Run Simulation Pre-Start Checks MENU to Continue
--

Run Simulation ATTENTION! Remove Mains Volts MENU to Continue
--

Run Simulation Starting X:XXs MENU to Continue
--

Run Simulation Running Apply Stop Signal
--

Run Simulation Stopping X:XXs MENU to Continue
--

Run Simulation Stopped MENU to Continue

Run Simulation Prog Relay A On MENU to Continue
--

16.5 Load/save settings

Load/Save Settings allows users to:

- Reset the ADXT's parameters to default values
- Load parameter settings from an internal file
- Save the current parameter settings to an internal file.

The internal file contains default values until a user file is saved. To load or save parameter settings:

1. Press MENU/SAVE to open the menu then select Setup Tools.
2. Scroll to Load/Save Settings and press the MENU/SAVE button.
3. Scroll to the required function and press the MENU/SAVE button.
4. At the confirmation prompt, select YES to confirm or NO to cancel, then press MENU/SAVE to proceed.
When the action has been completed, the screen will briefly display a confirmation message, then return to the previous menu level.

Load/Save Settings Load Defaults Load User Set Save User Set

Load Defaults No Yes

16.6 USB save & load

The USB save and load menu lets you:

- Save parameter settings and all event log entries to an external file (CSV format)
- Save parameter settings to an external file (proprietary format)
- Load parameter settings from a previously saved external file
- Load custom messages to display on the keypad when a programmable input is active



NOTE

The ADXT supports FAT32 file systems. The ADXT's USB functions are not compatible with NTFS file systems.

Save and load procedure

1. Connect the external drive to the USB port.
2. Press MENU/SAVE to open the menu then select Setup Tools.
3. Scroll to USB Save & Load and press MENU/SAVE.
4. Scroll to the required function and press the MENU/SAVE button.
5. At the confirmation prompt, select YES to confirm or NO to cancel, then press MENU/SAVE to proceed.
When the action has been completed, the screen will briefly display a confirmation message, then return to the previous menu level.

```

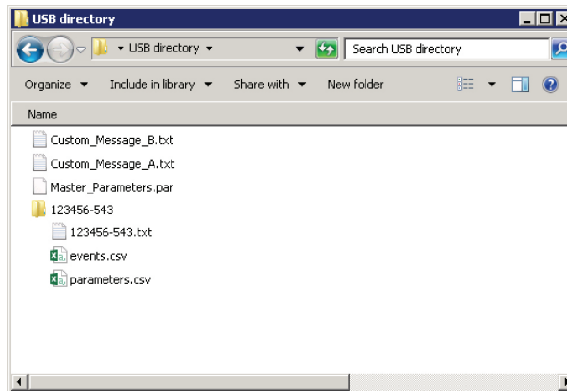
USB Save & Load
Save Params and Logs
Save Master Params
Load Master Params
  
```

```

Save Params and Logs
No
Yes
  
```

File locations and formats

Function	File location
Save Parameters and Logs	The starter will create a directory at the top level of the USB drive, named with the soft starter's serial number. The event log and parameter settings are saved as individual CSV files, and the soft starter's software and system information are saved to a text file.
Save Master Parameters	The starter will create a file called Master_Parameters.par, in the top level of the USB drive.
Load Master Parameters	The starter will load the file Master_Parameters.par from the top level of the USB drive. This file can be created or edited using the soft starter management software.
Load Custom Message	The starter will load the files Custom_Message_A.txt and Custom_Message_B.txt from the top level of the USB drive.



16.7 Auto-start/stop

The ADXT can be configured to automatically start and/or stop the motor at a particular time, or run it in cycles of a specified duration. The Auto-Start/Stop option in Setup Tools gives quick access to the auto-start/stop parameters.

1. Press MENU/SAVE to open the menu then select Setup Tools.
2. Scroll to Auto-Start/Stop and press the MENU/SAVE button.
3. Scroll to the required function and press the MENU/SAVE button.
4. Adjust the settings as required:
Press the MENU/SAVE and EXIT/RESET buttons to select which information to edit.
Use the ▲ and ▼ buttons to change the value.
5. To save changes, press the MENU/SAVE button. The ADXT will confirm the changes. To cancel changes, press the EXIT/RESET button.

```

Auto-Start/Stop
Start/Stop Mode
Start/Stop Sunday
Start/Stop Monday
  
```

```

Start/Stop Sunday
Start/Stop Disable
Start Time:00:00
Stop Time:          00:00
  
```

16.8 Network address

To use the ADXT on an Ethernet network, addresses must be configured for:

- IP Address
- Gateway Address
- Subnet Mask

To set the network addresses:

1. Press MENU/SAVE to open the menu then select Setup Tools.
2. Scroll to Network Address and press the MENU/SAVE button.
3. Scroll to the required function and press the MENU/SAVE button.
4. The first digit of the address will be highlighted.
5. Use EXIT/RESET and MENU/SAVE to select which digit to alter. Use the ▲ and ▼ buttons to change the value.
6. Press MENU/SAVE after the last digit to save the setting.

When the action has been completed, the screen will briefly display a confirmation message, then return to the previous menu level.

```
Set IP Address
192.168.000.002
```



NOTE
The network address can also be set using parameters 12H-12S.



NOTE
To configure the ADXT for use with other communication protocols, use parameters 12A-12G.

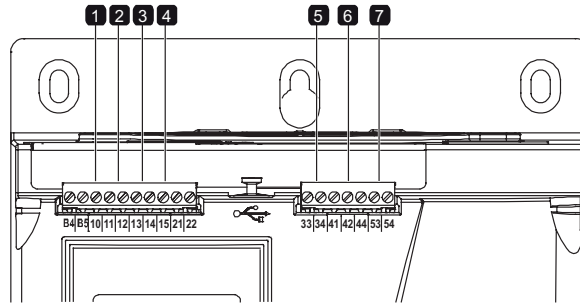
16.9 Digital I/O state

The top line of the screen shows the start/stop, reset and programmable inputs.

The bottom line of the screen shows the fixed Main Contactor output, then programmable outputs A and B.

```
Digital I/O State
Inputs: 00000000
Outputs: 00000000
```

- 1 10, 11: Reset input
- 2 11, 12: Start/stop input
- 3 13, 14: Programmable input A
- 4 13, 15: Programmable input B
- 5 33, 34: Main contactor output
- 6 41, 42, 44: Relay output A
- 7 53, 54: Relay output B



16.10 Analog I/O state

The top line of the screen shows the state of the motor thermistor input.

The bottom line of the screen shows the value of the analog output.

Thermistor input:

- S = Short
- H = Hot
- C = Cold
- O = Open

```
Analog I/O State
Thermistor: 0
4-20mA Output: 04.0 mA
```

16.11 Serial number and rating

The top line of the screen shows the product name. The middle line shows the unit's serial number.

The bottom line of the screen shows the model number.

```
Serial Number &
Rating ADXT
123456-123
```

16.12 Software versions

The software versions screen reports the version of each software component in the starter:

- user interface
- motor control
- remote keypad (if connected)
- parameter list
- bootloader
- expansion card (if fitted)



NOTE
Updated software, including alternative languages, can be loaded into the starter via the USB port if required. Contact your local supplier for further information.

16.13 Thermistor reset

The thermistor input is disabled by default, but activates automatically when a thermistor is detected. If thermistors have previously been connected to the ADXT but are no longer required, use the Thermistor Reset function to disable the thermistor.

16.14 Reset thermal model

The soft starter's thermal modelling software constantly monitors the motor's performance. This allows the starter to calculate the motor's temperature and ability to start successfully at any time. The thermal model can be reset if required.



CAUTION

Resetting the motor thermal model will compromise thermal model protection and may compromise motor life. Only reset the thermal model in an emergency.

17. LOGS

The Logs Menu provides information on events, trips and starter performance.

To access the Logs Menu on the local keypad, press MENU/SAVE to open the Menu then select Logs. On the remote keypad, press LOGS.

17.1 Event log

The Event Log stores details of the starter's most recent trips, warnings, and operations (including starts, stops and configuration changes). Event 1 is the most recent and event 384 is the oldest stored event.



NOTE

The event log can be exported to an external file for analysis away from the starter. Refer to USB save and load on page 53 for details.

17.2 Counters

The counters store statistics on the starter's operation:

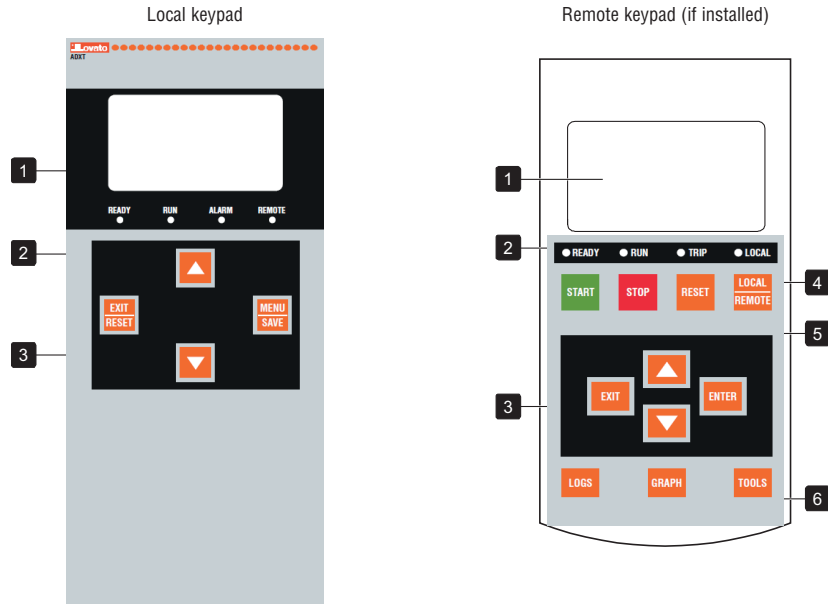
- Hours run (lifetime and since counter last reset)
- Number of starts (lifetime and since counter last reset)
- Number of times the thermal model has been reset.

To view the counters:

1. Open the Logs.
 2. Scroll to counters and press MENU/SAVE.
 3. Use the ▲ and ▼ buttons to scroll through the counters. Press MENU/SAVE to view details.
 4. To reset a counter, press MENU/SAVE then use the ▲ and ▼ buttons to select Reset/Do Not Reset. Press MENU/SAVE to confirm the action.
- To close the counter and return to the Logs, press MENU/SAVE.

18. KEYPAD AND FEEDBACK

18.1 The keypad



1	Four-line display for status and programming details.
2	Status LEDs
3	Menu navigation buttons: EXIT/RESET: Exit the menu or parameter, or cancel a parameter change. On the local keypad, this button also resets a trip. MENU/SAVE or ENTER: Enter a menu or parameter, or save a parameter change. ▲▼: Scroll to the next or previous menu or parameter, change the setting of the current parameter or scroll through the status screens.
4	Shortcut to the command source menu in Setup Tools.
5	Soft starter local control buttons
6	Shortcut buttons for quick access to common tasks. LOGS: Open the Logs Menu. GRAPH: Select which graph to view, or pause/restart the graph (hold longer than 0.5 seconds) TOOLS: Open the Setup Tools.

18.2 Remote keypad

The remote keypad can be used to control the soft starter if parameter 1A Command Source is set to 'Remote Keypad'.

- If the remote keypad is not selected as the command source, the START, STOP and RESET buttons will have no effect.
- The menu navigation buttons and display on the remote keypad are always active.
- If a button is pressed on the starter's local keypad, the display on the remote keypad will update to match.

NOTE
The remote keypad can be safely connected or removed while the starter is running. It is not necessary to remove mains or control voltage.

NOTE
If parameter 1A Command Source is set to Remote Keypad, removing the remote keypad will cause a trip.

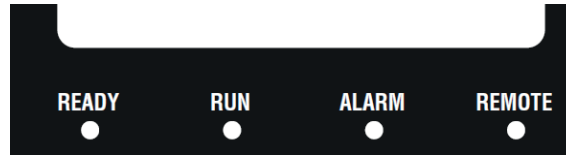
18.3 Lighten/darken the display

The backlight on the display can be adjusted:

- to lighten the display, hold down the EXIT/RESET button and press the ▲ key
- to darken the display, hold down the EXIT/RESET button and press the ▼ key

NOTE
The local and remote keypads can be adjusted independently.

18.4 Starter status LEDs



LED name	On	Flashing
READY	The motor is stopped and the starter is ready to start.	The motor is stopped and the starter is not ready to start: – waiting for the Restart Delay<(parameter 5P) – the thermal models indicate the starter and/or motor are too hot to start safely – the reset input (10, 11) is open
RUN	The motor is in run state (receiving full voltage).	The motor is starting or stopping.
ALARM	The starter has tripped.	The starter is in warning state.
REMOTE	The starter is being controlled via a remote keypad.	

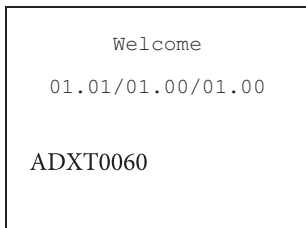
If all LEDs are off, the starter is not receiving control voltage.

18.5 Displays

The keypad displays a wide range of performance information about the soft starter. To scroll through the feedback screens, press the ▲ and ▼ buttons.

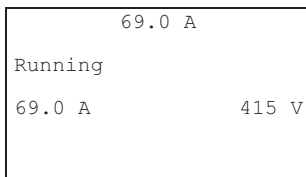
Starter information

At power-up, the starter information screen shows details of the starter's rating, software versions and serial number.



Software versions: user interface, motor control, remote keypad
Model code: current rating, mains voltage, frame size, control voltage
(remote keypad software version is only displayed when a remote keypad is connected)

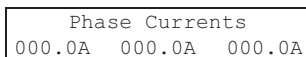
Starter status screen



Motor running current Starter status
Parameter 10H User Parameter 1 and parameter 10I
User Parameter 2

Current

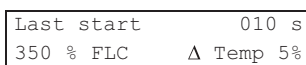
The current screen shows real-time line current on each phase.



Last start information

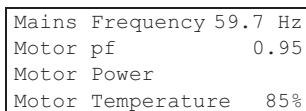
The last start information screen shows details of the most recent successful start:

- start duration (seconds)
- maximum start current drawn (as a percentage of motor full load current)
- calculated rise in motor temperature



User configurable screen

The programmable screen can be configured to show the most important information for the particular application. Use parameters 10J ~ 10M to select which information to display.



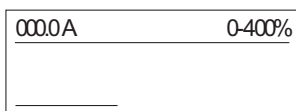
Date and time

The date/time screen shows the current system date and time (24 hour format). For details on setting the date and time, refer to Set date and time on page 51.

Performance graph

The performance graph provides a real-time display of operating performance. Use parameters 10B~10E to format the graph.

The display on the main keypad shows information for motor current.



If a remote keypad is connected, press ALT to change the graph data. The graph can show:

- motor current
- motor temperature
- motor pf
- analog input data from the smart card (if installed)

19. OPERATION

19.1 Start, stop and reset commands

The ADXT can be started and stopped via the digital inputs, remote keypad, communication network, smart card or scheduled auto-start/stop. The command source can be set via the Setup Tools, or using parameter 1A Command Source.

- The ADXT will only accept Start and Reset commands from the designated command source.
- The ADXT will accept Stop commands from the designated command source, but can be forced to stop by opening the reset input, or by opening the start/stop input during an auto-start/stop cycle.
- The programmable input can be used to override the selected command source (refer to parameter 7A Input A Function).

19.2 Command override

The programmable input (13, 14) can be used to override the command source, for situations where the normal control mechanism has been lost. Set parameter 7A Input A Function to the alternative command source (eg 'Command Override: Keypad').

While the input is active, the starter will only accept commands from the selected override source. To restore control to the command source selected in parameter 1A Command Source, reopen the input.

19.3 Auto-start/stop

The ADXT can be configured to automatically start and/or stop the motor at a particular time, or run it in cycles of a specified duration.



NOTE

Start delay, restart delay and auto-reset delay all apply to auto-start operation.

Clock mode

The starter can start and/or stop the motor once per day. For clock mode to operate:

- parameter 4A Auto-Start/Stop Mode must be set to 'Enable'
- parameter 1A Command Source must be set to 'Clock'
- the reset input must be closed
- the start input (11, 12) must be active. This allows the ADXT to be stopped via the digital inputs in an emergency.

Clock mode operation is controlled by parameters 4D ~ 4X.

Timer mode

The starter can automatically stop the motor after a specified run time, then restart it after a specified off (stopped) time. The starter will repeat the cycle while the start signal remains active.

For timer mode to operate:

- parameter 4A Auto-Start/Stop Mode must be set to 'Enable'
- parameter 1A Command Source must be set to 'Timer'
- the reset input must be closed
- the first start must be commanded by a start signal.

Timer mode operation is controlled by parameters 4B ~ 4C.

19.4 PowerThrough

PowerThrough allows the soft starter to control the motor even if the soft starter is damaged on one phase. The ADXT will use two-phase control techniques to soft start and soft stop the motor. PowerThrough does not support adaptive control soft starting or soft stopping. In PowerThrough, the soft starter will use constant current soft starting and timed voltage ramp soft stopping. If PowerThrough is enabled, parameters 2C and 2D must be set appropriately.



NOTE

The starter will trip on Lx-Tx Shorted on the first start attempt after control power is applied. PowerThrough will not operate if control power is cycled between starts.

- PowerThrough is only available with in-line installations. If the starter is installed inside delta, PowerThrough will not operate.
- PowerThrough remains active until '3-Phase Control Only' is reselected. While operating in PowerThrough, the trip LED will flash and the display will indicate '2 Phase - Damaged SCR'.



CAUTION

PowerThrough uses a two-phase soft start technology and additional care is required when sizing circuit breakers and protection. Contact your local supplier for assistance.

19.5 Emergency mode

Emergency mode allows the ADXT to run the motor and ignore trip conditions.

Emergency mode is controlled via a programmable input (input A 13, 14 or input B 13, 15) and parameter 7A InputA Function/7E Input B Function must be set to 'Emergency Mode'. A closed circuit across 13, 14 activates emergency mode. When the ADXT receives a start command, it will continue to run until a stop command is received, ignoring all trips and warnings.

Emergency mode can be used in conjunction with any command source.



NOTE

Although emergency mode operation satisfies the functionality requirements of Fire Mode, Lovato does not recommend its use in situations that require testing and/or compliance with specific standards as it is not certified.



CAUTION

Continued use of emergency mode is not recommended. Emergency mode may compromise the starter and/or motor life as all protections and trips are disabled.

Using the starter in emergency mode will void the product warranty.

19.6 Auxiliary trip

An external trip circuit (such as a low pressure alarm switch for a pumping system) can be used to trip the soft starter and stop the motor. The external circuit is connected to a programmable input (input A 13, 14 or input B 13, 15). To control the behaviour of the trip, set the following parameters:

- Parameter 7A Input A Function: select 'Input Trip (N/O)'.
- Parameter 7B Input A Trip: set as required. For example, 'Run Only' limits the input trip to when the soft starter is running only.
- Parameter 7C Input A Trip Delay: sets a delay between the input activating and the soft starter tripping.
- Parameter 7D Input A Initial Delay: sets a delay before the soft starter monitors the state of the input, after the start signal. For example, a delay may be required to allow time for pipeline pressure to build up.
- Parameter 7J Input A Name: select a name, eg 'Input A Trip' (optional).

19.7 Typical control methods

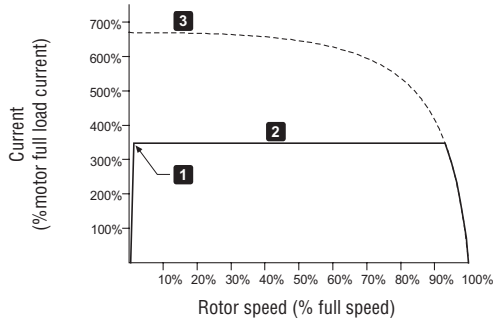
The requirements of an application differ between each installation, but the methods listed below are often a good starting point for common applications.

Application	Start Mode	Start Ramp Time (seconds)	Initial Current (%FLC)	Current Limit (%FLC)	Stop Mode	Stop Time (seconds)
Bow thruster	Constant Current	5	100	400	Coast To Stop	n/a
Centrifuge (Separator)	Constant Current	1	200	450	Coast To Stop	n/a
Chipper	Constant Current	1	200	450	Coast To Stop	n/a
Compressor - reciprocating - loaded	Constant Current	1	200	450	Coast To Stop	n/a
Compressor - reciprocating - unloaded	Constant Current	1	200	400	Coast To Stop	n/a
Compressor - screw - loaded	Constant Current	1	200	400	Coast To Stop	n/a
Compressor - screw - unloaded	Constant Current	1	200	350	Coast To Stop	n/a
Conveyor - horizontal	Constant Current	5	200	400	TVR Soft Stop	10
Conveyor - inclined	Constant Current	2	200	450	Coast To Stop	n/a
Conveyor - vertical (bucket)	Constant Current	2	200	450	Coast To Stop	n/a
Crusher - cone	Constant Current	1	200	350	Coast To Stop	n/a
Crusher - jaw	Constant Current	1	200	450	Coast To Stop	n/a
Crusher - rotary	Constant Current	1	200	400	Coast To Stop	n/a
Debarker	Constant Current	1	200	350	Coast To Stop	n/a
Fan - axial (damped)	Constant Current	1	200	350	Coast To Stop	n/a
Fan - axial (undamped)	Constant Current	1	200	450	Coast To Stop	n/a
Fan - centrifugal (damped)	Constant Current	1	200	350	Coast To Stop	n/a
Fan - centrifugal (undamped)	Constant Current	1	200	450	Coast To Stop	n/a
Fan - high pressure	Constant Current	1	200	450	Coast To Stop	n/a
Mill - ball	Constant Current	1	200	450	Coast To Stop	n/a
Mill - hammer	Constant Current	1	200	450	Coast To Stop	n/a
Pump - bore	Adaptive Control (Early accel.)	3	n/a	500	Adaptive Control (Late decel.)	3
Pump - centrifugal	Adaptive Control (Early accel.)	10	n/a	500	Adaptive Control (Late decel.)	15
Pump - Hydraulic	Constant Current	2	200	350	Coast To Stop	n/a
Pump - positive displacement	Adaptive Control (Const. accel.)	10	n/a	400	Adaptive Control (Const. decel.)	10
Pump - submersible	Adaptive Control (Early accel.)	5	n/a	500	Adaptive Control (Late decel.)	5
Saw - bandsaw	Constant Current	1	200	450	Coast To Stop	n/a
Saw - circular	Constant Current	1	200	350	Coast To Stop	n/a
Shredder	Constant Current	1	200	450	Coast To Stop	n/a

19.8 Soft start methods

Constant current

Constant current is the traditional form of soft starting, which raises the current from zero to a specified level and keeps the current stable at that level until the motor has accelerated. Constant current starting is ideal for applications where the start current must be kept below a particular level.

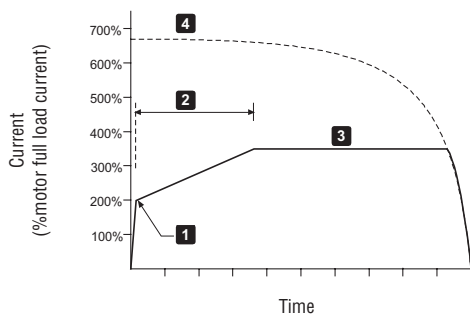


- 1: Initial Current (parameter 2C)
- 2: Current Limit (parameter 2D)
- 3: Full voltage current

Constant current with current ramp

Current ramp soft starting raises the current from a specified starting level (1) to a maximum limit (3), over an extended period of time (2). Current ramp starting can be useful for applications where:

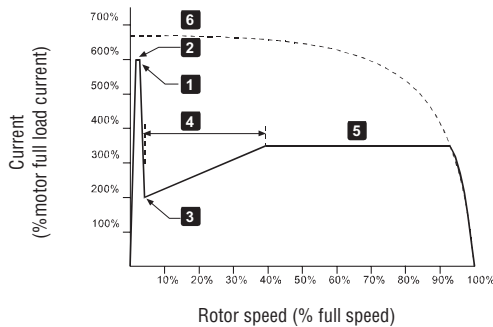
- the load can vary between starts (for example a conveyor which may start loaded or unloaded). Set the initial current (parameter 2C) to a level that will start the motor with a light load, and the current limit (parameter 2D) to a level that will start the motor with a heavy load.
- the load breaks away easily, but starting time needs to be extended (for example a centrifugal pump where pipeline pressure needs to build up slowly).
- the electricity supply is limited (for example a generator set), and a slower application of load will allow greater time for the supply to respond.



- 1: Initial Current (parameter 2C)
- 2: Start Ramp Time (parameter 2B)
- 3: Current Limit (parameter 2D)
- 4: Full voltage current

Constant current with kickstart

Kickstart provides a short boost of extra torque at the beginning of a start, and can be used in conjunction with current ramp or constant current starting. Kickstart can be useful to help start loads that require high breakaway torque but then accelerate easily (for example helical rotor pumps).



- 1: Kickstart Level (parameter 2G)
- 2: Kickstart Time (parameter 2F)
- 3: Initial Current (parameter 2C)
- 4: Start Ramp Time (parameter 2B)
- 5: Current Limit (parameter 2D)
- 6: Full voltage current

Timed voltage ramp

Timed voltage ramp (TVR) soft starting ramps the application of voltage to the motor over a defined time period. The voltage ramp reduces the initial starting torque and slows the motor's rate of acceleration.

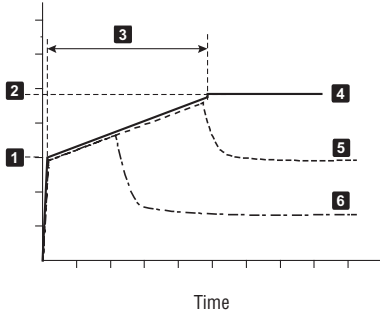
TVR starting can be useful for applications where multiple motors of different sizes are connected in parallel, and/or the loads are not mechanically linked.

NOTE
TVR soft starting is not suitable for high inertia loads (such as fans), which require a high level of voltage to accelerate the load.

NOTE
For multiple motors of the same sizes, and/or mechanically coupled loads, use constant current starting.

For a timed voltage ramp start, the following are typical values and can be adjusted to suit your specific application:

- Add the FLC value of all the connected motors. Use this combined value to set parameter 1B Motor Full Load Current. (Note that the combined value must not exceed the starter rating.)
- Set parameter 2C Initial Current to 100%, parameter 2D Current Limit to 500%, and set the ramp time as required (parameter 2B Start Ramp Time).

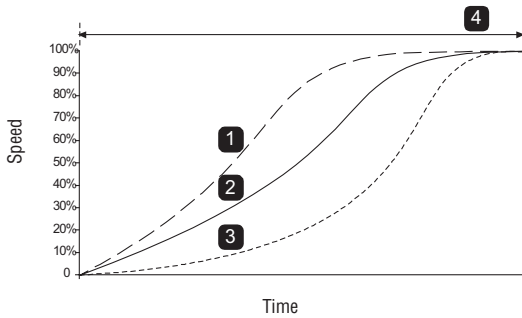


- 1: Initial Current (parameter 2C)
- 2: Current Limit (parameter 2D)
- 3: Start Ramp Time (parameter 2B)
- 4: Full voltage
- 5: Motor 1 current
- 6: Motor 2 current

Adaptive control for starting

In an adaptive control soft start, the ADXT adjusts the current in order to start the motor within a specified time and using a selected acceleration profile.

NOTE
The ADXT will apply the current limit on all soft starts, including adaptive control. If the current limit is too low or the start ramp time (parameter 2B) is too short, the motor may not start successfully.



- Adaptive Start Profile (parameter 2E):
- 1. Early Acceleration
- 2. Constant Acceleration
- 3. Late Acceleration
- 4. Start Ramp Time (parameter 2B)

Fine-tuning Adaptive Control

If the motor does not start or stop smoothly, adjust the adaptive control gain (parameter 2L). The gain setting determines how much the ADXT will adjust future adaptive control starts and stops, based on information from the previous start. The gain setting affects both starting and stopping performance.

- If the motor accelerates or decelerates too quickly at the end of a start or stop, increase the gain setting by 5%~10%.
- If the motor speed fluctuates during starting or stopping, decrease the gain setting slightly.

NOTE
The ADXT tunes Adaptive Control to match the motor. Changing the following parameters will reset Adaptive Control and the first start/stop cycle will use constant current start/timed voltage ramp stop: 1B Motor Full Load Current, 2D Current Limit, 2L Adaptive Control Gain.

19.9 Stop methods

Coast to stop

Coast to stop lets the motor slow at its natural rate, with no control from the soft starter. The time required to stop will depend on the type of load.

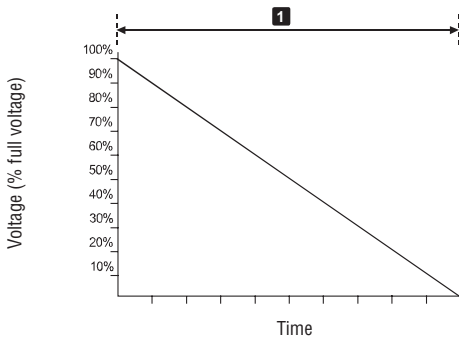
Timed voltage ramp soft stop

Timed voltage ramp stopping reduces the voltage to the motor gradually over a defined time. This can extend the stopping time of the motor and may avoid transients on generator set supplies.



NOTE

The load may continue to run after the stop ramp is complete.



1: Stop Time (parameter 2J)

Adaptive control for stopping

In an adaptive control soft stop, the ADXT controls the current in order to stop the motor within a specified time and using a selected deceleration profile. Adaptive control can be useful in extending the stopping time of low inertia loads.

If adaptive control is selected, the first soft stop will use timed voltage ramp. This allows the ADXT to learn the characteristics of the connected motor.

This motor data is used by the ADXT during subsequent adaptive control stops.



NOTE

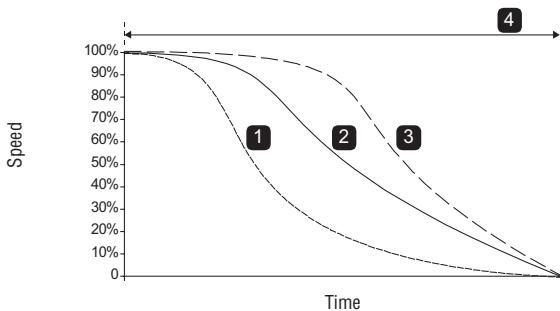
Adaptive control does not actively slow the motor down and will not stop the motor faster than a coast to stop. To shorten the stopping time of high inertia loads, use brake.



CAUTION

Adaptive Control controls the motor's speed profile, within the programmed time limit. This may result in a higher level of current than traditional control methods.

If replacing a motor connected to an ADXT programmed for adaptive control starting or stopping, the starter will need to learn the characteristics of the new motor. Change the value of parameter 1B Motor Full Load Current or parameter 2L Adaptive Control Gain to initiate the re-learning process. The next start will use constant current and the next stop will use timed voltage ramp.



Adaptive Stop Profile (parameter 2K):

1. Early Deceleration
2. Constant Deceleration
3. Late Deceleration
4. Stop Time (parameter 2J)

Adaptive control is ideal for pumping applications, where it can minimise the damaging effects of fluid hammer. We recommend testing the three profiles to identify the best profile for the application.

Adaptive Stop Profile	Application
Late Deceleration	High head systems where even a small decrease in motor/pump speed results in a rapid transition between forward flow and reverse flow.
Constant Deceleration	Low to medium head, high flow applications where the fluid has high momentum.
Early Deceleration	Open pump systems where fluid must drain back through the pump without driving the pump in reverse.

DC brake

Brake reduces the time required to stop the motor.

During braking an increased noise level from the motor may be audible. This is a normal part of motor braking.

CAUTION

When using DC brake, the mains supply must be connected to the soft starter (input terminals L1, L2, L3) in positive phase sequence.

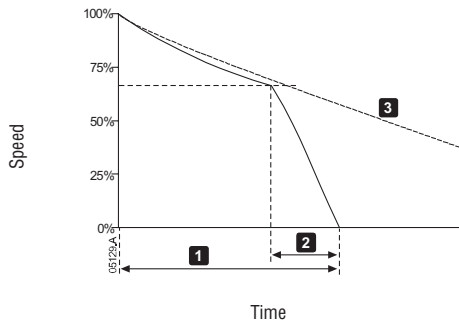
CAUTION

If the brake torque is set too high, the motor will stop before the end of the brake time and the motor will suffer unnecessary heating which could result in damage. Careful configuration is required to ensure safe operation of the starter and motor.

A high brake torque setting can result in peak currents up to motor DOL being drawn while the motor is stopping. Ensure protection fuses installed in the motor branch circuit are selected appropriately.

CAUTION

Brake operation causes the motor to heat faster than the rate calculated by the motor thermal model. If you are using brake, install a motor thermistor or allow sufficient restart delay (parameter 5P).



- 1: Stop Time (parameter 2J)
- 2: Brake Time (parameter 2P)
- 3: Coast to stop time

Parameter settings:

- Parameter 2I Stop Mode: set to 'DC Brake'.
- Parameter 2J Stop Time: This is the total braking time (1) and must be set sufficiently longer than the brake time (parameter 2P) to allow the pre-braking stage to reduce motor speed to approximately 70%. If the stop time is too short, braking will not be successful and the motor will coast to stop.
- Parameter 2O DC Brake Torque: set as required to slow the load. If set too low, the motor will not stop completely and will coast to stop after the end of the braking period.
- Parameter 2P DC Brake Time: Set Brake Time (parameter 2P) to approximately one quarter of the programmed Stop Time. This sets the time for the Full Brake stage (2).

Soft brake

For applications with high inertia and/or a variable load requiring the maximum possible braking torque, the ADXT can be configured for soft braking.

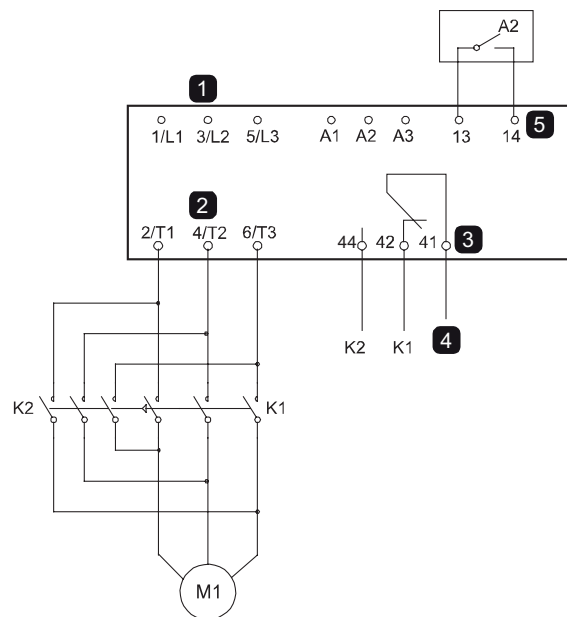
The ADXT uses a changeover relay to control forward run and braking contactors. While braking, the ADXT reverses the phase sequence to the motor and supplies reduced current, gently slowing the load.

When motor speed approaches zero, the zero speed sensor (A2) stops the soft starter and opens the braking contactor (K2).

Soft braking can be used with both the primary and secondary motor sets, and must be configured separately for each.

Parameter settings:

- Parameter 2I Stop Mode: set to 'Soft Brake'
- Parameter 2Q Brake Current Limit: set as required to slow the load
- Parameter 2R Soft Brake Delay: controls the time the soft starter will wait after a stop signal is received, before it begins to supply braking current to the motor. Set to allow time for K1 and K2 to switch.
- Parameter 7A Input A Function: set to 'Zero Speed Sensor'
- Parameter 8A Relay A Function: set to 'Soft Brake Relay'



- 1 Three-phase supply
- 2 Motor terminals
- 3 Relay output A
- 4 K1/K2 coil supply
- 5 Programmable input A

- K1 Line contactor (Run)
- K2 Line contactor (Brake)
- A2 Zero speed sensor

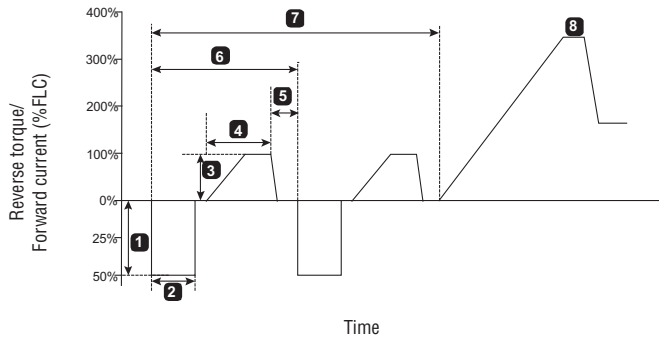
19.10 Pump clean

The starter can perform a pump clean function before soft starting the motor. This can help dislodge debris from the impeller.

Pump clean starts the motor in reverse then forward direction, then stops the motor. Pump clean can be configured to repeat the process up to 5 times.

After the specified number of cleaning cycles, the starter performs the programmed soft start.

Pump clean operation is controlled by the start/stop input (11, 12). A programmable input must be set to pump clean (refer to parameter 7A Input A Function for details) and the input must be closed when the start signal is applied.



- | | |
|---|-------------------------------------|
| 1 Reverse Torque (parameter 11A) | 5 Pump Stop Time (parameter 11F) |
| 2 Reverse Time (parameter 11B) | 6 Cleaning cycle |
| 3 Forward Current Limit (parameter 11C) | 7 Pump Clean Cycles (parameter 11G) |
| 4 Forward Time (parameter 11D) | 8 Programmed soft start |

19.11 Reverse direction operation

The starter can control a reversing contactor, to operate the motor in reverse direction. When reverse operation is selected, the starter will perform a soft start using the opposite phase sequence from normal operation.

Reverse operation is controlled by the start/stop input (11, 12). A programmable input must be set to reverse direction (parameter 7A Input A Function) and an output must be set to reversing contactor (parameter 8A Relay A Function).

The input must be closed when the start signal is applied. The starter will keep the reverse relay in the same state until the end of the starting/stopping cycle.

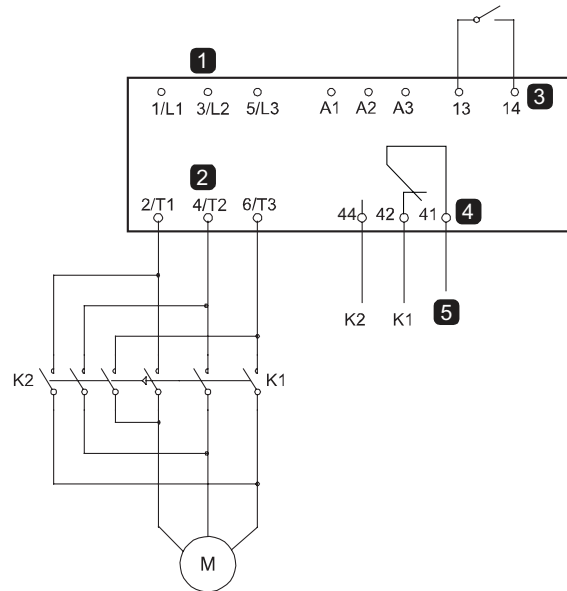
This example shows a simple installation, but many different configurations are possible depending on your application requirements. Contact your local supplier for an application note showing more installation options.



NOTE
The first start after the direction is changed will be constant current.



NOTE
If phase sequence protection is required, install the reversing contactor on the output (motor) side of the soft starter.



- | | |
|--|--------------------------|
| 1 Three-phase supply | K1 Forward run contactor |
| 2 Motor terminals | K2 Reversing contactor |
| 3 Programmable input A (set = Reverse Direction) | |
| 4 Relay output A (set = Reversing Contactor) | |
| 5 K1/K2 coil supply | |

19.12 Jog operation

Jog runs the motor at reduced speed, to allow alignment of the load or to assist servicing. The motor can be jogged in either forward or reverse direction. Jog is only available when the starter is controlled via the digital inputs (parameter 1A Command Source = 'Digital Input'). To operate in jog, a programmable input must be set to jog (refer to parameter 7A for details) and the input must be closed when the start signal is applied.

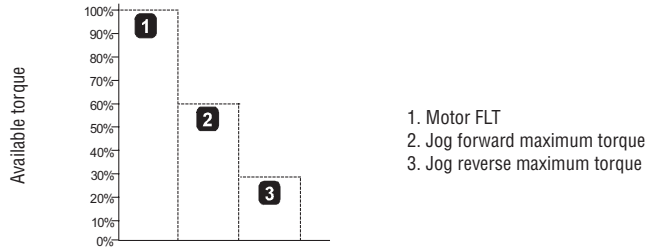
CAUTION

Slow speed running is not intended for continuous operation due to reduced motor cooling. Jog operation causes the motor to heat faster than the rate calculated by the motor thermal model. If you are using jog, install a motor thermistor or allow sufficient restart delay (parameter 5P).

The maximum available torque for jog forward is approximately 50%~75% of motor full load torque (FLT) depending on the motor. The torque when the motor is jogged in reverse is approximately 25% to 50% of FLT. Parameters 2H and 3J Jog Torque control how much of the maximum available jog torque the soft starter will apply to the motor.

NOTE

Torque settings above 50% may cause increased shaft vibration.



19.13 Inside delta operation

When connecting in inside delta, enter the motor full load current (FLC) for parameter 1B. The ADXT will automatically detect whether the motor is connected in-line or inside delta and will calculate the correct inside delta current level. Adaptive Control, Jog, Brake and PowerThrough functions are not supported with inside delta (six-wire) operation. If these functions are programmed when the starter is connected inside delta the behaviour is as given below:

Unsupported option	Replacement behaviour
Adaptive Control Start	The starter performs a constant current start.
Adaptive Control Stop	The starter performs a TVR soft stop if parameter 2J Stop Time is >0 secs. If parameter 2J is set to 0 secs the starter performs a coast to stop.
Jog	The starter issues a warning with the error message Unsupported option.
DC Brake	The starter performs a coast to stop.
Soft Brake	The starter performs a coast to stop.
PowerThrough	The starter trips with the error message Lx-Tx Shorted.

NOTE

When connected in inside delta, the ADXT will not detect phase loss on T2 during run.

NOTE

If the starter is not correctly detecting the motor connection, use parameter 20F Motor Connection.

19.14 Secondary motor set

The ADXT can be programmed with two separate starting and stopping profiles. This allows the soft starter to control the motor in two different starting and stopping configurations. The secondary motor set is ideal for dual winding (Dahlander) motors, multi-motor applications, or situations where the motor may start in two different conditions (such as loaded and unloaded conveyors). The secondary motor set can also be used for duty/standby applications.

NOTE

For duty/standby applications, set parameter 6Q Motor Overtemperature to Log Only and install temperature protection for each motor.

To use the secondary motor set, a programmable input must be set to 'Motor Set Select' and the input must be closed before a start command is given (refer to 7A Input A Function and 7E Input B Function). The ADXT checks which motor set to use at a start, and will use that motor set for the entire start/stop cycle.

20. PROGRAMMABLE PARAMETERS

20.1 Main menu

The main menu lets you view and change programmable parameters that control how the ADXT operates. To open the main menu, press the MENU/SAVE button then scroll to Main Menu and press MENU/SAVE again.



NOTE

Parameters for smart card functions are only visible in the parameter list if the smart card is installed.

20.2 Altering parameter values

To change a parameter value:

- scroll to the appropriate parameter in the main menu and press MENU/SAVE to enter edit mode.
- to alter the parameter setting, use the ▲ and ▼ buttons. Pressing ▲ or ▼ once will increase or decrease the value by one unit. If the button is held for longer than five seconds, the value will increase or decrease at a faster rate.
- to save changes, press MENU/SAVE. The setting shown on the display will be saved and the keypad will return to the parameter list.
- to cancel changes, press EXIT/RESET. The keypad will ask for confirmation, then return to the parameter list without saving changes.

20.3 Adjustment lock

You can prevent users from altering parameter settings by turning on the adjustment lock (parameter 10G Adjustment Lock).

If a user attempts to change a parameter value when the adjustment lock is active, an error message is displayed:

Access Denied
 Adj Lock is On

20.4 Parameter list

		Parameter Group	Default Setting
1		Motor Details	
	1A	Command Source	Digital Input
	1B	Motor Full Load Current	Model dependent
	1C	Motor kW	0 kW
	1D	Locked Rotor Time	00:10 (mm:ss)
	1E	Locked Rotor Current	600%
	1F	Motor Service Factor	105%
	1G	Reserved	
2		Motor Start/Stop	
	2A	Start Mode	Constant Current
	2B	Start Ramp Time	00:10 (mm:ss)
	2C	Initial Current	200%
	2D	Current Limit	350%
	2E	Adaptive Start Profile	Constant Acceleration
	2F	Kickstart Time	000 ms
	2G	Kickstart Level	500%
	2H	Jog Torque	50%
	2I	Stop Mode	TVR Soft Stop
	2J	Stop Time	00:00 (mm:ss)
	2K	Adaptive Stop Profile	Constant Deceleration
	2L	Adaptive Control Gain	75%
	2M	Multi Pump	Single Pump
	2N	Start Delay	00:00 (mm:ss)
	2O	DC Brake Torque	20%
	2P	DC Brake Time	00:01 (mm:ss)
	2Q	Brake Current Limit	250%
	2R	Soft Brake Delay	400 ms
3		Motor Start/Stop 2	
	3A	Motor Full Load Current-2	Model dependent
	3B	Motor kW-2	0 kW
	3C	Start Mode-2	Constant Current
	3D	Start Ramp Time-2	00:10 (mm:ss)
	3E	Initial Current-2	200%
	3F	Current Limit-2	350%
	3G	Adaptive Start Profile-2	Constant Acceleration
	3H	Kickstart Time-2	000 ms
	3I	Kickstart Level-2	500%
	3J	Jog Torque-2	50%
	3K	Stop Mode-2	TVR Soft Stop
	3L	Stop Time-2	00:00 (mm:ss)
	3M	Adaptive Stop Profile-2	Constant Deceleration
	3N	Adaptive Control Gain-2	75%
	3O	Multi Pump-2	Single Pump
	3P	Start Delay-2	00:00 (mm:ss)
	3Q	DC Brake Torque-2	20%
	3R	DC Brake Time-2	00:01 (mm:ss)
	3S	Brake Current Limit-2	250%
	3T	Soft Brake Delay-2	400 ms

		Parameter Group	Default Setting
4		Auto-Start/Stop	
	4A	Auto-Start/Stop Mode	Disable
	4B	Run Time	00:00 (hh:mm)
	4C	Stopped Time	00:00 (hh:mm)
	4D	Sunday Mode	Start/Stop Disable
	4E	Sunday Start Time	00:00 (hh:mm)
	4F	Sunday Stop Time	00:00 (hh:mm)
	4G	Monday Mode	Start/Stop Disable
	4H	Monday Start Time	00:00 (hh:mm)
	4I	Monday Stop Time	00:00 (hh:mm)
	4J	Tuesday Mode	Start/Stop Disable
	4K	Tuesday Start Time	00:00 (hh:mm)
	4L	Tuesday Stop Time	00:00 (hh:mm)
	4M	Wednesday Mode	Start/Stop Disable
	4N	Wednesday Start Time	00:00 (hh:mm)
	4O	Wednesday Stop Time	00:00 (hh:mm)
	4P	Thursday Mode	Start/Stop Disable
	4Q	Thursday Start Time	00:00 (hh:mm)
	4R	Thursday Stop Time	00:00 (hh:mm)
	4S	Friday Mode	Start/Stop Disable
	4T	Friday Start Time	00:00 (hh:mm)
	4U	Friday Stop Time	00:00 (hh:mm)
	4V	Saturday Mode	Start/Stop Disable
	4W	Saturday Start Time	00:00 (hh:mm)
	4X	Saturday Stop Time	00:00 (hh:mm)
5		Protection Levels	
	5A	Current Imbalance	30%
	5B	Current Imbalance Delay	00:03 (mm:ss)
	5C	Undercurrent	20%
	5D	Undercurrent Delay	00:05 (mm:ss)
	5E	Overcurrent	400%
	5F	Overcurrent Delay	00:00 (mm:ss)
	5G	Undervoltage	350 V
	5H	Undervoltage Delay	00:01 (mm:ss)
	5I	Overvoltage	500 V
	5J	Overvoltage Delay	00:01 (mm:ss)
	5K	Underpower	10%
	5L	Underpower Delay	00:05 (mm:ss)
	5M	Overpower	150%
	5N	Overpower Delay	00:05 (mm:ss)
	5O	Excess Start Time	00:20 (mm:ss)
	5P	Restart Delay	00:10 (mm:ss)
	5Q	Starts per Hour	0
	5R	Phase Sequence	Any Sequence
6		Protection Actions	
	6A	Auto-Reset Count	0
	6B	Auto-Reset Delay	00:05 (mm:ss)
	6C	Current Imbalance	Soft Trip and Log
	6D	Undercurrent	Soft Trip and Log
	6E	Overcurrent	Soft Trip and Log
	6F	Undervoltage	Soft Trip and Log
	6G	Overvoltage	Soft Trip and Log
	6H	Underpower	Log Only
	6I	Overpower	Log Only
	6J	Excess Start Time	Soft Trip and Log
	6K	Input A Trip	Soft Trip and Log
	6L	Input B Trip	Soft Trip and Log
	6M	Network Communications	Soft Trip and Log
	6N	Remote Keypad Fault	Soft Trip and Log
	6O	Frequency	Soft Trip and Log
	6P	Phase Sequence	Soft Trip and Log
	6Q	Motor Overtemperature	Soft Trip and Log
	6R	Motor Thermistor Circuit	Soft Trip and Log
	6S	Shorted SCR Action	3-Phase Control Only
	6T	Battery/Clock	Soft Trip and Log

		Parameter Group	Default Setting
7		Inputs	
	7A	Input A Function	Input Trip (N/O)
	7B	Input A Trip	Operating Only
	7C	Input A Trip Delay	00:00 (mm:ss)
	7D	Input A Initial Delay	00:00 (mm:ss)
	7E	Input B Function	Input Trip (N/O)
	7F	Input B Trip	Operating Only
	7G	Input B Trip Delay	00:00 (mm:ss)
	7H	Input B Initial Delay	00:00 (mm:ss)
	7I	Reset/Enable Logic	Normally Closed (N/C)
	7J	Input A Name	Input A Trip
	7K	Input B Name	Input B Trip
8		Relay Outputs	
	8A	Relay A Function	Run
	8B	Relay A On Delay	00:00 (mm:ss)
	8C	Relay A Off Delay	00:00 (mm:ss)
	8D	Relay B Function	Run
	8E	Relay B On Delay	00:00 (mm:ss)
	8F	Relay B Off Delay	00:00 (mm:ss)
	8G	Low Current Flag	50%
	8H	High Current Flag	100%
	8I	Motor Temperature Flag	80%
	8J	Main Contactor Time	400 ms
9		Analog Output	
	9A	Analog Output A	Current (% FLC)
	9B	Analog A Scale	4-20 mA
	9C	Analog A Maximum Adjustment	100%
	9D	Analog A Minimum Adjustment	000%
10		Display	
	10A	Language	English
	10B	Temperature Scale	Celsius
	10C	Graph Timebase	30 seconds
	10D	Graph Maximum Adjustment	400%
	10E	Graph Minimum Adjustment	0%
	10F	Current Calibration	100%
	10G	Adjustment Lock	Read & Write
	10H	User Parameter 1	Current
	10I	User Parameter 2	Motor Voltage
	10J	User Parameter 3	Mains Frequency
	10K	User Parameter 4	Motor pf
	10L	User Parameter 5	Motor Power
	10M	User Parameter 6	Motor Temperature (%)
11		Pump Clean	
	11A	Reverse Torque	20%
	11B	Reverse Time	00:10 (mm:ss)
	11C	Forward Current Limit	100%
	11D	Forward Time	00:10 (mm:ss)
	11E	Pump Stop Mode	Coast To Stop
	11F	Pump Stop Time	00:10 (mm:ss)
	11G	Pump Clean Cycles	1

		Parameter Group	Default Setting
12		Communications Card	
	12A	Modbus Address	1
	12B	Modbus Baud Rate	9600
	12C	Modbus Parity	None
	12D	Modbus Timeout	Off
	12E	Devicenet Address	0
	12F	Devicenet Baud Rate	125kB
	12G	Profibus Address	1
	12H	Gateway Address	192
	12I	Gateway Address 2	168
	12J	Gateway Address 3	0
	12K	Gateway Address 4	100
	12L	IP Address	192
	12M	IP Address 2	168
	12N	IP Address 3	0
	12O	IP Address 4	2
	12P	Subnet Mask	255
	12Q	Subnet Mask 2	255
	12R	Subnet Mask 3	255
	12S	Subnet Mask 4	0
	12T	DHCP	Disable
	12U	Location ID	0
20		Advanced	
	20A	Tracking Gain	50%
	20B	Pedestal Detect	80%
	20C	Bypass Contactor Delay	100 ms
	20D	Model Rating	Model dependent
	20E	Screen Timeout	1 minute
	20F	Motor Connection	Auto-detect
	20G	External Bypass	Disable
	20H	Shunt Trip Mode	Disable
30		Pump Input Configuration	
	30A	Pressure Sensor Type	None
	30B	Pressure Units	kPa
	30C	Pressure at 4 mA	0
	30D	Pressure at 20 mA	0
	30E	Flow Sensor Type	None
	30F	Flow Units	litres/second
	30G	Flow at 4 mA	0
	30H	Flow at 20 mA	0
	30I	Units per Minute at Max Flow	0
	30J	Pulses per Minute at Max Flow	0
	30K	Units per Pulse	0
	30L	Depth Sensor Type	None
	30M	Depth Units	metres
	30N	Depth at 4 mA	0
	30O	Depth at 20 mA	0
31		Flow Protection	
	31A	High Flow Trip Level	10
	31B	Low Flow Trip Level	5
	31C	Flow Start Delay	00:00:500 (mm:ss:ms)
	31D	Flow Response Delay	00:00:500 (mm:ss:ms)
32		Pressure Protection	
	32A	High Pressure Trip Level	10
	32B	High Pressure Start Delay	00:00:500 (mm:ss:ms)
	32C	High Pressure Response Delay	00:00:500 (mm:ss:ms)
	32D	Low Pressure Trip Level	5
	32E	Low Pressure Start Delay	00:00:500 (mm:ss:ms)
	32F	Low Pressure Response Delay	00:00:500 (mm:ss:ms)
33		Pressure Control	
	33A	Pressure Control Mode	Off
	33B	Start Pressure Level	5
	33C	Start Response Delay	00:00:500 (mm:ss:ms)
	33D	Stop Pressure Level	10
	33E	Stop Response Delay	00:00:500 (mm:ss:ms)

		Parameter Group	Default Setting
34		Depth Protection	
	34A	Depth Trip Level	5
	34B	Depth Reset Level	10
	34C	Depth Start Delay	00:00:500 (mm:ss:ms)
	34D	Depth Response Delay	00:00:500 (mm:ss:ms)
35		Thermal Protection	
	35A	Temperature Sensor Type	None
	35B	Temperature Trip Level	40
36		Pump Trip Action	
	36A	Pressure Sensor	Soft Trip and Log
	36B	Flow Sensor	Soft Trip and Log
	36C	Depth Sensor	Soft Trip and Log
	36D	High Pressure	Soft Trip and Log
	36E	Low Pressure	Soft Trip and Log
	36F	High Flow	Soft Trip and Log
	36G	Low Flow	Soft Trip and Log
	36H	Flow Switch	Soft Trip and Log
	36I	Well Depth	Soft Trip and Log
	36J	RTD/PT100 B	Soft Trip and Log
40		Ground Fault	
	40A	Ground Fault Level	0 A
	40B	Ground Fault Delay	00:01 (mm:ss)
	40C	Ground Fault Trip Active	Operating only
	40D	Ground Fault Action	Soft Trip and Log
	40E	Ground Fault CT Ratio	1000:1
41		Calibrate 4-20 mA	
	41A	4 mA Calibration	100%
	41B	20 mA Calibration	100%

20.5 1 Motor Details

1A – Command Source

Options:	Digital Input (default)	The ADXT will accept start and stop commands from the digital inputs.
	Network	The ADXT will accept start and stop commands from the communication expansion card.
	Remote Keypad	The ADXT will accept start and stop commands from the Remote Keypad.
	Clock	The ADXT will start and stop as scheduled in parameters 4D to 4X.
	Smart Card	The ADXT will accept start and stop commands from the smart card.
	Smart Card + Clock	The ADXT will accept start commands from the smart card if they are within the operating schedule set in parameters 4D to 4X. A stop command from the smart card will be accepted regardless of the schedule.
	Timer	After a start signal is received, the ADXT will start and stop the motor according to the timers set in parameters 4B and 4C.
Description:	Selects the command source for controlling the soft starter.	

1B – Motor Full Load Current

Range:	Model dependent
Description:	Matches the starter to the connected motor's full load current. Set to the full load current (FLC) rating shown on the motor nameplate.

1C – Motor kW

Range:	0 - 9999 kW	Default: 0
Description:	Sets the running power of the connected motor, in kilowatts. This setting is the basis for power reporting and protection.	



NOTE

The motor nameplate may state different power ratings for different supply voltages or power connections. Ensure that the motor kW setting is accurate for the installation.

1D – Locked Rotor Time

Range:	0:01 - 2:00 (minutes:seconds)	Default: 10 seconds
Description:	Sets the maximum length of time the motor can sustain locked rotor current from cold before reaching its maximum temperature. Set according to the motor datasheet.	

1E – Locked Rotor Current

Range:	400% - 1200% FLC	Default: 600%
Description:	Sets the locked rotor current of the connected motor, as a percentage of full load current. Set according to the motor datasheet.	

1F – Motor Service Factor

Range: 100% - 130% Default: 105%

Description: Sets the motor service factor used by the thermal model. If the motor runs at full load current, it will reach 100%. Set according to the motor datasheet.

**NOTE**

Parameters 1D, 1E and 1F determine the trip current for motor overload protection. The default settings of parameters 1D, 1E and 1F provide Motor Overload Protection: Class 10, Trip Current 105% of FLA (full load amperage) or equivalent.

1G – Reserved

Description: This parameter is reserved for future use.

20.6 2 Motor Start/Stop**2A – Start Mode**

Options: Constant Current (default)
Adaptive Control

Description: Selects the soft start mode.

**NOTE**

The ADXT will apply the current limit on all soft starts, including adaptive control. If the current limit is too low or the start ramp time (parameter 2B) is too short, the motor may not start successfully.

2B – Start Ramp Time

Range: 0:01 - 3:00 (minutes:seconds) Default: 10 seconds

Description: Sets the total start time for an Adaptive Control start or the ramp time for current ramp starting (from the initial current to the current limit).

2C – Initial Current

Range: 100% - 600% FLC Default: 200%

Description: Sets the initial start current level for current ramp starting, as a percentage of motor full load current. Set so that the motor begins to accelerate immediately after a start is initiated.
If current ramp starting is not required, set the initial current equal to the current limit.

2D – Current Limit

Range: 100% - 600% FLC Default: 350%

Description: Sets the current limit for constant current and current ramp soft starting, as a percentage of motor full load current.

2E – Adaptive Start Profile

Options: Early Acceleration
Constant Acceleration (default)
Late Acceleration

Description: Selects which profile the ADXT will use for an Adaptive Control soft start.

**NOTE**

The ADXT will apply the current limit on all soft starts, including adaptive control. If the current limit is too low or the start ramp time (parameter 2B) is too short, the motor may not start successfully.

2F – Kickstart Time

Range: 0 – 2000 milliseconds Default: 0000

Description: Sets the kickstart duration. A setting of 0 disables kickstart.

2G – Kickstart Level

Range: 100% - 700% FLC Default: 500%

Description: Sets the level of the kickstart current.

**CAUTION**

Kickstart subjects the mechanical equipment to increased torque levels. Ensure the motor, load and couplings can handle the additional torque before using this feature.

2H – Jog Torque

The ADXT can jog the motor at a reduced speed, which allows precise positioning of belts and flywheels. Jog can be used for either forward or reverse operation.

Range: 20% - 100% Default: 50%

Description: Sets the current limit for jog operation.

2I – Stop Mode

Options: Coast To Stop
TVR Soft Stop (default)
Adaptive Control
DC Brake Soft Brake

Description: Selects the stop mode.

2J – Stop Time

Range: 0:00 - 4:00 (minutes:seconds) Default: 0 second

Description: Sets the time for soft stopping the motor using timed voltage ramp or Adaptive Control. If a main contactor is installed, the contactor must remain closed until the end of the stop time. Use the main contactor output (33, 34) to control the main contactor.

2K – Adaptive Stop Profile

Options: Early Deceleration
Constant Deceleration (default)
Late Deceleration

Description: Selects which profile the ADXT will use for an Adaptive Control soft stop.

2L – Adaptive Control Gain

Range: 1% - 200% Default: 75%

Description: Adjusts the performance of Adaptive Control. This setting affects both starting and stopping control.

2M – Multi Pump

Options: Single Pump (default)
Manifold Pump

Description: Adjusts the performance of adaptive control to suit installations with multiple pumps connected to a common outlet manifold.

2N – Start Delay

Range: 10:00 - 60:00 (minutes:seconds) Default: 0 second

Description: Sets a delay after the starter receives a start command, before it starts the motor.

2O – DC Brake Torque

Range: 20% - 100% Default: 20%

Description: Sets the amount of brake torque the ADXT will use to slow the motor.

2P – DC Brake Time

Range: 0:01 - 0:30 (minutes:seconds) Default: 1 second

Description: Sets the duration for DC injection during a braking stop.

2Q – Brake Current Limit

Range: 100% - 600% FLC Default: 250%

Description: Sets the current limit for soft brake.

2R – Soft Brake Delay

Range: 400 - 2000 milliseconds Default: 400 milliseconds

Description: Sets the time the soft starter will wait after a stop signal is received, before it begins to supply braking current to the motor. Set to allow time for K1 and K2 to switch.

20.7 3 Motor Start/Stop-2

The parameters in this group control the operation of the secondary configuration of the motor. Use the programmable input to select the active motor set. Refer to Secondary motor set on page 78 for details.

3A – Motor Full Load Current-2

Range: Model dependent

Description: Sets the secondary motor's full load current.

3B – Motor kW-2

Range: 0 - 9999 kW Default: 0

Description: Sets the running power of the secondary motor, in kilowatts.

3C – Start Mode-2

Options: Constant Current (default)
Adaptive Control

Description: Selects the soft start mode.

3D – Start Ramp Time-2

Range: 0:01 - 3:00 (minutes:seconds) Default: 10 seconds

Description: Sets the total start time for an Adaptive Control start or the ramp time for current ramp starting (from the initial current to the current limit).

3E – Initial Current-2

Range: 100% - 600% FLC Default: 200%

Description: Sets the initial start current level for current ramp starting, as a percentage of motor full load current. Set so that the motor begins to accelerate immediately after a start is initiated. If current ramp starting is not required, set the initial current equal to the current limit.

3F – Current Limit-2

Range: 100% - 600% FLC Default: 350%
 Description: Sets the current limit for constant current and current ramp soft starting, as a percentage of motor full load current.

**NOTE**

The ADXT will apply the current limit on all soft starts, including adaptive control. If the current limit is too low or the start ramp time (parameter 2B) is too short, the motor may not start successfully.

3G – Adaptive Start Profile-2

Options: Early Acceleration
 Constant Acceleration (default)
 Late Acceleration
 Description: Selects which profile the ADXT will use for an Adaptive Control soft start.

3H – Kickstart Time-2

Range: 0 – 2000 milliseconds Default: 0000
 Description: Sets the kickstart duration. A setting of 0 disables kickstart.

3I – Kickstart Level-2

Range: 100% - 700% FLC Default: 500%
 Description: Sets the level of the kickstart current.

3J – Jog Torque-2

Range: 20% - 100% Default: 50%
 Description: Sets the current limit for jog operation.

3K – Stop Mode-2

Options: Coast To Stop
 TVR Soft Stop (default)
 Adaptive Control
 DC Brake
 Soft Brake
 Description: Selects the stop mode.

3L – Stop Time-2

Range: 0:00 - 4:00 (minutes:seconds) Default: 0 second
 Description: Sets the time for soft stopping the motor using timed voltage ramp or Adaptive Control.
 If a main contactor is installed, the contactor must remain closed until the end of the stop time. Use the main contactor output (33, 34) to control the main contactor.

3M – Adaptive Stop Profile-2

Options: Early Deceleration
 Constant Deceleration (default)
 Late Deceleration
 Description: Selects which profile the ADXT will use for an Adaptive Control soft stop.

3N – Adaptive Control Gain-2

Range: 1%~200% Default: 75%
 Description: Adjusts the performance of Adaptive Control. This setting affects both starting and stopping control.

3O – Multi Pump-2

Options: Single Pump (default)
 Manifold Pump
 Description: Adjusts the performance of adaptive control to suit installations with multiple pumps connected to a common outlet manifold.

3P – Start Delay-2

Range: 0:00 - 60:00 (minutes:seconds) Default: 0 second
 Description: Sets a delay after the starter receives a start command, before it starts the motor.

3Q – DC Brake Torque-2

Range: 20% - 100% Default: 20%
 Description: Sets the amount of brake torque the ADXT will use to slow the motor.

3R – DC Brake Time-2

Range: 0:01 - 0:30 (minutes:seconds) Default: 1 second
 Description: Sets the duration for DC injection during a braking stop.

3S – Brake Current Limit-2

Range: 100% - 600% FLC Default: 250%
 Description: Sets the current limit for soft brake.

3T – Soft Brake Delay-2

Range: 400 - 2000 milliseconds Default: 400 milliseconds
 Description: Sets the time the soft starter will wait after a stop signal is received, before it begins to supply braking current to the motor. Set to allow time for K1 and K2 to switch.

20.8 4 Auto-Start/Stop

The ADXT can be configured to automatically start and/or stop the motor at a particular time, or run it in cycles of a specified duration.

4A – Auto-Start/Stop Mode

Options: Disable (default)
 Enable Clock Mode
 Enable Timer Mode
 Description: Enable or disable auto-start/stop operation.

4B – Run Time

Range: 00:00 - 23:59 hh:mm Default: 00:00
 Description: Sets the duration for the starter to run, after a timer mode auto-start.

4C – Stopped Time

Range: 00:00 - 23:59 hh:mm Default: 00:00
 Description: Sets the duration for the starter to remain stopped, when operating in timer mode.

4D – Sunday Mode

Options: Start/Stop Disable (default) Disables auto-start/stop control. Any times scheduled in parameters 4E or 4F will be ignored.
 Start Only Enable Enables auto-start control. Any auto-stop times scheduled in parameter 4F will be ignored.
 Stop Only Enable Enables auto-stop control. Any auto-start times scheduled in parameter 4E will be ignored.
 Start/Stop Enable Enables auto-start and auto-stop control.
 Description: Enables or disables auto-start/stop for Sunday.

4E – Sunday Start Time

Range: 00:00 - 23:59 Default: 00:00
 Description: Sets the auto-start time for Sunday (24 hour format).

4F – Sunday Stop Time

Range: 00:00 - 23:59 Default: 00:00
 Description: Sets the auto-stop time for Sunday (24 hour format).

4G – Monday Mode

Options: Start/Stop Disable (default) Stop Only Enable
 Start Only Enable Start/Stop Enable
 Description: Enables or disables auto-start/stop for Monday.

4H – Monday Start Time

Range: 00:00 - 23:59 Default: 00:00
 Description: Sets the auto-start time for Monday (24 hour format).

4I – Monday Stop Time

Range: 00:00 - 23:59 Default: 00:00
 Description: Sets the auto-stop time for Monday (24 hour format).

4J – Tuesday Mode

Options: Start/Stop Disable (default) Stop Only Enable
 Start Only Enable Start/Stop Enable
 Description: Enables or disables auto-start/stop for Tuesday.

4K – Tuesday Start Time

Range: 00:00 - 23:59 Default: 00:00
 Description: Sets the auto-start time for Tuesday (24 hour format).

4L – Tuesday Stop Time

Range: 00:00 - 23:59 Default: 00:00
 Description: Sets the auto-stop time for Tuesday (24 hour format).

4M – Wednesday Mode

Options: Start/Stop Disable (default) Stop Only Enable
 Start Only Enable Start/Stop Enable
 Description: Enables or disables auto-start/stop for Wednesday.

4N – Wednesday Start Time

Range: 00:00 - 23:59 Default: 00:00
 Description: Sets the auto-start time for Wednesday (24 hour format).

4O – Wednesday Stop Time

Range: 00:00 - 23:59 Default: 00:00

Description: Sets the auto-stop time for Wednesday (24 hour format).

4P – Thursday Mode

Options: Start/Stop Disable (default) Stop Only Enable
Start Only Enable Start/Stop Enable

Description: Enables or disables auto-start/stop for Thursday.

4Q – Thursday Start Time

Range: 00:00 - 23:59 Default: 00:00

Description: Sets the auto-start time for Thursday (24 hour format).

4R – Thursday Stop Time

Range: 00:00 - 23:59 Default: 00:00

Description: Sets the auto-stop time for Thursday (24 hour format).

4S – Friday Mode

Options: Start/Stop Disable (default) Stop Only Enable
Start Only Enable Start/Stop Enable

Description: Enables or disables auto-start/stop for Friday.

4T – Friday Start Time

Range: 00:00 - 23:59 Default: 00:00

Description: Sets the auto-start time for Friday (24 hour format).

4U – Friday Stop Time

Range: 00:00 - 23:59 Default: 00:00

Description: Sets the auto-stop time for Friday (24 hour format).

4V – Saturday Mode

Options: Start/Stop Disable (default) Stop Only Enable
Start Only Enable Start/Stop Enable

Description: Enables or disables auto-start/stop for Saturday.

4W – Saturday Start Time

Range: 00:00 - 23:59 Default: 00:00

Description: Sets the auto-start time for Saturday (24 hour format).

4X – Saturday Stop Time

Range: 00:00 - 23:59 Default: 00:00

Description: Sets the auto-stop time for Saturday (24 hour format).

20.9 5 Protection Levels**5A – Current Imbalance**

Range: 10% - 50% Default: 30%

Description: Sets the trip point for current imbalance protection.

5B – Current Imbalance Delay

Range: 0:00 - 4:00 (minutes:seconds) Default: 3 seconds

Description: Slows the ADXT's response to current imbalance, avoiding trips due to momentary fluctuations.

5C – Undercurrent

Range: 0% - 100% Default: 20%

Description: Sets the trip point for undercurrent protection, as a percentage of motor full load current. Set to a level between the motor's normal working range and the motor's magnetising (no load) current (typically 25% to 35% of full load current). A setting of 0% disables undercurrent protection.

5D – Undercurrent Delay

Range: 0:00 - 4:00 (minutes:seconds) Default: 5 seconds

Description: Slows the ADXT's response to undercurrent, avoiding trips due to momentary fluctuations.

5E – Overcurrent

Range: 80% - 600% Default: 400%

Description: Sets the trip point for overcurrent protection, as a percentage of motor full load current.

5F – Overcurrent Delay

Range: 0:00 - 1:00 (minutes:seconds) Default: 0 second

Description: Slows the ADXT's response to overcurrent, avoiding trips due to momentary overcurrent events.

5G – Undervoltage

Range: 100 - 1200 V Default: 350

Description: Sets the trip point for undervoltage protection. Set as required.

**NOTE**

Voltage protections will not operate correctly until the starter is in Run mode.

5H – Undervoltage Delay

Range: 0:00 - 1:00 (minutes:seconds) Default: 1 second

Description: Slows the ADXT's response to undervoltage, avoiding trips due to momentary fluctuations.

5I – Overvoltage

Range: 100 - 1500 V Default: 500

Description: Sets the trip point for overvoltage protection. Set as required.

5J – Overvoltage Delay

Range: 0:00 - 1:00 (minutes:seconds) Default: 1 second

Description: Slows the ADXT's response to overvoltage, avoiding trips due to momentary fluctuations.

5K – Underpower

Range: 10% -120% Default: 10%

Description: Sets the trip point for underpower protection. Set as required.

5L – Underpower Delay

Range: 0:01 - 1:00 (minutes:seconds) Default: 5 seconds

Description: Slows the ADXT's response to underpower, avoiding trips due to momentary fluctuations.

5M – Overpower

Range: 80% -200% Default: 150%

Description: Sets the trip point for overpower protection. Set as required.

5N – Overpower Delay

Range: 0:01 - 1:00 (minutes:seconds) Default: 5 seconds

Description: Slows the ADXT's response to overpower, avoiding trips due to momentary fluctuations.

5O – Excess Start Time

Range: 0:00 - 4:00 (minutes:seconds) Default: 20 seconds

Description: Excess start time is the maximum time the ADXT will attempt to start the motor. If the motor does not transition to Run mode within the programmed limit, the starter will trip. Set for a period slightly longer than required for a normal healthy start. A setting of 0 disables excess start time protection.

5P – Restart Delay

Range: 00:01 - 60:00 (minutes:seconds) Default: 10 seconds

Description: The ADXT can be configured to force a delay between the end of a stop and the beginning of the next start. During the restart delay period, the display shows the time remaining before another start can be attempted.

5Q – Starts per Hour

Range: 0 - 10 Default: 0

Description: Sets the maximum number of starts the ADXT will attempt in a 60 minute period. A setting of 0 disables this protection.

5R – Phase SequenceOptions: Any Sequence (default)
Positive Only
Negative Only

Description: Selects which phase sequences the soft starter will allow at a start. During its pre-start checks, the starter examines the sequence of the phases at its input terminals and trips if the actual sequence does not match the selected option.

**CAUTION**

When using DC brake, the mains supply must be connected to the soft starter (input terminals L1, L2, L3) in positive phase sequence and parameter 5R Phase Sequence must be set to Positive Only.

20.10 6 Protection Action**6A – Auto-Reset Count**

Range: 0 – 5 Default: 0

Description: Sets how many times the soft starter will auto-reset, if it continues to trip. The reset counter increases by one each time the soft starter auto-resets, and resets after a successful start. Setting this parameter to zero disables auto-reset.

6B – Auto-Reset Delay

Range: 0:05 - 15:00 (minutes:seconds) Default: 5 seconds

Description: Sets a delay before the soft starter will auto-reset a trip.

6C – Current Imbalance

Options:

Soft Trip and Log (default)	The soft starter will stop the motor as selected in parameter 2I or 3K Stop Mode, then enter trip state. The trip must be reset before the starter can restart.
Soft Trip and Reset	The soft starter will stop the motor as selected in parameter 2I or 3K Stop Mode, then enter trip state. The trip will reset after the auto-reset delay.
Trip Starter	The soft starter will remove power and the motor will coast to stop. The trip must be reset before the starter can restart.
Trip and Reset	The soft starter will remove power and the motor will coast to stop. The trip will reset after the auto-reset delay.
Warn and Log	The protection will be written to the event log and the display will show a warning message, but the soft starter will continue to operate.
Log Only	The protection will be written to the event log but the soft starter will continue to operate.
Trip + Shunt Relay	The soft starter will remove power and the motor will coast to stop. The shunt trip relay (33, 34) will activate and the circuit breaker will disconnect mains voltage from the soft starter. The circuit breaker must be manually reset before operation can resume. This option is only effective if parameter 20H Shunt Trip Mode is set to 'Enable'.

Description: Selects the soft starter's response to each protection. All protection events are written to the event log.

6D – Undercurrent

Options:

Soft Trip and Log (default)	Warn and Log
Soft Trip and Reset	Log Only
Trip Starter	Trip + Shunt Relay
Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6E – Overcurrent

Options:

Soft Trip and Log (default)	Warn and Log
Soft Trip and Reset	Log Only
Trip Starter	Trip + Shunt Relay
Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6F – Undervoltage

Options:

Soft Trip and Log (default)	Warn and Log
Soft Trip and Reset	Log Only
Trip Starter	Trip + Shunt Relay
Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6G – Overvoltage

Options:

Soft Trip and Log (default)	Warn and Log
Soft Trip and Reset	Log Only
Trip Starter	Trip + Shunt Relay
Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6H – Underpower

Options:

Log Only (default)	Trip Starter
Trip + Shunt Relay	Trip and Reset
Soft Trip and Log	Warn and Log
Soft Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6I – Overpower

Options:

Log Only (default)	Trip Starter
Trip + Shunt Relay	Trip and Reset
Soft Trip and Log	Warn and Log
Soft Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6J – Excess Start Time

Options:

Soft Trip and Log (default)	Warn and Log
Soft Trip and Reset	Log Only
Trip Starter	Trip + Shunt Relay
Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6K – Input A Trip

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6L – Input B Trip

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6M – Network Communications

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Stop
	Trip and Reset	Trip + Shunt Relay

Description: Selects the soft starter's response to the protection event. If set to Stop, the ADXT will perform a soft stop, then can be restarted without a reset.

6N – Remote Keypad Fault

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6O – Frequency

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6P – Phase Sequence

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6Q – Motor Overtemperature

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6R – Motor Thermistor Circuit

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

6S – Shorted SCR Action

Options:	3-Phase Control Only (default)
	PowerThrough
	Trip + Shunt Relay

Description: Selects whether the soft starter will allow PowerThrough operation, if the soft starter is damaged on one phase. The soft starter will use two-phase control, allowing the motor to continue operating in critical applications. Refer to PowerThrough on page 64 for further information.

6T – Battery/Clock

Options:	Soft Trip and Log (default)	Warn and Log
	Soft Trip and Reset	Log Only
	Trip Starter	Trip + Shunt Relay
	Trip and Reset	

Description: Selects the soft starter's response to the protection event.

20.11 7 Inputs**7A – Input A Function**

Options:	Command Override: Network	Overrides the setting of 1A and sets the command source to the communications network.
	Command Override: Digital	Overrides the setting of 1A and sets the command source to the digital inputs.
	Command Override: Keypad	Overrides the setting of 1A and sets the command source to the remote keypad.
	Input Trip (N/O) (default)	A closed circuit across 13, 14 trips the soft starter.
	Input Trip (N/C)	An open circuit across 13, 14 trips the soft starter.
	Emergency Mode	A closed circuit across 13, 14 activates emergency mode. When the ADXT receives a start command, it will continue to run until a stop command is received, ignoring all trips and warnings.
	Jog Forward	Activates jog operation in a forward direction.
	Jog Reverse	Activates jog operation in reverse direction.
	Zero Speed Sensor	An open circuit across 13, 14 indicates to the soft starter that the motor has reached a standstill. The soft starter requires a normally open zero speed sensor.
	Motor Set Select	A closed circuit across 13, 14 instructs the starter to use the secondary motor configuration for the next start/stop cycle.
	Reverse Direction	A closed circuit across 13, 14 instructs the starter to reverse the phase sequence for the next start.
	Pump Clean	Activates the pump clean function.
Description:	Selects the function of Input A.	

7B – Input A Trip

Options:	Always Active	A trip can occur at any time when the soft starter is receiving power.
	Operating Only (default)	A trip can occur while the soft starter is running, stopping or starting.
	Run Only	A trip can only occur while the soft starter is running.

Description: Selects when an input trip can occur.

7C – Input A Trip Delay

Range: 0:00 - 4:00 (minutes:seconds) Default: 0 second

Description: Sets a delay between the input activating and the soft starter tripping.

7D – Input A Initial Delay

Range: 00:00 - 30:00 (minutes:seconds) Default: 0 second

Description: Sets a delay before an input trip can occur. The initial delay is counted from the time a start command is received. The state of the input is ignored until the initial delay has elapsed.

7E – Input B Function

Options:	Input Trip (N/O) (default)	Zero Speed Sensor
	Input Trip (N/C)	Motor Set Select
	Emergency Mode	Reverse Direction
	Jog Forward	Pump Clean
	Jog Reverse	

Description: Selects the function of Input B. Refer to parameter 7A Input A Function for details.

7F – Input B Trip

Options:	Always Active
	Operating Only (default)
	Run Only

Description: Selects when an input trip can occur.

7G – Input B Trip Delay

Range: 0:00 - 4:00 (minutes:seconds) Default: 0 second

Description: Sets a delay between the input activating and the soft starter tripping.

7H – Input B Initial Delay

Range: 00:00 - 30:00 (minutes:seconds) Default: 0 second

Description: Sets a delay before an input trip can occur. The initial delay is counted from the time a start command is received. The state of the input is ignored until the initial delay has elapsed.

7I – Reset/Enable Logic

Options:	Normally Closed (default)
	Normally Open

Description: Selects whether the reset input (10, 11) is normally open or normally closed.

**NOTE**

If the reset input is active, the starter will not operate.

7J – Input A Name

Options:	Input A Trip (default)	Controller
	Low Pressure	PLC
	High Pressure	Vibration Alarm
	Pump Fault	Field Trip
	Low Level	Interlock Trip
	High Level	Motor Temperature
	No Flow	Motor Protection
	Starter Disable	Feeder Protection
		Custom Message

Description: Selects a message for the keypad to display when Input A is active. The custom message can be loaded via the USB port. Refer to USB save and load on page 53 for details.

7K – Input B Name

Options:	Input B Trip (default)	Controller
	Low Pressure	PLC
	High Pressure	Vibration Alarm
	Pump Fault	Field Trip
	Low Level	Interlock Trip
	High Level	Motor Temperature
	No Flow	Motor Protection
	Starter Disable	Feeder Protection
		Custom Message

Description: Selects a message for the keypad to display when Input B is active.

20.12 8 Relay Outputs

8A – Relay A Function

Options:	Off	Relay A is not used.
	Ready	The relay is closed when the starter is in Ready state.
	Run (default)	The Run output closes when the soft start is complete (when the starting current falls below 120% of the programmed motor full load current) and remains closed until the beginning of a stop (either soft stop or coast to stop).
	Warning	The relay closes when the starter issues a warning (refer to 6 Protection Action on page 101).
	Trip	The relay closes when the starter trips (refer to 6 Protection Action on page 101).
	Low Current Flag	The relay closes when the low current flag activates while the motor is running (refer to parameter 8G Low Current Flag).
	High Current Flag	The relay closes when the high current flag activates while the motor is running (refer to parameter 8H High Current Flag).
	Motor Temperature Flag	The relay closes when the motor temperature flag activates (refer to parameter 8I Motor Temperature Flag).
	Soft Brake Relay	The relay closes when the soft starter receives a stop signal, and remains closed until the end of soft brake.
	Reversing Contactor	The relay will control an external contactor, for reverse operation. Refer to Reverse direction operation on page 76 for details.
	Trip Failsafe	The relay closes when control power is applied. The relay opens if the soft starter trips or if control power is lost.
	Operating Only	The relay is closed while the soft starter is running, stopping or starting.

Description: Selects the function of Relay A. Relay A is a changeover relay.

8B – Relay A On Delay

Range: 0:00 - 5:00 (minutes:seconds) Default: 0 second

Description: Sets the delay for changing the state of Relay A.

8C – Relay A Off Delay

Range: 0:00 - 5:00 (minutes:seconds) Default: 0 second

Description: Sets the delay for changing the state of Relay A.

8D – Relay B Function

Options:	Off	High Current Flag
	Ready	Motor Temperature Flag
	Run (default)	Soft Brake Relay
	Warning	Reversing Contactor
	Trip	Trip Failsafe
	Low Current Flag	Operating Only

Description: Selects the function of Relay B (normally open). Refer to parameter 8A Relay A Function.

8E – Relay B On Delay

Range: 0:00 - 5:00 (minutes:seconds) Default: 0 second

Description: Sets the delay for closing Relay B.

8F – Relay B Off Delay

Range: 0:00 - 5:00 (minutes:seconds) Default: 0 second

Description: Sets the delay for re-opening Relay B.

8G – Low Current Flag

The ADXT has low and high current flags to give early warning of abnormal operation. The current flags can be configured to indicate an abnormal current level during operation, between the normal operating level and the undercurrent or instantaneous overcurrent trip levels. The flags can signal the situation to external equipment via one of the programmable outputs. The flags clear when the current returns within the normal operating range by 10% of the programmed flag value.

Range: 1% - 100% FLC Default: 50%

Description: Sets the level at which the low current flag operates, as a percentage of motor full load current.

8H – High Current Flag

Range: 50% - 600% FLC Default: 100%

Description: Sets the level at which the high current flag operates, as a percentage of motor full load current.

8I – Motor Temperature Flag

The ADXT has a motor temperature flag to give early warning of abnormal operation. The flag can indicate that the motor is operating above its normal operating temperature but lower than the overload limit. The flag can signal the situation to external equipment via one of the programmable outputs.

Range: 0% - 160% Default: 80%

Description: Sets the level at which the motor temperature flag operates, as a percentage of the motor's thermal capacity.

8J – Main Contactor Time

Range: 100 – 2000 milliseconds Default: 400 milliseconds

Description: Sets the delay period between the starter switching the main contactor output (terminals 33, 34) and beginning the pre-start checks (before a start) or entering the not ready state (after a stop). Set according to the specifications of the main contactor used.

20.13 9 Analog Output**9A – Analog Output A**

Options:

Current (% FLC) (default)	Current as a percentage of motor full load current.
Motor Temperature (%)	The motor's temperature, calculated by the thermal model.
Motor pf	Motor power factor, measured by the soft starter.
Motor Power (%kW)	Motor power, as a percentage of the programmed power.
Heatsink Temperature (°C)	The soft starter's temperature, measured at the heatsink.

Description: Selects which information will be reported via the analog output.

9B – Analog A Scale

Range: 0-20 mA
4-20 mA (default)

Description: Selects the range of the analog output.

9C – Analog A Maximum Adjustment

Range: 0% - 600% Default: 100%

Description: Sets the upper limit of the range that the analog output will represent. When the selected information is at or above the upper limit, the analog output will remain at its highest value.

9D – Analog A Minimum Adjustment

Range: 0% - 600% Default: 0%

Description: Sets the lower limit of the range that the analog output will represent. When the selected information is at or below the lower limit, the analog output will remain at its lowest value.

**NOTE**

If the values of parameters 9C and 9D are far apart, the analog output will represent a wide dynamic range. The resolution of the output will be coarse.

**NOTE**

If precise accuracy is important, use parameters 41A 4 mA Calibration and 41B 20 mA Calibration to calibrate the analog output.

20.14 10 Display**10A – Language**

Options:

English (default)	Português
Chinese	Français
Español	Italiano
Deutsch	Russian

Description: Selects which language the keypad will use to display messages and feedback.

10B – Temperature Scale

Options: Celsius (default)
Fahrenheit

Description: Selects whether the ADXT will display temperatures in degrees Celsius or Fahrenheit.

10C – Graph Timebase

Options: 30 seconds (default)
1 minute
30 minutes
1 hour

Description: Sets the graph time scale. The graph will progressively replace the old data with new data.

10D – Graph Maximum Adjustment

Range: 0% – 600% Default: 400%

Description: Adjusts the upper limit of the performance graph.

10E – Graph Minimum Adjustment

Range: 0% – 600% Default: 0%
 Description: Adjusts the lower limit of the performance graph.

10F – Current Calibration

Range: 85% - 115% Default: 100%
 Description: Calibrates the soft starter's current monitoring circuits to match an external current metering device. Use the following formula to determine the necessary adjustment:

$$\text{Calibration (\%)} = \frac{\text{Current shown on ADXT display}}{\text{Current measured by external device}}$$

10G – Adjustment Lock

Options: Read & Write (default) Allows users to alter parameter values in the main menu.
 Read Only Prevents users altering parameter values in the main menu. Parameter values can still be viewed.
 Description: Selects whether the keypad will allow parameters to be changed via the main menu.

10H – User Parameter 1

Options: Blank Displays no data in the selected area, allowing long messages to be shown without overlapping.
 Current (default) Average rms current across all three phases
 Motor Voltage Average rms voltage across all three phases.
 P1 Voltage Phase 1 voltage.
 P2 Voltage Phase 2 voltage.
 P3 Voltage Phase 3 voltage.
 Mains Frequency The average frequency measured on three phases.
 Motor pf The motor's power factor, measured by the soft starter.
 Motor Power The motor's running power in kilowatts.
 Motor Temperature (%) The motor's temperature, calculated by the thermal model.
 Hours Run The number of hours the motor has run via the soft starter.
 Number of Starts The number of starts the ADXT has completed since the start counter was last reset.
 Analog Output Value The value of the analog output (refer to parameters 9A~9D).
 Heatsink Temperature The soft starter's temperature, measured at the heatsink.
 Bypass Model (%) The percentage of thermal capacity remaining in the bypass contactor.
 SCR Temperature The temperature of the SCRs, calculated by the thermal model.
 Rating Capacity (%) The thermal capacity available in the soft starter for its next start.
 Ground current Measured ground current. This information is only available if a compatible option card is installed.
 Description: Selects which information will be displayed on the main monitoring screen.

10I – User Parameter 2

Options: Refer to parameter 10H User Parameter 1 for details.
 Default: Motor Voltage
 Description: Selects which information will be displayed on the main monitoring screen. Refer to parameter 10H User Parameter 1 for details.

10J – User Parameter 3

Options: Refer to parameter 10H User Parameter 1 for details.
 Default: Mains Frequency
 Description: Selects which information will be displayed on the programmable monitoring screen.

10K – User Parameter 4

Options: Refer to parameter 10H User Parameter 1 for details.
 Default: Motor pf
 Description: Selects which information will be displayed on the programmable monitoring screen.

10L – User Parameter 5

Options: Refer to parameter 10H User Parameter 1 for details.
 Default: Motor Power
 Description: Selects which information will be displayed on the programmable monitoring screen.

10M – User Parameter 6

Options: Refer to parameter 10H User Parameter 1 for details.
 Default: Motor Temperature (%)
 Description: Selects which information will be displayed on the programmable monitoring screen.

20.15 11 Pump Clean**11A – Reverse Torque**

Range: 20% - 100% Default: 20%
 Description: Sets the torque level for reverse jog operation during pump clean.

11B – Reverse Time

Range: 0:00 - 1:00 (minutes:seconds) Default: 10 seconds
 Description: Sets the time for the starter to operate in reverse jog during a pump clean cycle.

11C – Forward Current Limit

Range: 100% - 600% FLC Default: 100%
 Description: Sets the current limit for forward start operation during pump clean.

11D – Forward Time

Range: 0:00 - 1:00 (minutes:seconds) Default: 10 seconds
 Description: Sets the time for the starter to run the motor after a forward start, during a pump clean cycle.

11E – Pump Stop Mode

Options: Coast To Stop (default)
 TVR Soft Stop
 Description: Selects the stop mode for pump clean.

11F – Pump Stop Time

Range: 0:00 - 1:00 (minutes:seconds) Default: 10 seconds
 Description: Sets the stopping time for the starter during a pump clean cycle.

11G – Pump Clean Cycles

Range: 1 – 5 Default: 1
 Description: Sets how many times the soft starter will repeat the pump clean cycle.

20.16 12 Communications Card**12A – Modbus Address**

Range: 1 - 254 Default: 1
 Description: Sets the Modbus RTU network address for the soft starter.

12B – Modbus Baud Rate

Options: 4800
 9600 (default)
 19200
 38400
 Description: Selects the baud rate for Modbus RTU communications.

12C – Modbus Parity

Options: None (default)
 Odd
 Even
 10-bit
 Description: Selects the parity for Modbus RTU communications.

12D – Modbus Timeout

Options: Off (default)
 10 seconds
 60 seconds
 100 seconds
 Description: Selects the timeout for Modbus RTU communications.

12H – Gateway Address

Range: 0 - 255 Default: 192
 Description: Sets the first component of the network gateway address.
 The gateway address is set using parameters 12H-12K and the default address is 192.168.0.100.

12I – Gateway Address 2

Range: 0 - 255 Default: 168
 Description: Sets the second component of the network gateway address.

12J – Gateway Address 3

Range: 0 - 255 Default: 0
 Description: Sets the third component of the network gateway address.

12K – Gateway Address 4

Range: 0 - 255 Default: 100

Description: Sets the fourth component of the network gateway address.

**NOTE**

The network address can also be set via the Network Address options in the Setup Tools. Refer to Network address on page 55 for details.

12L – IP Address

Range: 0 - 255 Default: 192

Description: Sets the first component of the soft starter's IP address, for Ethernet communications. The IP address is set using parameters 12L~12O and the default address is 192.168.0.2.

12M – IP Address 2

Range: 0 - 255 Default: 168

Description: Sets the second component of the soft starter's IP address, for Ethernet communications.

12N – IP Address 3

Range: 0 - 255 Default: 0

Description: Sets the third component of the soft starter's IP address, for Ethernet communications.

12O – IP Address 4

Range: 0 - 255 Default: 2

Description: Sets the fourth component of the soft starter's IP address, for Ethernet communications.

**NOTE**

The network address can also be set via the Network Address options in the Setup Tools. Refer to Network address on page 55 for details.

12P – Subnet Mask

Range: 0 - 255 Default: 255

Description: Sets the first component of the network subnet mask, for Ethernet communications. The subnet mask is set using parameters 12P~12S and the default mask is 255.255.255.0.

12Q – Subnet Mask 2

Range: 0 - 255 Default: 255

Description: Sets the second component of the network subnet mask, for Ethernet communications.

12R – Subnet Mask 3

Range: 0 - 255 Default: 255

Description: Sets the third component of the network subnet mask, for Ethernet communications.

12S – Subnet Mask 4

Range: 0 - 255 Default: 0

Description: Sets the fourth component of the network subnet mask, for Ethernet communications.

**NOTE**

The network address can also be set via the Network Address options in the Setup Tools. Refer to Network address on page 55 for details.

12T – DHCP

Options: Disable (default)
Enable

Description: Selects whether the communications card will accept an IP address assigned by DHCP.

**NOTE**

DHCP addressing is available with Modbus TCP.

12U – Location ID

Range: 0 - 65535 Default: 0

Description: Sets the soft starter's unique location ID.

20.17 20 Advanced**20A – Tracking Gain**

Range: 1% - 200% Default: 50%
 Description: Fine-tunes the behaviour of the adaptive control algorithm.

20B – Pedestal Detect

Range: 0% - 200% Default: 80%
 Description: Adjusts the behaviour of the adaptive control algorithm for soft stop.

20C – Bypass Contactor Delay

Range: 50 – 200 milliseconds Default: 100 milliseconds
 Description: Sets the starter to match the bypass contactor closing/opening time. Set according to the specifications of the bypass contactor used. If this time is too short, the starter will trip.

20D – Model Rating

Range: Model dependent
 Description: The soft starter's internal model reference, as shown on the silver label on the side of the unit.

 **NOTE**

This parameter can only be adjusted by authorised servicing agents.

20E – Screen Timeout

Options: 1 minute (default) 4 minutes
 2 minutes 5 minutes
 3 minutes
 Description: Sets the timeout for the menu to automatically close if no keypad activity is detected.

20F – Motor Connection

Options: Auto-detect (default)
 In-line
 Inside delta
 Description: Selects whether the soft starter will automatically detect the format of the connection to the motor.

20H – Shunt Trip Mode

Options: Disable (default)
 Enable
 Description: Reconfigures the soft starter's main contactor output (33, 34) for use as a shunt trip relay. When the soft starter trips on selected conditions, the relay will activate and the shunt trip will trigger the circuit breaker and disconnect mains voltage from the soft starter. Use parameters 6C-6T to select which trips will activate the shunt trip relay.

 **NOTE**

If shunt trip operation is enabled, the shunt trip relay will activate for certain non-adjustable trips as well as the selected adjustable trips.

- Current at Stop
- Current Read Err Lx
- EEPROM fail
- Firing Fail Px
- Instantaneous overcurrent
- Internal fault
- Motor connection
- SCR Itsm
- VZC Fail Px

20.18 40 Ground Fault **NOTE**

Ground fault protection is only available if a compatible expansion card is installed.

40A – Ground Fault Level

Range: 0 A - 50 A Default: 0 A
 Description: Sets the trip point for ground fault protection. A setting of 0 disables this protection.

40B – Ground Fault Delay

Range: 00:00 – 01:30 mm:ss Default: 1 second
 Description: Slows the ADXT response to ground fault variation, avoiding trips due to momentary fluctuations. If the soft starter detects ground current above 50 A or more than 1.5 times the level set in parameter 40A, it will ignore the delay setting and trip within 1 second.

40C – Ground Fault Trip Active

Options: Always Active A trip can occur at any time when the soft starter is receiving power.
 Operating Only (default) A trip can occur while the soft starter is running, stopping or starting.
 Run Only A trip can only occur while the soft starter is running.
 Description: Selects when a ground fault trip can occur.

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40D – Ground Fault Action

Options: Soft Trip and Log (default) Warn and Log
 Soft Trip and Reset Log Only
 Trip Starter Trip + Shunt Relay
 Trip and Reset

Description: Selects the soft starter's response to the protection event.

40E – Ground Fault CT Ratio

Options: 1000:1 (default)
 2000:1

Description: Set to match the ratio of the ground current measuring CT.

20.19 Calibrate 4-20mA

41A – 4mA Calibration

Range: 90% - 110% Default: 100%

Description: Calibrates the analog output to read exactly 4mA when the motor is not running.

41B – 20mA Calibration

Range: 90% - 110% Default: 100%

Description: Calibrates the analog output to read exactly 20mA when the motor is running at full load current.

21. TROUBLESHOOTING

21.1 Protection responses

When a protection condition is detected, the ADXT will write this to the event log and may also trip or issue a warning. The soft starter's response depends on the Protection Action setting (parameter group 6).


Some protection responses cannot be adjusted by the user. These trips are usually caused by external events (such as phase loss) or by a fault within the soft starter. These trips do not have associated parameters and cannot be set to Warn or Log.

If the ADXT trips you will need to identify and clear the condition that triggered the trip, then reset the soft starter before restarting. To reset the starter, press the EXIT/RESET button on the keypad or activate the Reset remote input.

If the ADXT has issued a warning, the soft starter will reset itself once the cause of the warning has been resolved.

21.2 Trip messages

Display	Possible cause/Suggested solution
2 Phase - Damaged SCR	This message is displayed if the soft starter tripped on "Lx-Tx shorted" during the pre-start checks and PowerThrough is enabled. It indicates that the starter now operates in PowerThrough mode (2-phase control only). Check for either a shorted SCR or a short within the bypass contactor. Related parameters: 6S
Battery/clock	A verification error has occurred on the real time clock, or the backup battery voltage is low. If the battery is low and the power is off, date/time settings will be lost. The ADXT will continue to soft start and soft stop correctly. Reprogram the date and time. The battery is not removable. In order to replace the battery, the main control PCB must be replaced. Related parameters: 6T
Bypass overload	This trip is not adjustable. Bypass overload protection protects the soft starter from severe operating overloads while running. The soft starter will trip if it detects overcurrent at 600% of the contactor rating. Related parameters: None
Current at Stop	The soft starter has detected current at a time when no current is expected (Ready, Not Ready or Tripped states). – If the motor is connected inside delta (six-wire connection) and no main contactor is installed, a shorted SCR may be passing current to the motor. Related parameters: None
Current imbalance	Current imbalance can be caused by problems with the motor, the environment or the installation, such as: – An imbalance in the incoming mains voltage – A problem with the motor windings – A light load on the motor – A phase loss on input terminals L1, L2 or L3 during Run mode – An SCR that has failed open circuit. A failed SCR can only be definitely diagnosed by replacing the SCR and checking the starter's performance. Related parameters: 5A, 5B, 6C
Current Read Err Lx	Where 'X' is 1, 2 or 3. Internal fault (PCB fault). The output from the CT circuit is not close enough to zero when the SCRs are turned off. Contact your local supplier for advice. Related parameters: None
Depth Sensor	The smart card has detected a fault with the depth sensor. Related parameters: 30L, 36C
EEPROM fail	An error occurred loading data from the EEPROM to RAM when the keypad powered up. If the problem persists, contact your local distributor. Related parameters: None
Excess start time	Excess start time trip can occur in the following conditions: – parameter 1B Motor Full Load Current is not appropriate for the motor – parameter 2D Current Limit has been set too low – parameter 2B Start Ramp Time has been set greater than the setting for 50 Excess Start Time – parameter 2B Start Ramp Time is set too short for a high inertia load when using Adaptive Control Related parameters: 1B, 2B, 2D, 3D, 3F.
Firing Fail Px	Where 'X' is phase 1, 2 or 3. The SCR did not fire as expected. The SCR may be faulty or there may be an internal wiring fault. Related parameters: None
FLC too high	The soft starter can be used on a motor with a higher full load current (FLC) if it is connected inside delta, or if a non-bypassed soft starter is installed with an external bypass contactor. – If this trip occurs when the soft starter is installed inside delta, the soft starter may not be correctly detecting the connection. Set parameter 20F Motor Connection to 'Inside Delta'. – If the starter is a non-bypassed model and was previously used with an external bypass contactor, but parameter 20G External Bypass has now been set to 'Disable', the FLC may be above the maximum non-bypassed rating. Check that the non-bypassed rating of the soft starter is suitable for the motor, then set parameter 1B Motor Full Load Current to match the motor's FLC. Related parameters: 1B, 20F, 20G
Flow Sensor	The smart card has detected a fault with the flow sensor. Related parameters: 30E, 36B
Flow Switch	The flow switch sensor (smart card terminals C23, C24) has closed. Related parameters: 30E, 36H
Frequency	This trip is not adjustable. The mains frequency has gone beyond the specified range. Check for other equipment in the area that could be affecting the mains supply, particularly variable speed drives and switch mode power supplies (SMPS). If the ADXT is connected to a generator set supply, the generator may be too small or could have a speed regulation problem. Related parameters: 6O
Ground Fault	Test the insulation of the output cables and the motor. Identify and resolve the cause of any ground fault. Related parameters: 40A, 40B, 40C, 40D, 40E
Heatsink overtemperature	– Check that bypass contactors are operating. – Check that cooling fans are operating (if fitted). – If mounted in an enclosure, check if ventilation is adequate. – The soft starter must be mounted vertically. Related parameters: None
Input A trip Input B trip	The soft starter's programmable input is set to a trip function and has activated. Resolve the trigger condition. Related parameters: 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H


Display	Possible cause/Suggested solution
Instantaneous overcurrent	This trip is not adjustable. The current on all three phases has exceeded 7.2 times the value of parameter 1B Motor Full Load Current. Causes can include a locked rotor condition or an electrical fault in the motor or cabling. Related parameters: None
Internal fault x	Where 'X' is a number. This trip is not adjustable. The ADXT has tripped on an internal fault. Contact your local supplier with the fault code (X).
Internal fault 88	The soft starter firmware does not match the hardware.
Keypad disconnected	Parameter 1A Command Source is set to Remote Keypad but the ADXT cannot detect a remote keypad. If a remote keypad is installed, check the cable is firmly connected to the soft starter. If no remote keypad is installed, change the setting of parameter 1A. Related parameters: 1A
L1 phase loss L2 phase loss L3 phase loss	This trip is not adjustable. During pre-start checks the starter has detected a phase loss as indicated. In run state, the starter has detected that the current on the affected phase has dropped below 10% of the programmed motor FLC for more than 1 second, indicating that either the incoming phase or connection to the motor has been lost. Check the supply and the input and output connections at the starter and at the motor end. Related parameters: None
L1-T1 shorted L2-T2 shorted L3-T3 shorted	During pre-start checks the starter has detected a shorted SCR or a short within the bypass contactor as indicated. Consider using PowerThrough to allow operation until the starter can be repaired. Related parameters: 6S
Low Control Volts	The ADXT has detected a drop in the internal control voltage. – Check the external control supply (A1, A2, A3) and reset the starter. If the external control supply is stable: – the 24 V supply on the main control PCB may be faulty; or – the bypass driver PCB may be faulty. Contact your local supplier for advice. This protection is not active in Ready state. Related parameters: None
Motor connection Motor Connection T1 Motor Connection T2 Motor Connection T3	This trip is not adjustable. The motor is not connected correctly to the soft starter. – Check individual motor connections to the soft starter for power circuit continuity. – Check connections at the motor terminal box. – If the soft starter is connected to a grounded delta mains supply, adjust parameter 20F Motor Connection to match the motor connection configuration. Related parameters: 20F
Motor overload	The motor has reached its maximum thermal capacity. Overload can be caused by: – The soft starter protection settings not matching the motor thermal capacity – Excessive starts per hour or start duration – Excessive current – Damage to the motor windings Resolve the cause of the overload and allow the motor to cool. Related parameters: 1B, 1D, 1E, 1F, 5O, 6J  NOTE Parameters 1D, 1E and 1F determine the trip current for motor overload protection. The default settings of parameters 1D, 1E and 1F provide Motor Overload Protection: Class 10, Trip Current 105% of FLA (full load amperage) or equivalent.
Motor thermistor	The motor thermistor input has been enabled and: – The resistance at the thermistor input has exceeded 3.6 kΩ for more than one second. – The motor winding has overheated. Identify the cause of the overheating and allow the motor to cool before restarting. – The motor thermistor input has been opened. If thermistors have previously been connected to the ADXT but are no longer required, use the Thermistor Reset function to disable the thermistor. Related parameters: 6Q
Network communication	There is a network communication problem, or the network master may have sent a trip command to the starter. Check the network for causes of communication inactivity. Related parameters: 6M
Not ready	– The reset input may be active. If the reset input is active, the starter will not operate. – The soft starter may be waiting for the restart delay to elapse. The length of the restart delay is controlled by parameter 5P Restart Delay. Related parameters: 5P
Overcurrent	The current has exceeded the level set in parameter 5E Overcurrent for longer than the time set in parameter 5F Overcurrent Delay. Causes can include a momentary overload condition. Related parameters: 5E, 5F, 6E
Overpower	The motor has experienced a sharp rise in power. Causes can include a momentary overload condition which has exceeded the adjustable delay time. Related parameters: 5M, 5N, 6I
Overvoltage	There has been a voltage surge on the mains. Causes can include problems with a transformer tap regulator or off-loading of a large transformer load. Related parameters: 5I, 5J, 6G
Parameter out of range	This trip is not adjustable. – A parameter value is outside the valid range. The keypad will indicate the first invalid parameter. – An error occurred loading data from the EEPROM to RAM when the keypad powered up. – The parameter set or values in the keypad do not match the parameters in the starter. – "Load User Set" has been selected but no saved file is available. Reset the fault. The starter will load the default settings. If the problem persists, contact your local distributor. Related parameters: None
Phase sequence	The phase sequence on the soft starter's input terminals (L1, L2, L3) is not valid. Check the phase sequence on L1, L2, L3 and ensure the setting in parameter 5R is suitable for the installation. Related parameters: 5R, 6P

Display	Possible cause/Suggested solution
Power loss	This trip is not adjustable. The starter is not receiving mains supply on one or more phases. Check that the main contactor closes when a start command is given, and remains closed until the end of a soft stop. Check the fuses. If testing the soft starter with a small motor, it must draw at least 10% of the starter's programmed FLC setting on each phase. If shunt relay mode is enabled (parameter 20H Shunt Trip Mode), certain trips may cause the shunt relay to open the circuit breaker. Related parameters: None
Rating Capacity	The ADXT is operating beyond its safe capacity. Allow the starter to cool. Related parameters: None
SCR Itsm	The SCR current surge rating has been exceeded. Related parameters: None
SCR overtemperature	The temperature of the SCRs, calculated by the thermal model, is too high to allow further operation. Wait for the starter to cool. Related parameters: None
Starter communication	There is a problem with the connection between the soft starter and the optional expansion card. Remove and reinstall the card. If the problem persists, contact your local distributor. Related parameters: None
Starts per hour	The soft starter has already attempted the maximum number of starts in the last 60 minutes. Wait before attempting another start. To determine when the waiting period will end, review the log. Related parameters: 5Q
Thermistor circuit	The thermistor input has been enabled and: – The resistance at the input has fallen below 20 Ω (the cold resistance of most thermistors will be over this value) or – A short circuit has occurred. Check and resolve this condition. Related parameters: None
Time-overcurrent	The ADXT is internally bypassed and has drawn high current during running. (The 10A protection curve trip has been reached or the motor current has risen to 600% of the motor FLC setting.) Related parameters: None
Undercurrent	The motor has experienced a sharp drop in current, caused by loss of load. Causes can include broken components (shafts, belts or couplings), or a pump running dry. Related parameters: 5C, 5D, 6D
Underpower	The motor has experienced a sharp drop in power, caused by loss of load. Causes can include broken components (shafts, belts or couplings), or a pump running dry. Related parameters: 5K, 5L, 6H
Undervoltage	Mains voltage has fallen below the level selected. Causes can include an undersized supply or adding a large load to the system. Related parameters: 5G, 5H, 6F
Unsupported option	The selected function is not available (eg jog is not supported in inside delta configuration). Related parameters: None
VZC Fail Px	Where 'X' is 1, 2 or 3. Internal fault (PCB fault). Contact your local supplier for advice. Related parameters: None
Zero Speed Detect	The zero speed input has not closed within the expected duration of a soft stop. – Check the zero speed sensor is operating correctly. – Check that parameters 2Q Brake Current Limit and 5O Excess Start Time are appropriate for the application. Related parameters: 2Q, 3S, 5O

21.3 General faults

This table describes situations where the soft starter does not operate as expected but does not trip or give a warning.

Symptom	Probable Cause
Starter "Not Ready"	– The reset input may be active. If the reset input is active, the starter will not operate.
"Simul" on display	– The starter is running simulation software. This software is intended for demonstration purposes only and is not suitable for controlling a motor. Contact your local supplier for advice.
The soft starter does not respond to the START or RESET button on the keypad.	– The soft starter will only accept commands from the keypad if parameter 1A Command Source is set to Remote Keypad. Check that the Local LED on the starter is on.
The soft starter does not respond to commands from the control inputs.	– The soft starter will only accept commands from the inputs if parameter 1A Command Source is set to Digital Input. Check the setting of 1A. – The control wiring may be incorrect. Check that the remote start, stop and reset inputs are configured correctly (refer to Start/stop on page 36 for details). – The signals to the remote inputs may be incorrect. Test the signalling by activating each input signal in turn.
The soft starter does not respond to a start command from either the keypad or the digital inputs.	– The soft starter may be waiting for the restart delay to elapse. The length of the restart delay is controlled by parameter 5P Restart Delay. – The motor may be too hot to permit a start. The soft starter will only permit a start when it calculates that the motor has sufficient thermal capacity to complete the start successfully. Wait for the motor to cool before attempting another start. – The reset input may be active. If the reset input is active, the starter will not operate. – The soft starter may be waiting for control signals via the communications network (parameter 1A Command Source = Network). – The ADXT may be waiting for a scheduled auto-start (parameter 1A Command Source = Clock).
Erratic and noisy motor operation.	– If the soft starter is connected to the motor using inside delta configuration, the soft starter may not be correctly detecting the connection. Contact your local supplier for advice.
Remote keypad shows message "awaiting data"	– The keypad is not receiving data from the control PCB. Check the cable connection.
The soft starter does not control the motor correctly during starting.	– Start performance may be unstable when using a low Motor Full Load Current setting (parameter 1B). – Power factor correction (PFC) capacitors must be installed on the supply side of the soft starter and must be disconnected during starting and stopping. To use the ADXT to control power factor correction, connect the PFC contactor to a programmable relay set to Run. – High levels of harmonics on the mains supply can affect soft starter performance. If variable speed drives are installed nearby, check they are properly grounded and filtered.

Symptom	Probable Cause
Motor does not reach full speed.	<ul style="list-style-type: none"> – If the start current is too low, the motor will not produce enough torque to accelerate to full speed. The soft starter may trip on excess start time. <p> NOTE Make sure the motor starting parameters are appropriate for the application and that you are using the intended motor starting profile. If a programmable input is set to Motor Set Select, check that the corresponding input is in the expected state.</p> <ul style="list-style-type: none"> – The load may be jammed. Check the load for severe overloading or a locked rotor situation.
Soft stop ends too quickly.	<ul style="list-style-type: none"> – The soft stop settings may not be appropriate for the motor and load. Review the soft stop settings. – If the motor is very lightly loaded, soft stop will have limited effect.
After selecting Adaptive Control the motor used an ordinary start and/or the second start was different to the first.	<ul style="list-style-type: none"> – The first Adaptive Control start is actually 'Constant Current' so that the starter can learn from the motor characteristics. Subsequent starts use Adaptive Control.
PowerThrough does not operate when selected.	<ul style="list-style-type: none"> – The starter will trip on Lx-Tx Shorted on the first start attempt after control power is applied. PowerThrough will not operate if control power is cycled between starts.
Parameter settings cannot be stored.	<ul style="list-style-type: none"> – Make sure you are saving the new value by pressing the MENU/SAVE button after adjusting a parameter setting. If you press EXIT/RESET, the change will not be saved. The ADXT does not display a confirmation. – Check that the adjustment lock (parameter 10G) is set to Read & Write. If the adjustment lock is set to Read Only, settings can be viewed but not changed.
USB Full	<ul style="list-style-type: none"> – The USB drive may not have enough free space available for the selected function. – The file system on the USB drive may not be compatible with the soft starter. The ADXT supports FAT32 file systems. The ADXT's USB functions are not compatible with NTFS file systems.
USB Missing	A USB function has been selected in the menu, but the product cannot detect a USB drive. Check that the USB drive has been inserted in the port.
File Missing	A USB function has been selected in the menu, but the required file cannot be found. Save/Load Master Parameters uses a file called Master_Parameters.par, at the top level of the USB drive. For these functions to work correctly, do not move or rename this file.
File Not Valid	A USB function has been selected in the menu, but the file is not valid.
File Empty	A USB function has been selected in the menu and the file has been found, but does not contain the expected content.
Rating Not Valid	The value of parameter 20D Model Rating is incorrect. Parameter 20D is not user-adjustable. Contact your local supplier for advice.

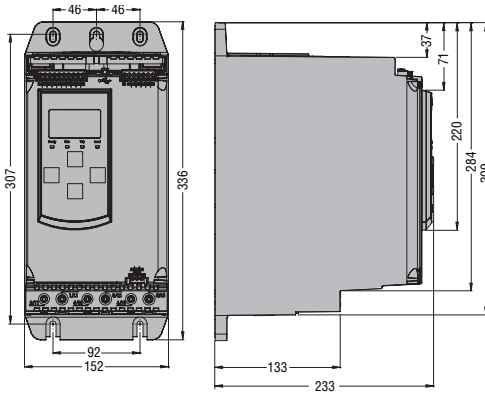
22. TECHNICAL DATA

Mains voltage (L1, L2, L3)	
Rated voltage	380~690VAC ($\pm 10\%$)
Rated frequency	50/60Hz ($\pm 5\text{Hz}$)
Auxiliary supply voltage (A1,A2, A3)	
ADXT...24	A1, A2: 24VAC/VDC ($\pm 20\%$), 2.8A
ADXT...	A1, A2: 110~120VAC ($+10\%/-15\%$), 600mA A2, A3: 220~240VAC ($+10\%/-15\%$), 600mA
Insulation	
Rated insulation voltage	690VAC
Rated impulse withstand voltage	6kV
Short circuit capability	
Coordination with semiconductor fuses	Type 2
Coordination with HRC fuses	Type 1
Inputs	
Input rating	Active 24VDC, 8mA approx
Motor thermistor (B4, B5)	Trip $>3.6\text{k}\Omega$, reset $<1.6\text{k}\Omega$
Outputs	
Relay outputs ratings	10A @ 250VAC resistive, 5A @ 250VAC AC15 pf 0.3
Line contactor (33, 34)	Normally open
Relay output A (41, 42, 44)	Changeover
Relay output B (53, 54)	Normally open
Analog output (21, 22)	
Maximum load	600 Ω (12VDC @ 20mA)
Accuracy	$\pm 5\%$

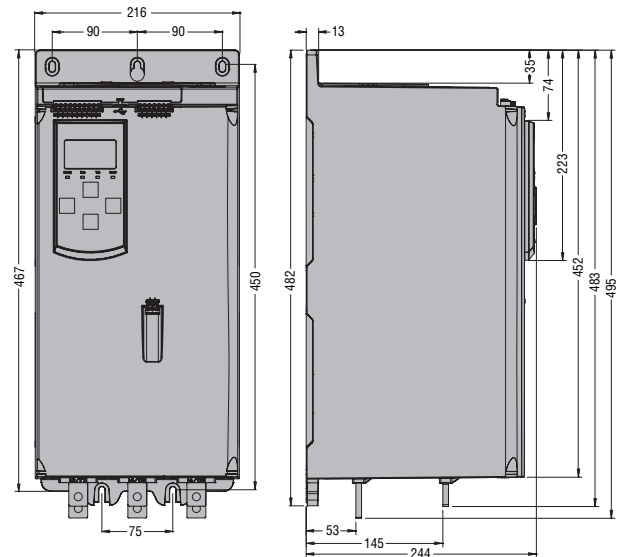
Environmental	
Operating temperature	-10...+60°C, above 40°C with derating
Storage temperature	-25...+60°C
Operating altitude	0~1000m, above 1000m with derating
Humidity	5~95% Relative Humidity
Pollution degree	3
Vibrations	IEC 60068-2-6
Protection degree	ADXT0034...ADXT0126: IP20 ADXT0139...ADXT0554: IP00
Heat dissipation	
During Start	4.5 watts per ampere
During Run (bypassed)	ADXT0034...ADXT0126 $\leq 35\text{W}$ approx ADXT0060...ADXT0126 $\leq 50\text{W}$ approx ADXT0139...ADXT0230 $\leq 120\text{W}$ approx ADXT0311...ADXT0554 $\leq 140\text{W}$ approx
Operational life	
Internal bypass contacts	100 000 operations
Electromagnetic capability	
EMC Immunity	IEC 60947-4-2
EMC Emissions	IEC 60947-4-2 Class B
Certifications and compliance	
Certifications	cULus
Compliant with standards	EN 60947-4-2, UL 60947-4-2, CSA-C22.2 n. 60947-4-2

23. DIMENSIONS

ADXT0034...ADXT0126



ADXT0139...ADXT0230



ADXT0311...ADXT0554

