

Altivar Soft Starter ATS480

Cascade Function – Application Note

NNZ85564.01
03/2022



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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

 DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Qualification of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used. All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended Use

This product is intended for industrial use according to this manual.

The product may only be used in compliance with all applicable safety standard and local regulations and directives, the specified requirements and the technical data. The product must be installed outside the hazardous ATEX zone. Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures must be implemented. Since the product is used as a component in an entire system, you must ensure the safety of persons by means of the design of this entire system (for example, machine design). Any use other than the use explicitly permitted is prohibited and can result in hazards.

Product related information

Read and understand these instructions before performing any procedure with this soft starter.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only appropriately trained persons who are familiar with and fully understand the contents of the present manual and all other pertinent product documentation and who have received all necessary training to recognize and avoid hazards involved are authorized to work on and with this equipment.
- Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Only use properly rated, electrically insulated tools and measuring equipment.
- Do not touch unshielded components or terminals with voltage present.
- Prior to performing any type of work on the equipment, block the motor shaft to prevent rotation.
- Insulate both ends of unused conductors of the motor cable.

Failure to follow these instructions will result in death or serious injury.

⚠️⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before performing work on the equipment:

- Use all required personal protective equipment (PPE).
- Disconnect all power, including external control power that may be present. Take into account that the circuit breaker or main switch does not de-energize all circuits.
- Place a "Do Not Turn On" label on all power switches related to the equipment.
- Lock all power switches in the open position.
- Verify the absence of voltage using a properly rated voltage sensing device.

Before applying voltage to the equipment:

- Verify that the work has been completed and that the entire installation cannot cause hazards.
- If the mains input terminals and the motor output terminals have been grounded and short-circuited, remove the ground and the short circuits on the mains input terminals and the motor output terminals.
- Verify proper grounding of all equipment.
- Verify that all protective equipment such as covers, doors, grids is installed and/or closed.

Failure to follow these instructions will result in death or serious injury.

Your application consists of a whole range of different interrelated mechanical, electrical, and electronic components, the soft starter being just one part of the application. The soft starter by itself is neither intended to nor capable of providing the entire functionality to meet all safety-related requirements that apply to your application. Depending on the application and the corresponding risk assessment to be conducted by you, a whole variety of additional equipment is required such as, but not limited to, external encoders, external brakes, external monitoring devices, guards, etc.

As a designer/manufacturer of machines, you must be familiar with and observe all standards that apply to your machine. You must conduct a risk assessment and determine the appropriate Performance Level (PL) and/or Safety Integrity Level (SIL) and design and build your machine in compliance with all applicable standards. In doing so, you must consider the interrelation of all components of the machine. In addition, you must provide instructions for use that enable the user of your machine to perform any type of work on and with the machine such as operation and maintenance in a safe manner.

The present document assumes that you are fully aware of all normative standards and requirements that apply to your application. Since the soft starter cannot provide all safety-related functionality for your entire application, you must ensure that the required Performance Level and/or Safety Integrity Level is reached by installing all necessary additional equipment.

⚠ WARNING

INSUFFICIENT PERFORMANCE LEVEL/SAFETY INTEGRITY LEVEL AND/OR UNINTENDED EQUIPMENT OPERATION

- Conduct a risk assessment according to EN ISO 12100 and all other standards that apply to your application.
- Use redundant components and/or control paths for all critical control functions identified in your risk assessment.
- Verify that the service life of all individual components used in your application is sufficient for the intended service life of your overall application.
- Perform extensive commissioning tests for all potential error situations to verify the effectiveness of the safety-related functions and monitoring functions implemented, for example, but not limited to, speed monitoring by means of encoders, short circuit monitoring for all connected equipment, correct operation of brakes and guards.
- Perform extensive commissioning tests for all potential error situations to verify that the load can be brought to a safe stop under all conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The products may perform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Carefully install the wiring in accordance with the EMC requirements.
- Do not operate the product with unknown or unsuitable settings or data.
- Perform a comprehensive commissioning test.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

▲ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop, overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines (1).
- Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) For USA: Additional information, refer to NEMA ICS 1.1 (latest edition), Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control and to NEMA ICS 7.1 (latest edition), Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.

About the Book

Document Scope

The purpose of this document is to show how to configure the cascade function with an Altivar Soft Starter ATS480.

The document is structured in two main parts which are:

- Description of the cascade function, advantages and limitations
- Use case with a 4 pumps water substation for cascade function application

NOTE: Read and understand this document and all related documents (see below) before installing, operating and maintaining your soft starter.

Validity Note

Original instructions and information given in the present document have been written in English (before optional translation).

NOTE: The products listed in the document may not be available at any time after the publication of this document. The data, illustrations and product specifications listed in the guide will be completed and updated as the product availabilities evolve. Updates to the guide will be available for download once products are released onto the market.

This documentation is valid for the ATS480.

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

Step	Action
1	Go to the Schneider Electric home page www.se.com .
2	In the Search box type the reference of the product or the name of a product range. <ul style="list-style-type: none"> • Do not include blank spaces in the reference or product range. • To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the Product Datasheets search results and click on the reference that interests you. If you entered the name of a product range, go to the Product Ranges search results and click on the product range that interests you.
4	If more than one reference appears in the Products search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click Download XXX product datasheet .

Related Documents

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on www.se.com The Internet site provides the information you need for products and solutions:

- The whole catalog for detailed characteristics and selection guides
- The CAD files to help design your installation, available in over 20 different file formats
- All software and firmware to maintain your installation up to date
- A large quantity of White Papers, Environment documents, Application solutions, Specifications... to gain a better understanding of our electrical systems and equipment or automation
- And finally all the User Guides related to your soft starter, listed below:

Title of documentation	Catalog number
Catalog: Altivar Soft Starter ATS480	DIA2ED2210602EN (English), DIA2ED2210602FR (French), DIA2ED2210602CN (Chinese), DIA2ED2210602DE (German), DIA2ED2210602IT (Italian), DIA2ED2210602SP (Spanish), DIA2ED2210602PTBR (Brazilian Portuguese), DIA2ED2210602TR (Turkish)
ATS480 Getting Started Manual	NNZ85504 (English), NNZ85505 (French), NNZ85506 (Spanish), NNZ85507 (Italian), NNZ85508 (German), NNZ85509 (Chinese), NNZ85510 (Portuguese), NNZ85511 (Turkish)
ATS480 Getting Started Manual Annex for UL	NNZ86539 (English)
ATS480 User Manual	NNZ85515 (English), NNZ85516 (French), NNZ85517 (Spanish), NNZ85518 (Italian), NNZ85519 (German), NNZ85520 (Chinese), NNZ85521 (Portuguese), NNZ85522 (Turkish)
ATS48 to ATS480 Substitution Manual	NNZ85529 (English), NNZ85530 (French), NNZ85531 (Spanish), NNZ85532 (Italian), NNZ85533 (German), NNZ85534 (Chinese), NNZ85535 (Portuguese), NNZ85536 (Turkish)
ATS480 Embedded Modbus RTU Manual	NNZ85539 (English)
ATS480 EtherNet/IP – Modbus TCP Manual VW3A3720	NNZ85540 (English)
ATS480 PROFIBUS DP Manual VW3A3607	NNZ85542 (English)
ATS480 CANopen Manual VW3A3608, VW3A3618, VW3A3628	NNZ85543 (English)
ATS480 Communication Parameter Addresses	NNZ85544 (English)
ATS480 Cascade Function Application Note	NNZ85564 (English)
SoMove: FDT	SoMove FDT (English, French, German, Spanish, Italian, Chinese)
ATS480: DTM	ATS480 DTM Library EN (English – to be installed first), ATS480 DTM Lang FR (French), ATS480 DTM Lang SP (Spanish), ATS480 DTM Lang IT (Italian), ATS480 DTM Lang DE (German), ATS480 DTM Lang CN (Chinese)
EcoStruxure Automation Device Maintenance	EADM (English)
Recommended Cybersecurity Best Practices	CS-Best-Practices-2019–340 (English)

You can download there technical publications and other technical information from our website at www.se.com/en/download.

Terminology

The technical terms, terminology, and the corresponding descriptions in this manual normally use the terms or definitions in the relevant standards.

In the area of soft starters this includes, but is not limited to, terms such as error, error message, failure, fault, fault reset, protection, safe state, safety function, warning, warning message, and so on.

Among others, these standards include:

European standards:

- IEC 60947–1 Low–Voltage Switchgear and Control Gear – General rules
- IEC 60947–4-2 Semiconductor Motor controllers, Starters and Soft Starters
- IEC 60529 Degrees of protection provided by enclosures (IP Code)
Safety of machinery – Electrical equipment of machines – General requirements
- IEC 60664–1 Insulation coordination for equipment within low-voltage supply systems – Principles, requirements, and tests
- IEC 61000–4–2/-4–3/4–4/4–5/4–6/4–11/4–12 Electromagnetic Compatibility
- IEC 60721–3 Classification of environmental conditions
- IEC 61131–2: Programmable controllers – Part 2: Equipment requirements and tests
- IEC 60068: Environmental testing
- IEC 61158 series: Industrial communication networks – Fieldbus specifications
- IEC 61784 series: Industrial communication networks – Profiles
- IEC 62443: Security for industrial automation and control systems

European Community directives:

- 86/188/EEC Protection of Workers for the Risks Related to Exposure to Noise at Work
- 2014/35/EU Low Voltage Directive
- 2014/30/EU EMC Directive
- 2006/42/EC Machine Directive

North American standards:

- UL 60947–4–2: Low–Voltage Switchgear and Control gear – Part 4-2: Contactors and Motor–Starters – AC Semiconductor Motor Controllers and Starters

Other standards:

- ISO 12100:2010: Safety of machinery – General principles for design – Risk assessment and risk reduction
- GB/T 14078.6-2016: Low—Voltage Switchgear and Control Gear - - Part 4-2: Contactors and motor starters - - AC Semiconductor Motor Controllers and Starters (including Soft Starters)
- IEC 61800-9-2: Adjustable speed electrical power drive systems – Part 9-2: Ecodesign for power drive systems, motor starters, power electronics and their driver applications – Energy efficiency indicators for power drive systems and motor starters

In addition, the term zone of operation is used in conjunction with the description of specific hazards, and is defined as it is for a hazard zone or danger zone in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

Also see the glossary at the end of this manual.

Contact us

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Implementing A Cascade Function

The goal of this Application Note is to provide the automation architecture, commission steps and operation procedure to use the cascade function of the Altivar Soft Starter ATS480.

This Application Note describes an use case with an electromechanical sequence controlled by an operator via push buttons.

Applications

A cascade architecture consist of starting and stopping several asynchronous motors with a single soft starter. This operation is done by executing an electromechanical sequence with contactors and a soft starter which will start a motor before switching to the next one to start (or stop) it.

Advantages

- A single soft starter to start several motors, reducing costs, system footprint and wiring time
- Possibility to choose the order with which to start and stop the motors

Limitations

- Requires an architecture using motors with identical motor and voltage ratings
- Only one motor at a time can be controlled by the soft starter
- For economic reasons, the cascade function shall be used when all motors rotate in the same direction

When the cascade function is enabled, thermal monitoring of the motor is disabled.

NOTICE

MOTOR OVERHEATING

- Install external thermal monitoring equipment for each motor used in the cascade sequence.

Failure to follow these instructions can result in equipment damage.

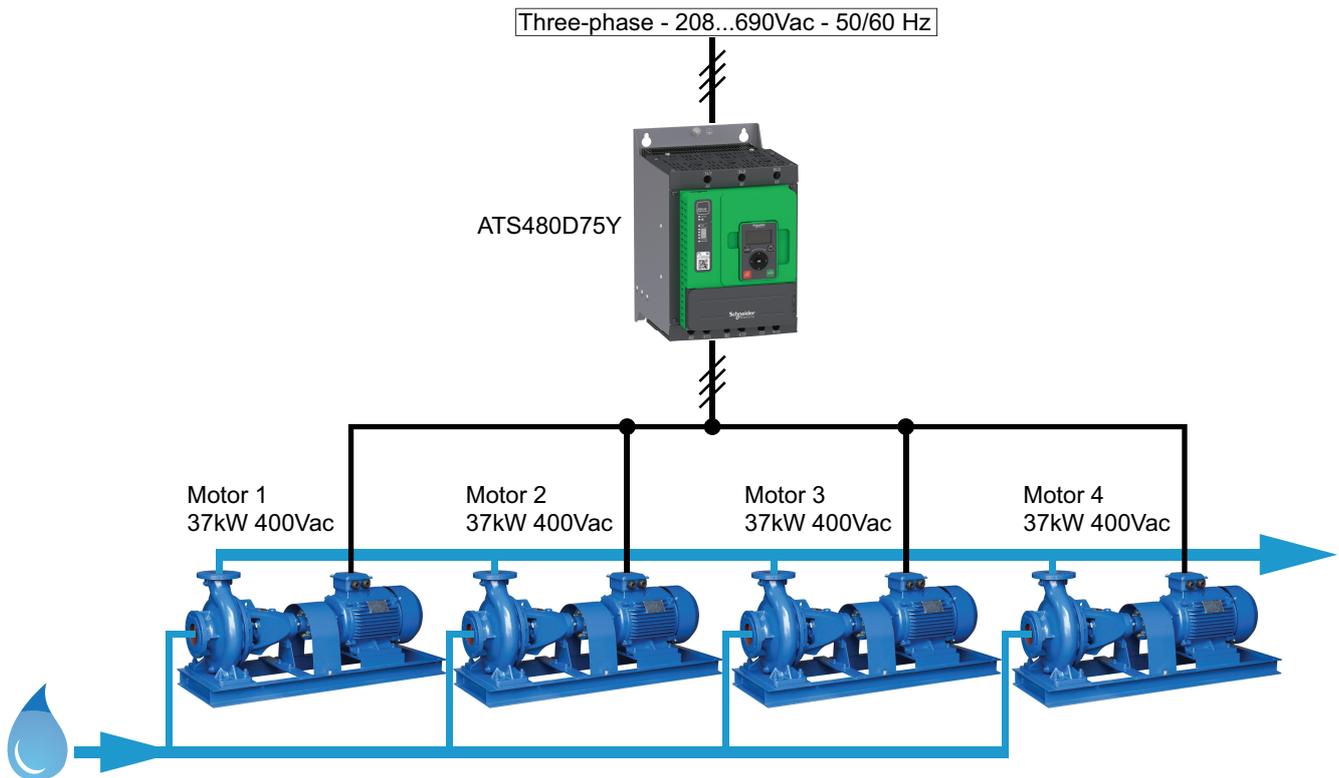
Use Case: 4 Pump Water Substation

Description

The use case of this application note is a substation of 4 pumps equipped with 4 motors 37kW 400Vac and an Altivar Soft Starter ATS480D75Y. The 4 pumps are in parallel, starting and stopping them one after another impact the water flow of the system.

To start and stop the motors, an operator commands the contactors by pressing push buttons.

This use case cannot be set in an isolated area without any human control because, in case of mains loss, the sequence cannot restart automatically.



Bill Of Material For Diagram 1

The following bill of material for the diagram 1 is compliant with IEC coordination type 1.

Designation	Product	P/N	Description	Quantity
Q1	Breaker	C40N31M320	Circuit breaker ComPact NSX400N, 50 kA at 415 VAC, MicroLogic 1.3 M trip unit 320 A, 3 poles 3d	1
KM1	Contactator	LC1G330LSEA	High power contactor, TeSys Giga, 3 pole (3NO), AC-3 <=440V 330A, advanced version, 200...500V wide band AC/DC coil	1
	Auxiliary contact	LAG8N203P	Auxiliary contact block, TeSys Giga, 2NO, lateral face side mounting, push-in terminals L1/R1	1
Q11, Q12, Q13, Q14	Breaker	GV4P80N	Motor circuit breaker, TeSys GV4, 3P, 80 A, Icu 50 kA, magnetic, EverLink terminals	4
	Auxiliary contact	GV4AE11	Auxiliary contacts OFSD	4
KM11, KM21, KM31, KM41	Contactator	LC1D80P7	TeSys D contactor - 3P(3 NO) - AC-3 - <= 440 V 80 A- 230 V AC 50/60 Hz coil	4
	Auxiliary contact	LAD8N02	Auxiliary contact block, TeSys D, 2NC, side mounting, screw clamp terminals	4
	Auxiliary contact	LAD8N20	Auxiliary contact block, TeSys D, 2NO, side mounting, screw clamp terminals	4
KM12, KM22, KM32, KM42	Contactator	LC1D80P7	TeSys D contactor - 3P(3 NO) - AC-3 - <= 440 V 80 A- 230 V AC 50/60 Hz coil	4
	Auxiliary contact	LAD8N20	Auxiliary contact block, TeSys D, 2NO, side mounting, screw clamp terminals	4
A1	Soft starter	ATS480D75Y	Soft starter for asynchronous motor, ATS480, 75 A, 208...690 V, 37 KW	1

The components are available in those catalogues:

- TeSys MKTED210011EN (English)
- TeSys Control Giga Contactors – TeSys Protect Giga Electronic Overload Relays MKTED210011EN (English)

The other components used in the following diagrams depends on the customer installation.

Consider the ATS480 control block apparent power supply to dimension the control supply coordination elements:

- ATS480D17Y...D22Y: 60 VA
- ATS480D32Y...C17Y: 90 VA
- ATS480C21Y...C41Y: 106 VA
- ATS480C48Y...C66Y: 125 VA
- ATS480C79Y...M12Y: 200 VA

Electrical Diagrams

Diagram 1: Motor mains supply

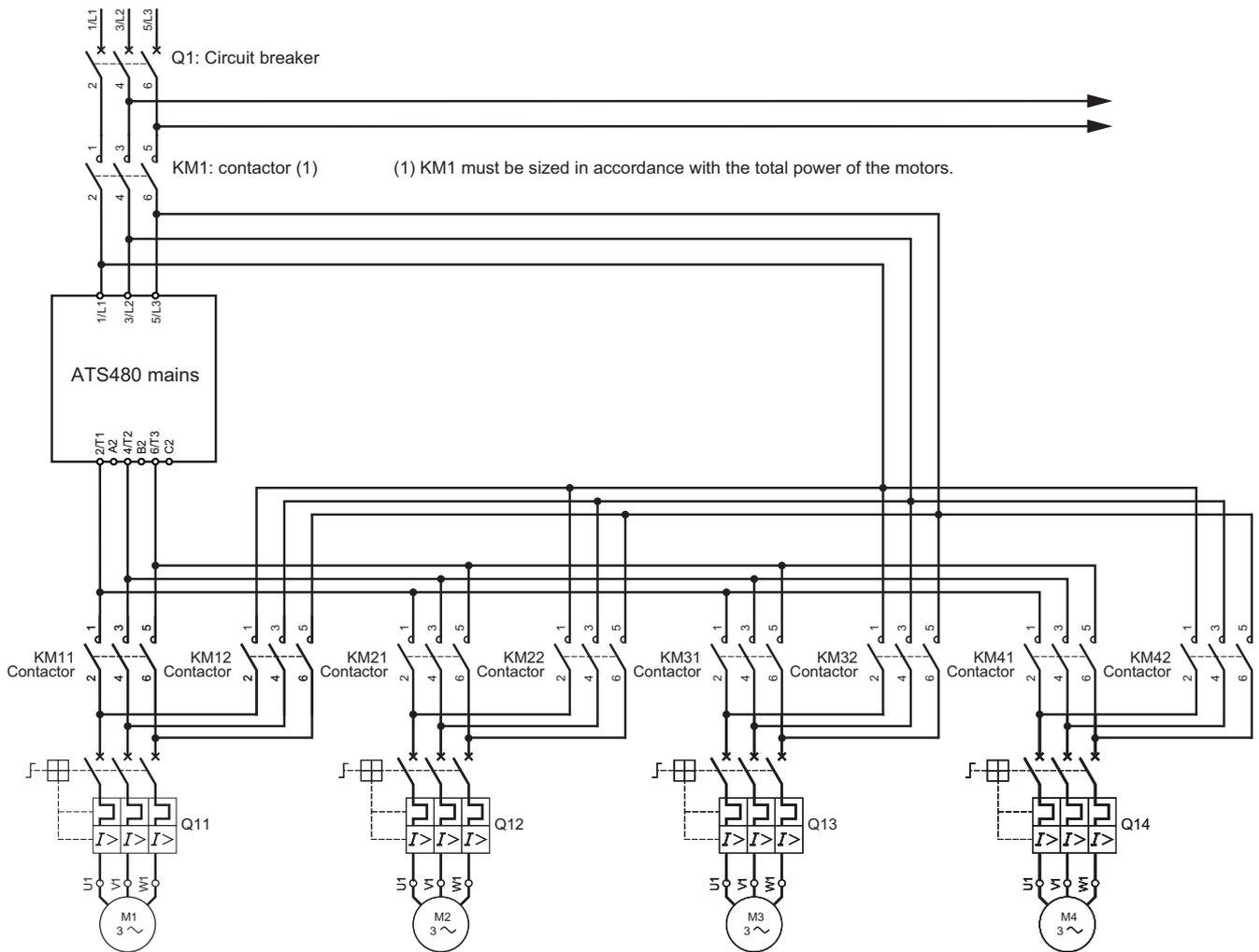


Diagram 2: Soft Starter control

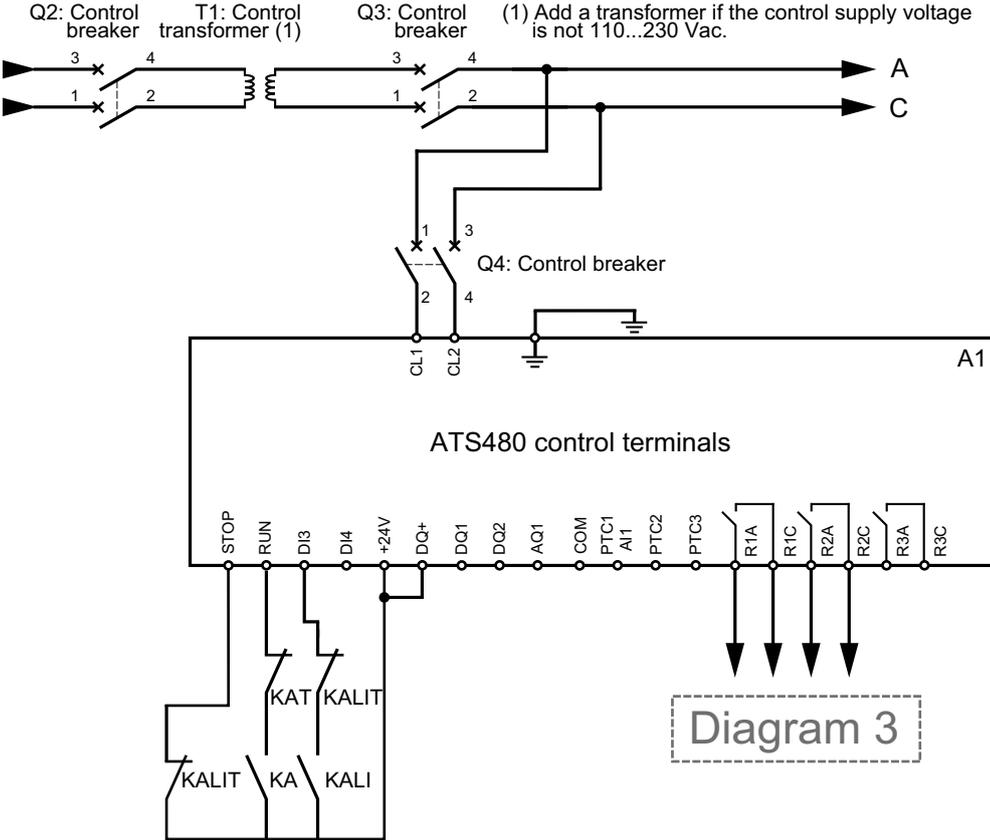
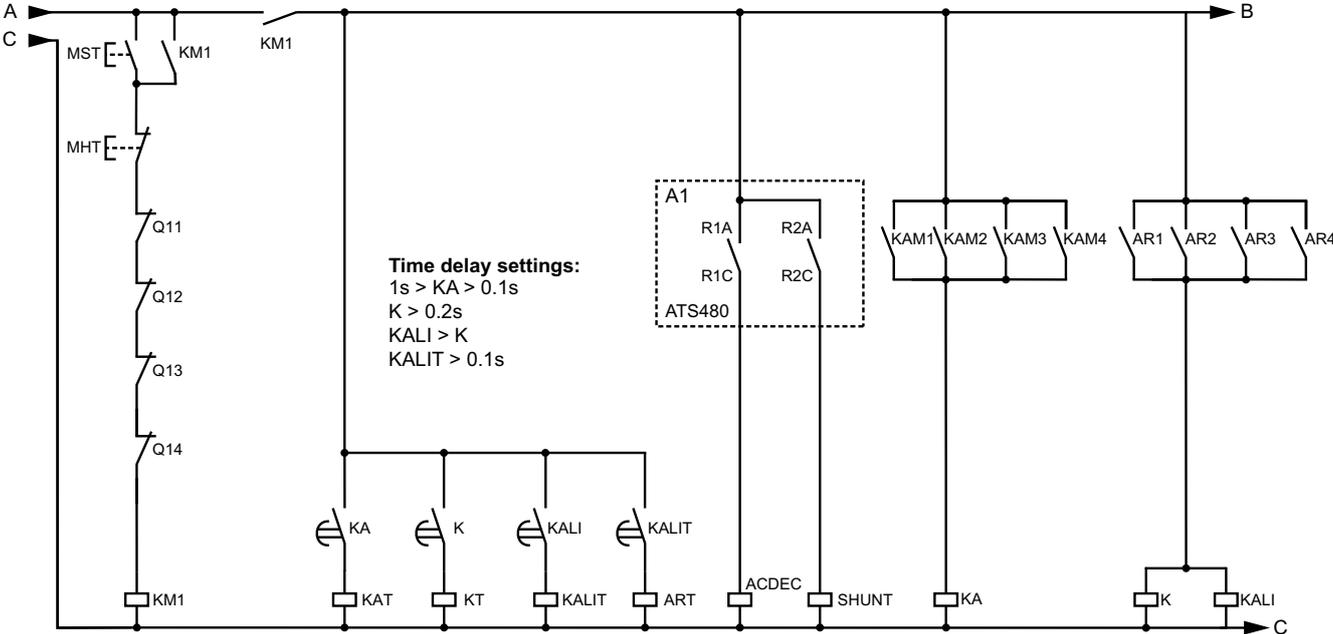


Diagram 3

Diagram 3: Start and stop intermediate relays and main contactor commands



NOTE: Add surge suppressor on the coils of ACDEC and SHUNT, refer to the ATS480 User Manual chapter "Relay Contacts Wiring".

Diagram 4: Start and stop sequences for motors #1 and #2

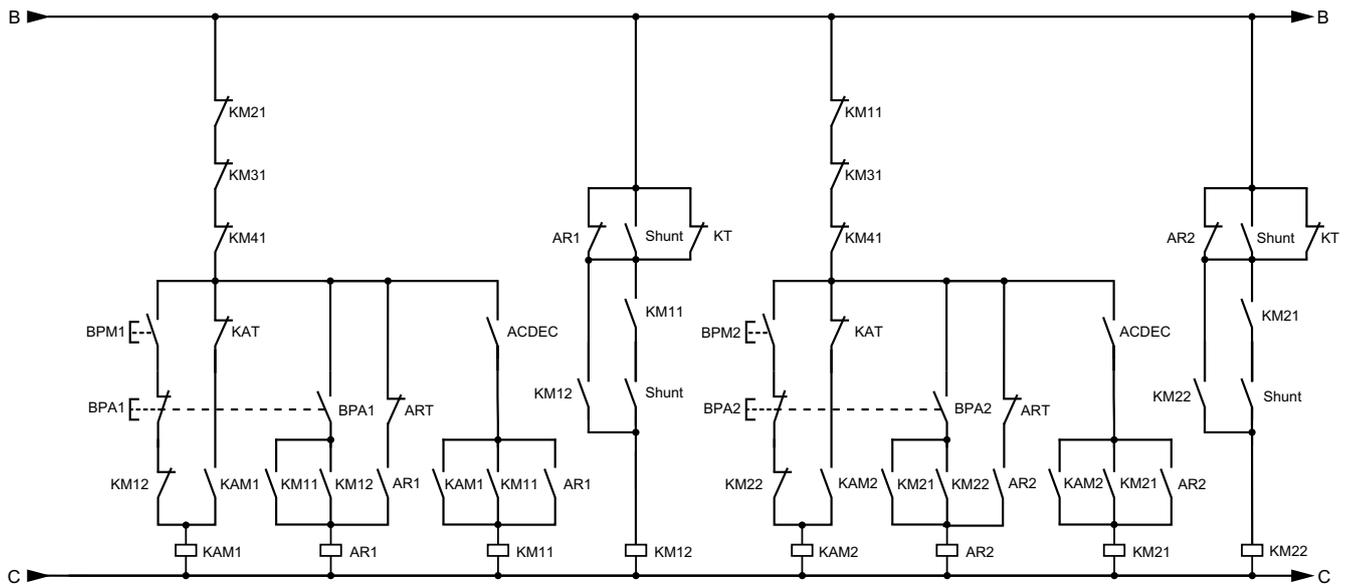
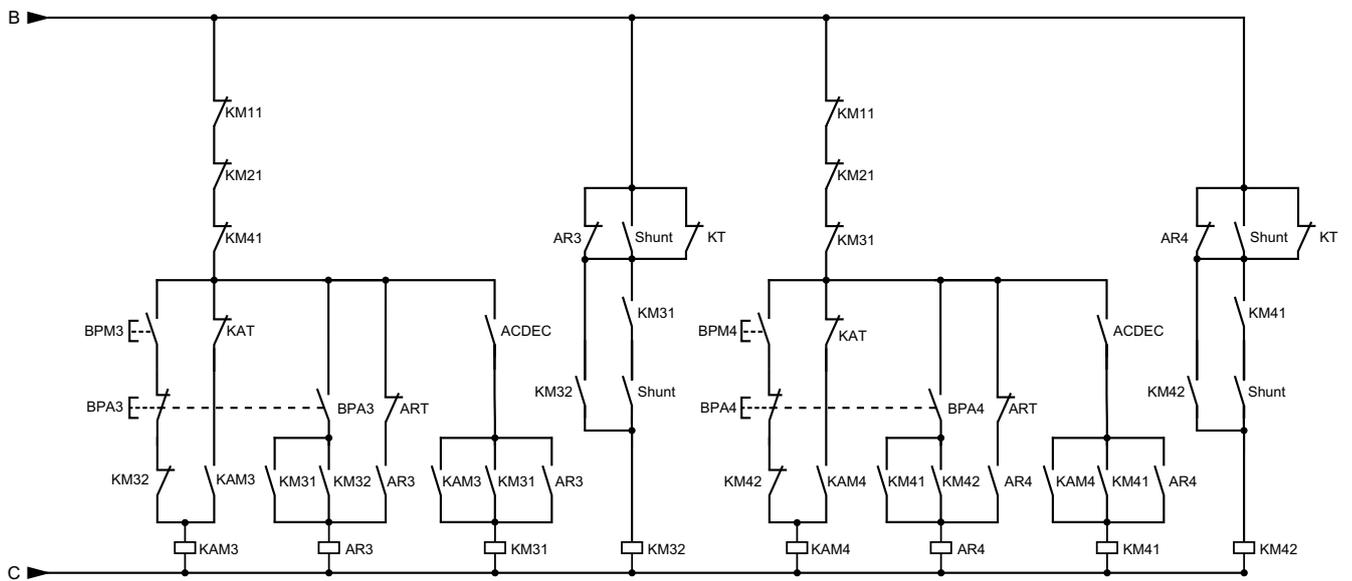


Diagram 5: Start and stop sequences for motors #3 and #4



Commissioning

Start And Stop Settings

The soft starter must be configured in torque control with a deceleration ramp to avoid hammer effect.

Starting and stopping time are set to 10 seconds.

The current limit is set to 300% of the motor nominal current.

Refer to the Step / Action table below for detailed explanations.

Soft Starter Wiring

To wire the soft starter, follow the previous electrical diagrams:

- Wire RUN and STOP inputs
- Wire DI3 input
- Wire R1 and R2 relays to respectively ACDEC & SHUNT (add surge suppressor on the coil of ACDEC and SHUNT, refer to the ATS480 User Manual chapter "Relay Contacts Wiring" in Related Documents, page)

Soft Starter Setting

Refer to this procedure to setup the ATS480 via the display terminal. The labels correspond to those displayed on the display terminal.

Step	Action
1	In the [Simply Start] SYS → [Simply start] SIM menu, set: <ul style="list-style-type: none"> • [Motor Nom Current] IN according to the rated motor current indicated on the motors nameplate • [Current Limit] ILT to 300% • [Mains Voltage] ULN to 400Vac, according to the mains voltage indicated on the motors nameplate • [Acceleration] ACC to 10s • [Init Starting Torque] TQ0 to 0% • [Type of stop] STT to [Deceleration] D • [Deceleration] DEC to 10s • [End Of Deceleration] EDC to 20% (factory setting)
2	In the [Complete settings] CST → [Start & Stop] SSP menu, set: <ul style="list-style-type: none"> • [Control Mode] CLP to [Torque Control] TC (factory setting)
3	In the [Input/Output] IO menu, set: <ul style="list-style-type: none"> • [DI3 assignment] L3A to [No] NO • [R1 Assignment] R1 to [Isolating Relay] ISOL
4	In the [Complete settings] CST → [Cascade] CSC menu, set: <ul style="list-style-type: none"> • [Cascade] CSC to [Yes] YES • [Cascade DI Assign] CSCA to [DI3] LI3
5	In the [Monitoring] PROT menu, set: <ul style="list-style-type: none"> • [Time Before Restart] TBS to as low as possible or keep the factory setting (2s)

Optional step, to reset the soft starter if it triggers an error:

1. Wire the DI4 terminals
2. In the **[Input/Output] IO** menu, set **[DI4 assignment] L4A** to **[Fault Reset] LIRSF**.
3. Apply a high level on the terminal DI4 to reset the soft starter when it triggers an error.

NOTE: Consider the following limitations when **[Cascade] CSC** is set to **[Yes] YES**:

- The motor thermal protection class is disabled: **[Motor Class] THP** is forced to **[No Protection] NO**
- The preheating function is disabled: **[Preheating Assign] PRHA** is forced to **[Not Assigned] NO**
- The soft starter cannot be used inside the motor delta wiring: **[Inside Delta] DLT** is forced to **[No] NO**
- The soft starter can only control the motor of the active sequence

No specific action is required to take those limitations into account.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

If cascade function is enabled, monitoring functions such as output phase loss detection are not effective for the motors that are started and bypassed. Phase loss and, by implication, accidental disconnection of cables, are not detected.

- Verify that the absence of phase loss monitoring does not result in unsafe conditions or install external monitoring device to detect phase loss on each motor.

Failure to follow these instructions will result in death or serious injury.

Soft Starter Status

List of possible states for the soft starter, visible on the display terminal, when using the cascade function:

Soft starter state	Condition
[Ready] RDY	Soft starter supplied and ready to start. No Run order applied yet, the first motor of the cascade sequence is not started.
[Cascade Waiting] STB	First motor is started and the cascade sequence is ongoing. This state is displayed until all the motors of the cascade sequence are stopped. NOTE: In this state the settings of the soft starter are locked and cannot be modified.
[Wait for Restart] TBS	Starting time delay not elapsed, the motor cannot be started until the time set to the parameter [Time Before Restart] TBS in the menu [Monitoring] PROT is elapsed.

Supply Loss Consequences

Mains Loss

When the motor mains supply is no longer present (mains supply loss, Q11, Q12, Q13, Q14 motor circuit breaker open, emergency stop, MHT contact open):

- All the motors in the cascade sequence are stopped in freewheel.

Control Supply Loss

When the control supply CL1/CL2 (230 Vac) is no longer present:

- The motors that were already started by the cascade sequence keep running until the mains contactor is opened and cut the mains power supply from the motor or until a Stop command is applied. In this case the motor stops in freewheel.
- The motor that was controlled by the soft starter is stopped in freewheel.

Electromechanical Sequence

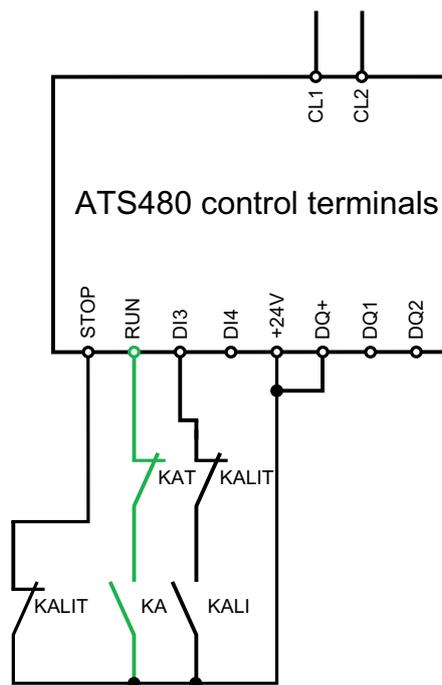
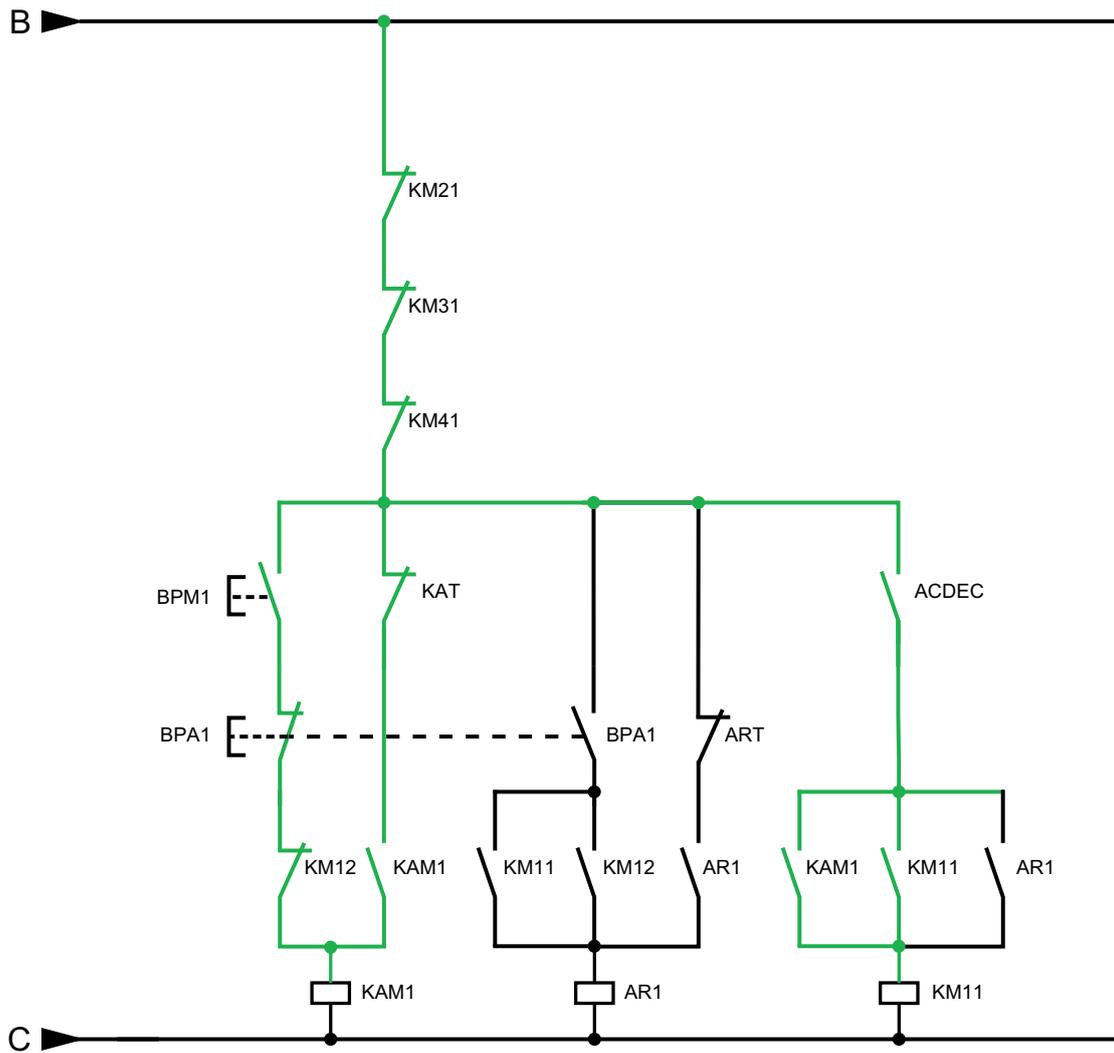
The following sequence describes how to start and stop motor 1.

Starting Phase

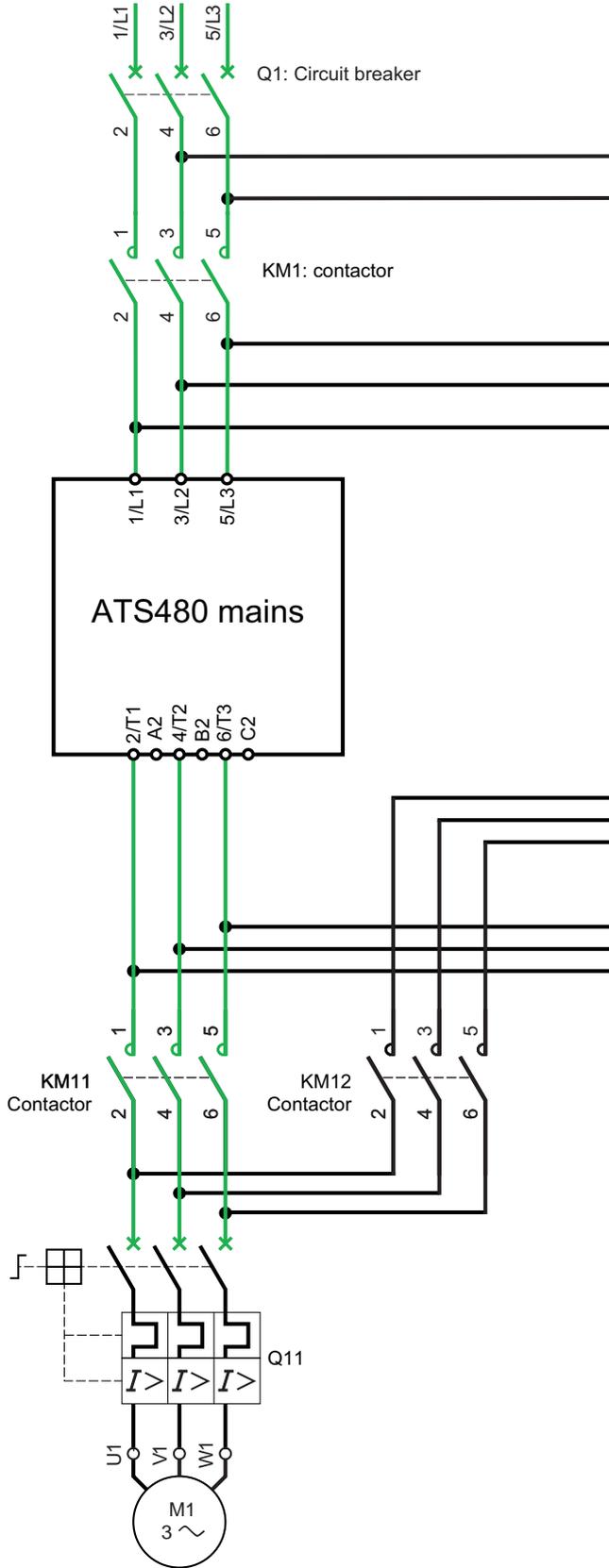
MST is On and no error on Q1, Q2, Q3, Q4. Apply a high level on KM1 and is maintain it.

Step	Action
1	BPM1 is activated and no other soft starter is in starting phase. This applies a high level on KAM1 and maintain it.
2	KA rises. KA validates the Run input on the soft starter because KAT is Off. The motor starts and is controlled by the soft starter.
3	ACDEC is controlled by relay R1 when it rises. Apply a high level on KM11 and maintain it. No other motors can be controlled by the soft starter during this time.
4	KAT rises 0,1 seconds after KA, then KMA1 falls and cuts the soft starter Run input.

Starting sequence for motor 1

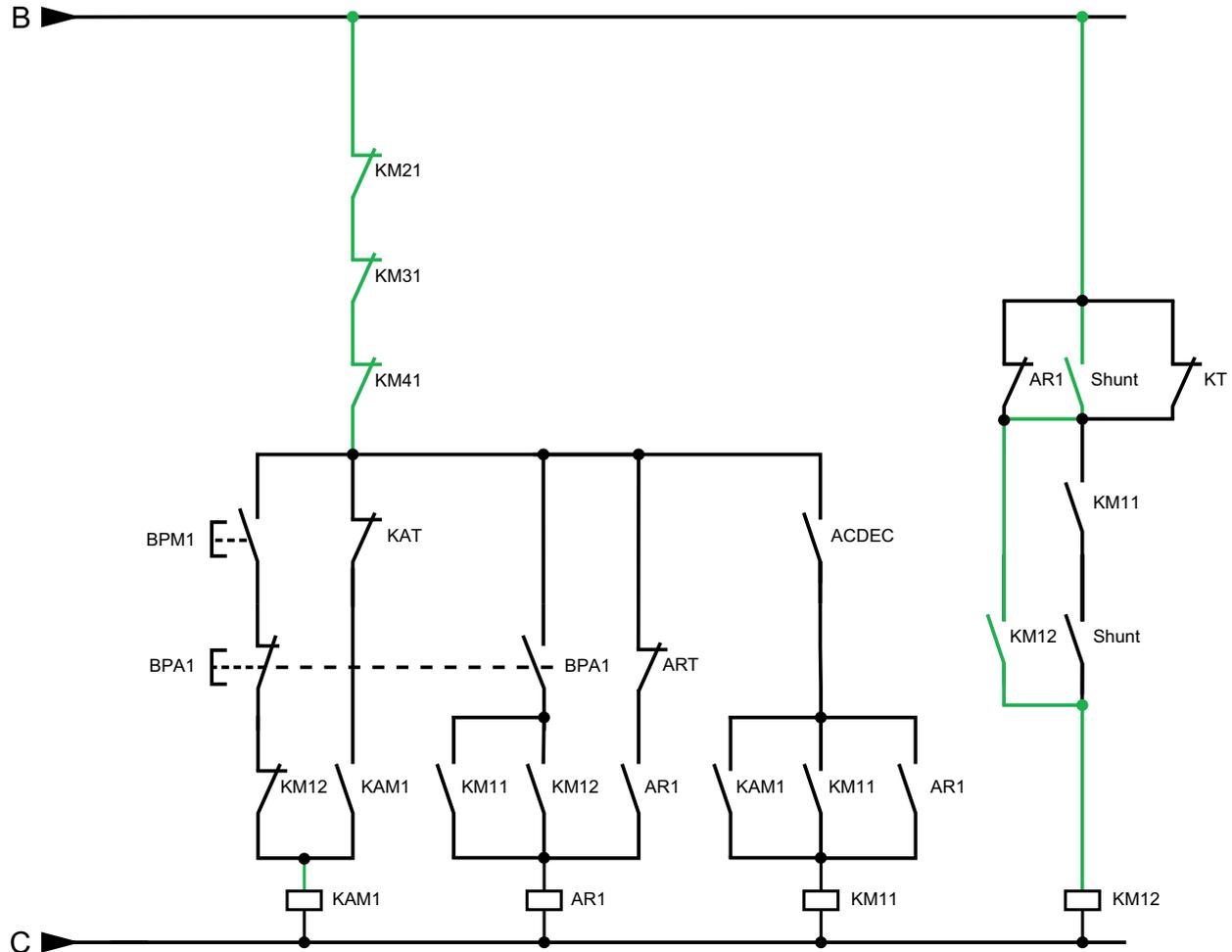


Starting sequence for motor 1

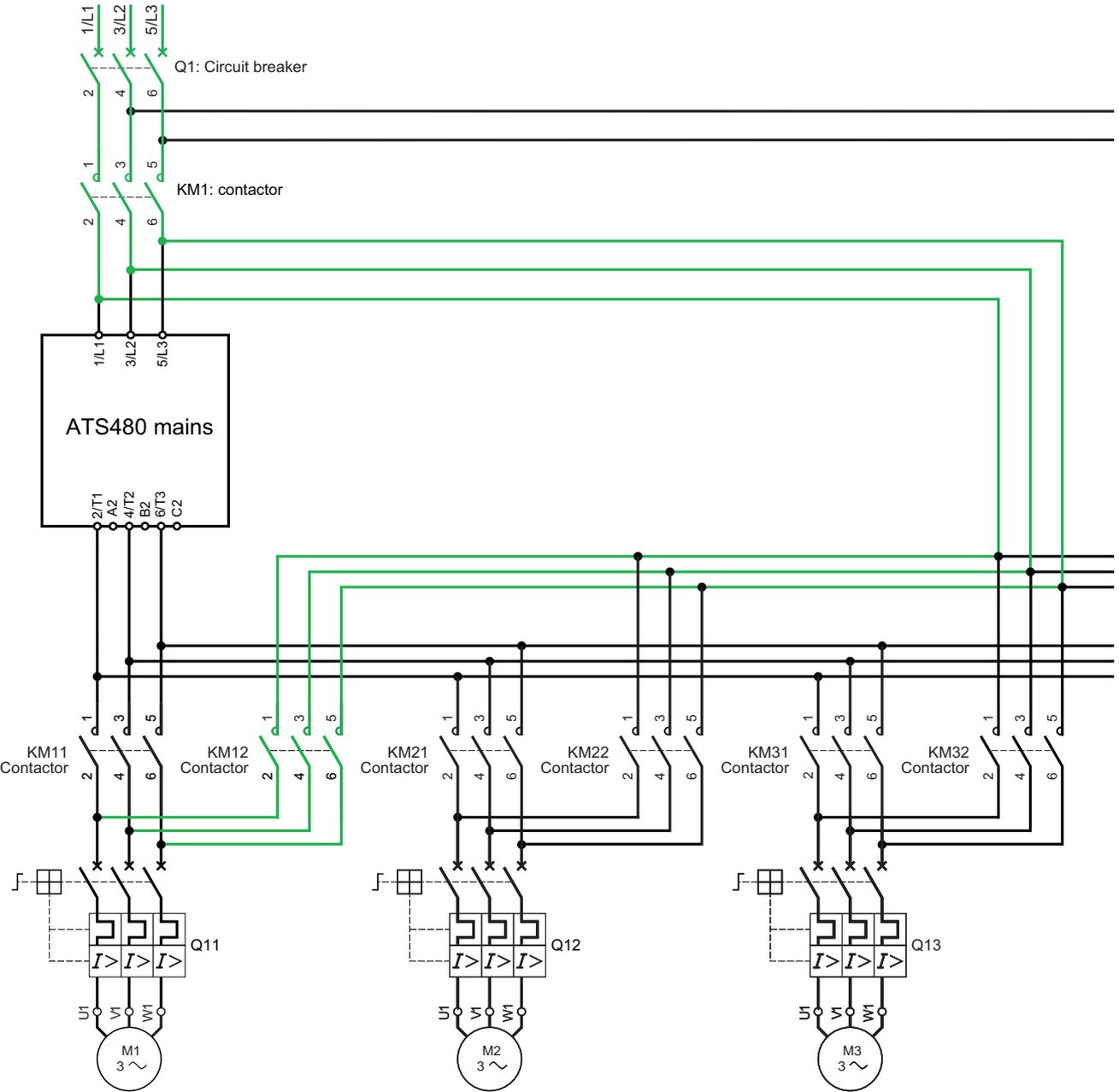


Step	Action
5	At the end of the starting phase, SHUNT is controlled by the relay R2 and rises, ACDEC is controlled by the relay R1 and falls to 0.
6	KM11 opens after ACDEC opens. A high level is applied and maintained on KM12. The motor is now supplied directly in the line of the mains supply. The soft starter can now control another motor of the cascade architecture.

Switching sequence from started to bypassed for motor 1



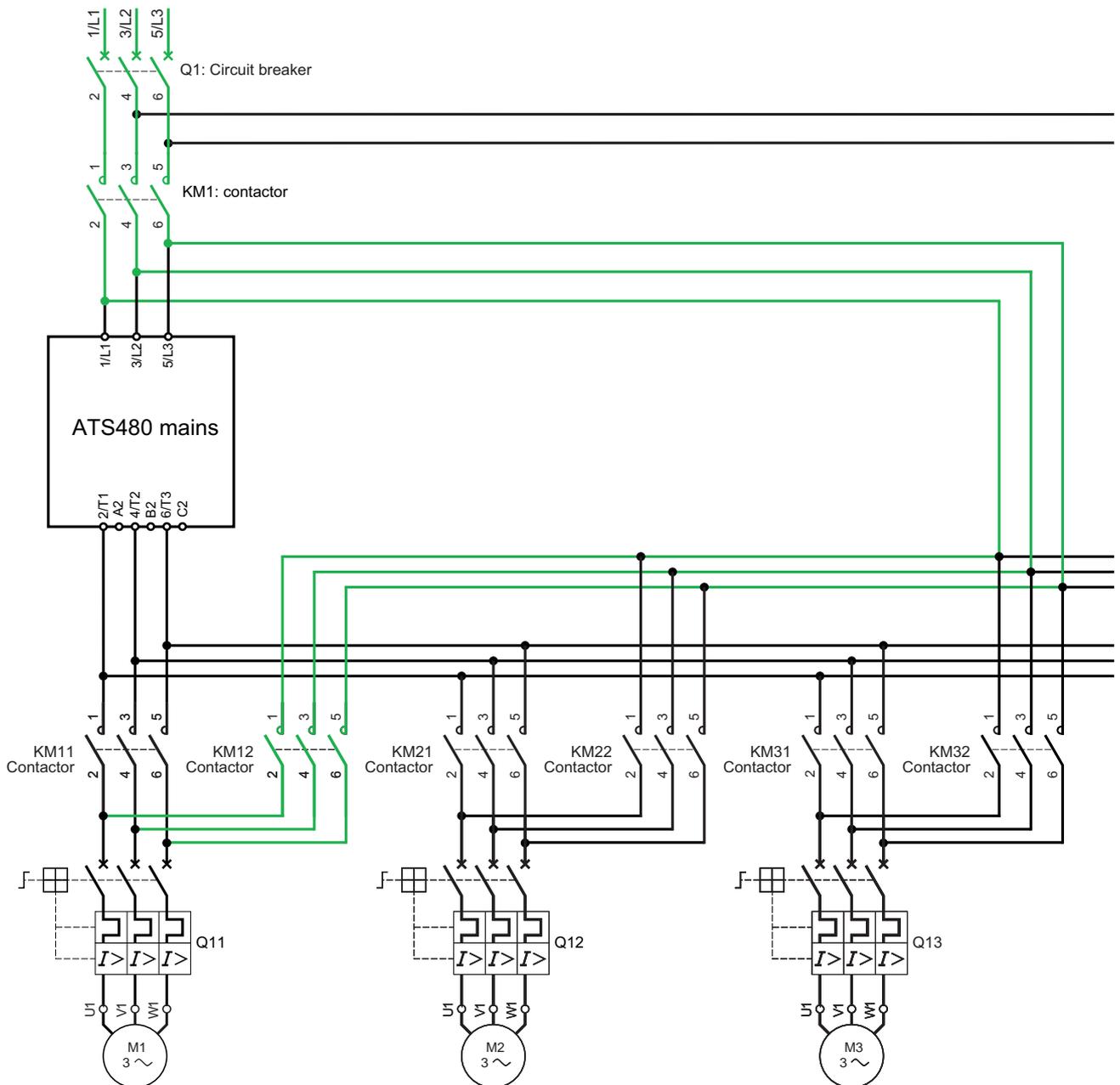
Switching sequence from started to bypassed for motor 1



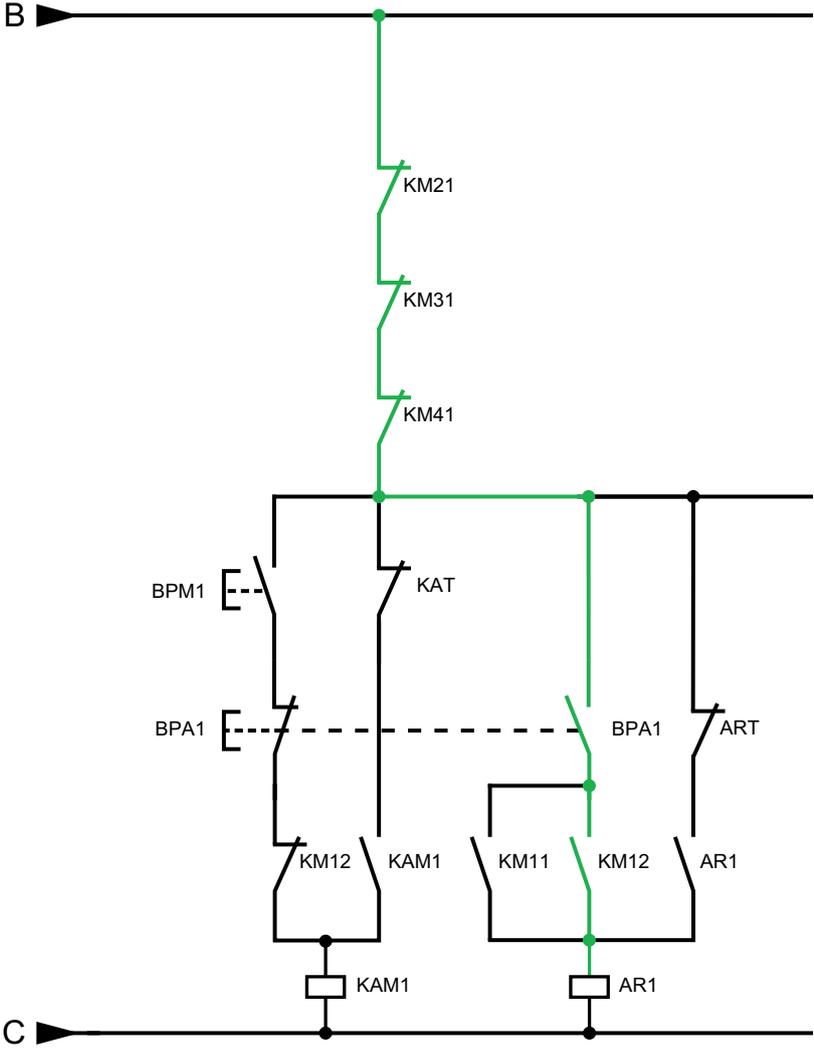
Stopping Phase

Step	Action
1	Close BPA1 to apply and maintain a high level on AR1. K and KALI rises and apply a high level on the logic inputs DI3 and STOP.
2	The soft start begins the stopping phase.
3	KM12 and KM11 will be closed at the same time for a short time. No other motors can be controlled by the soft starter during this time (KM11 = On).

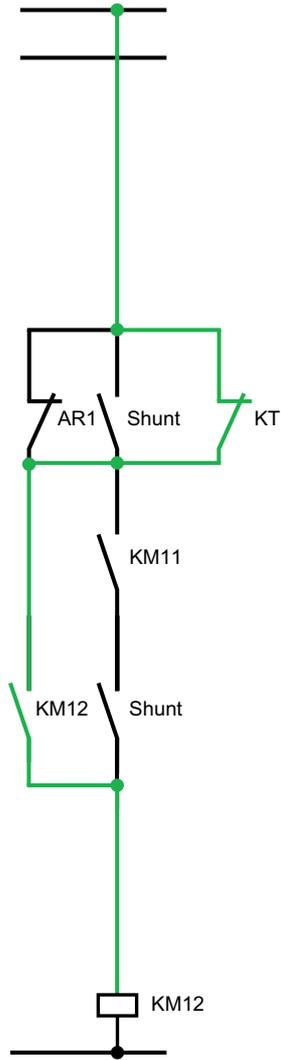
Stopping sequence for motor 1 from bypassed



Switching sequence for motor 1 from bypassed to soft starter control

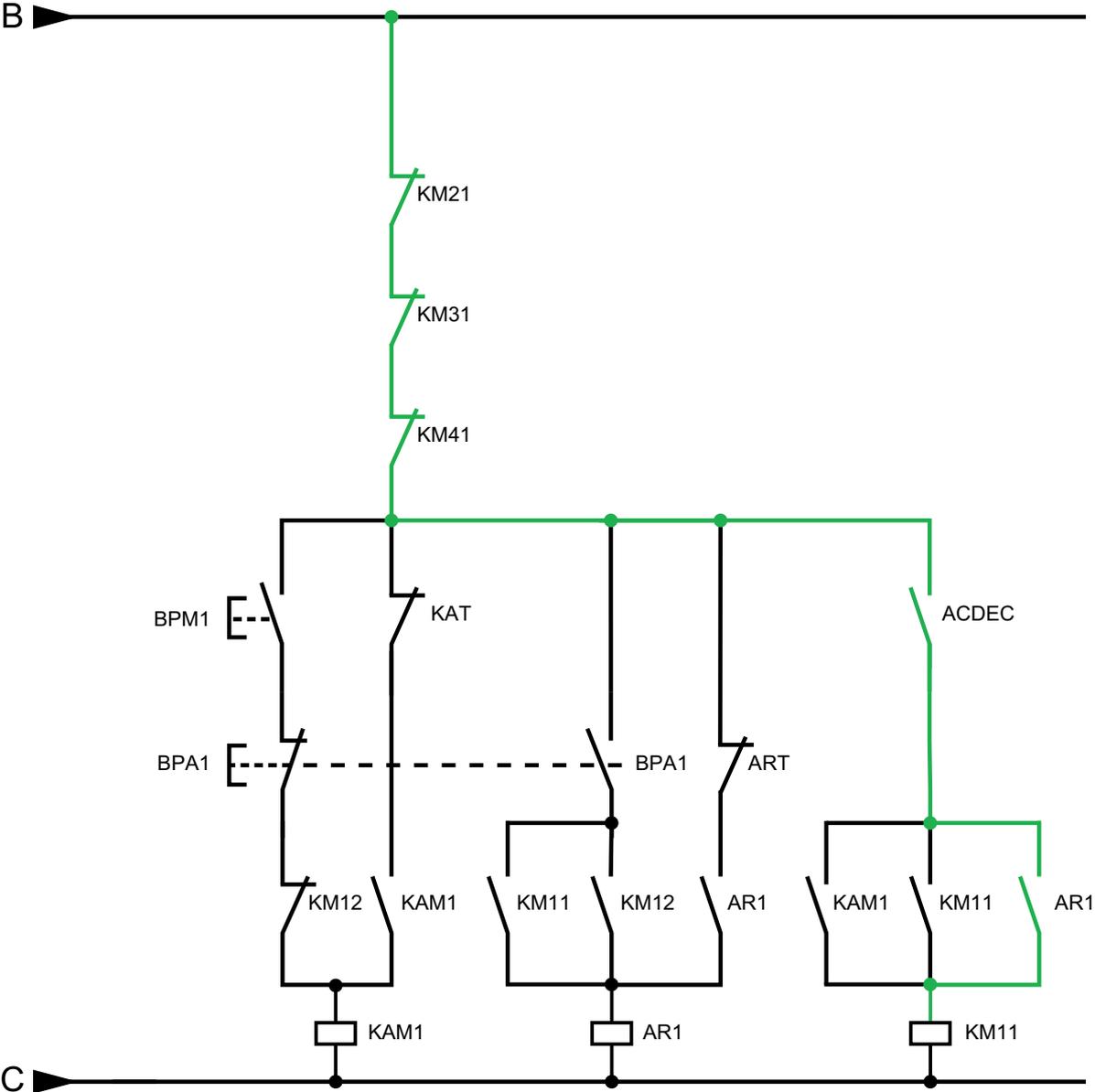


Switching sequence for motor 1 from bypassed to soft starter control

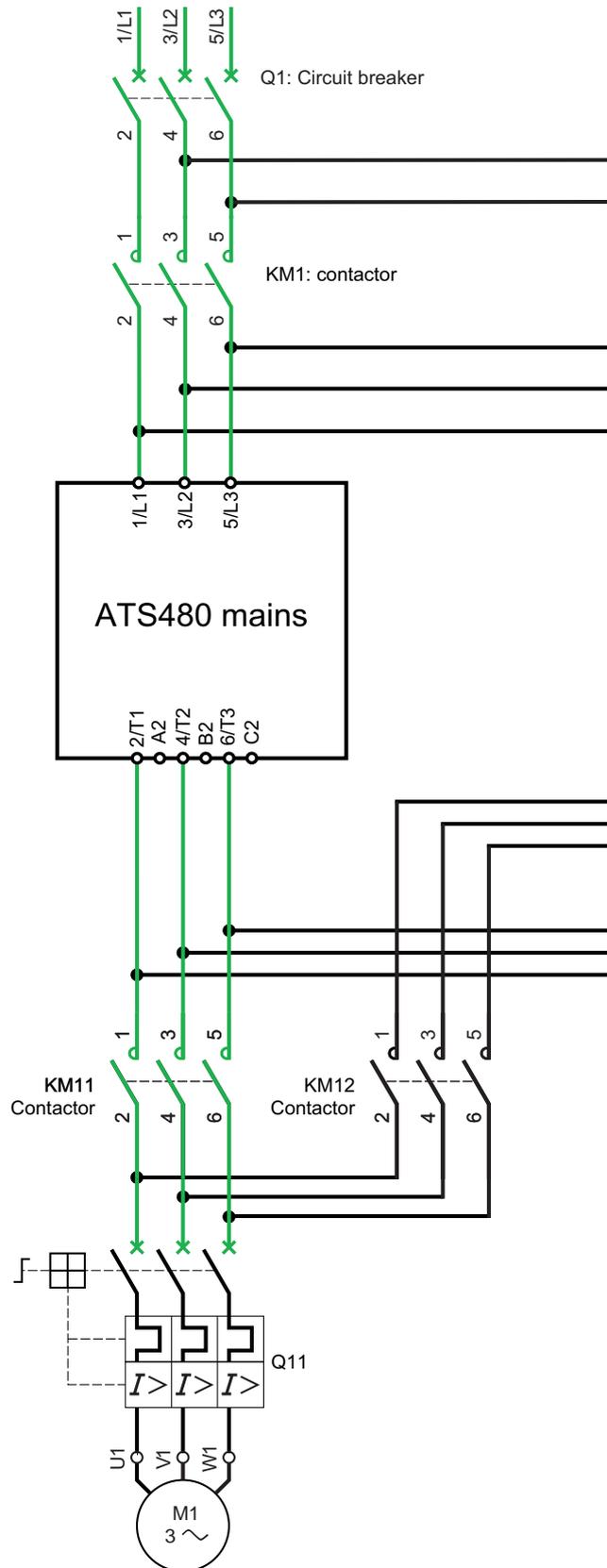


Step	Action
4	KALIT and ART will rise after temporization and AR1 opens
5	During a short time, KM12 and KM11 will be closed due to SHUNT and ACDEC
6	Due to SHUNT opens, KM12 opens and the motor is controlled with KM11 by the soft starter
7	Until ACDEC will be closed, KM11 is closed and the soft starter control the stopping phase
8	The soft starter can now control the next motor to start or stop it.

Deceleration sequence for motor #1 with Soft Starter



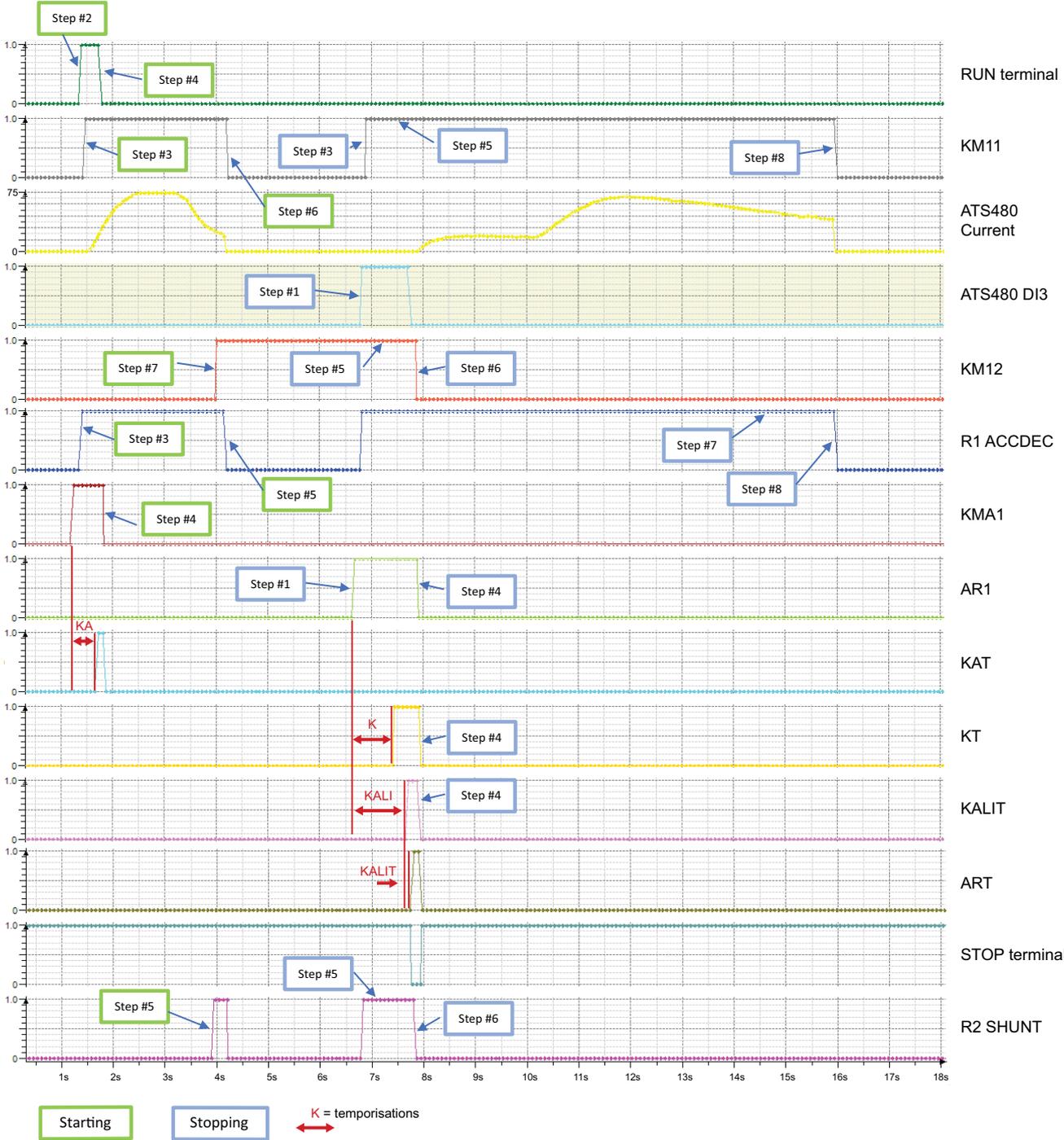
Deceleration sequence for motor #1 with Soft Starter until stopping



Application Chronogram

This chronograph describes start and stop Motor 1 (torque control).

NOTE: The Step #1 is pressing the push-button BPM1.



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