Altivar Soft Starter ATS480

Soft Starter for Asynchronous Motors

PROFIBUS DP Manual VW3A3607

NNZ85542.01
03/2022

www.se.com

Legal Information

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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.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Do not use renewable link fuses in fused switches.

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

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

⚠⚠DANGER

ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION

Do not use damaged products or accessories.

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

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

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.

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

⚠WARNING

UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS

- In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cyber security concept.
- Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering IT security and cyber security (such as: ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/ IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security, SE recommended Cybersecurity Best Practices*).
- Verify the effectiveness of your IT security and cyber security systems using appropriate, proven methods.

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

(*) : SE Recommended Cybersecurity Best Practices can be downloaded on SE.com

⚠WARNING

LOSS OF CONTROL

Perform a comprehensive commissioning test to verify that communication monitoring properly detects communication interruptions

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

This product meets the EMC requirements according to the standard CEI 60947-4-1. This device has been designed for environment A. Use of this product in a domestic environment (B environment) may cause unwanted radio interference.

⚠⚠WARNING

RADIO INTERFERENCE

- In a domestic environment (B environment), this product may cause radio interference in which case supplementary mitigation measures may be required.
- The references from ATS480D17Y to ATS480C11Y can be adapted to a domestic environment (B environment) by adding an external bypass contactor. For other ATS480 references, you must consider other mitigation measures.

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

NOTICE

DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE

Before switching on and configuring the product, verify that it is approved for the mains voltage.

Failure to follow these instructions can result in equipment damage.

About the Book

At a Glance

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 are not all available at the time of publication of this document online. 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 only for 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. • 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.**

Document scope

The purpose of this document is to:

- Show you how to install the PROFIBUS DP fieldbus module on the soft starter.
- Show you how to configure the soft starter to use PROFIBUS DP fieldbus.

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

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:

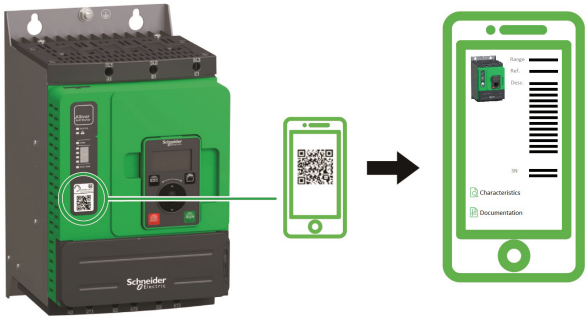
- The whole catalog for detailed characteristics and selection guides
- The CAD files to help design your installation, available in over 20 different file formats
- All software and firmware to maintain your installation up to date
- A large quantity of White Papers, Environment documents, Application 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.

Electronic product data sheet

Scan the QR code in front of the soft starter to get the product data sheet.



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

Select your country on www.se.com/contact.

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Presentation

Hardware Overview

General

The VW3A3607 is a PROFIBUS DP fieldbus module that can be used in a PROFIBUS DP industrial fieldbus. The module has a 9-pin female Sub-D connector for connection to the PROFIBUS DPV1 network.

The figure shows the hardware presentation of the VW3A3607 PROFIBUS DP fieldbus module:

Software Overview

Compatibility

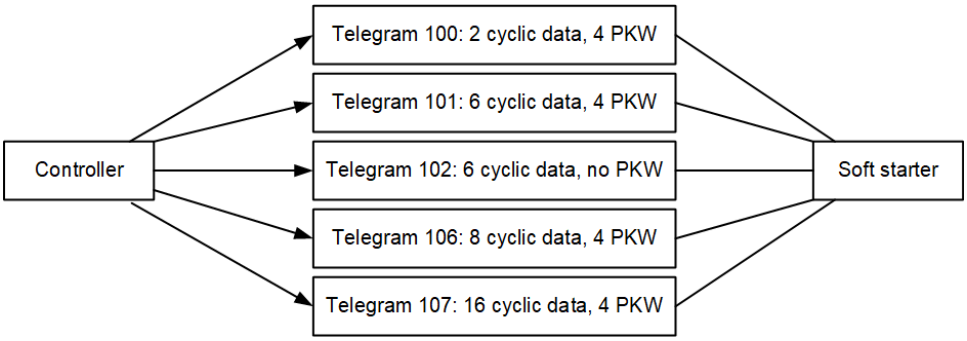
The VW3A3607 communication module enables the integration of a variable speed soft starter into a PROFIBUS DP fieldbus. This module offers the possibility to control its host soft starter in native profile.

Profile	Telegrams
Standard Mode	100,101,102,106, 107

NOTE: PROFIdrive is not supported by the soft starter but the channel access of the parameters is available.

Fieldbus Module Features Overview

There are few modes of operation which are telegram 100, 101, 102, 106 and 107. The other telegrams are based on the native profile of the device.



Data is exchanged in order to make use of all the soft starter functions.

The following features are supported by the VW3A3607 PROFIBUS DP module:

- Five configurable telegrams (Optimizes the I/Os usage of the controller)
- Mapping of the process data from the controller
- Parameter management compliant with PROFIdrive V4.1
- Baud rate from 9.6 to 12000 kbps (Automatic detection of the bus speed)
- Supports standard identification & maintenance requests
- Several DP V1 messaging modes
- Host soft starter can be handled from two controllers (MS0 and MS1)
- Quick setup from soft starter side

Communication Parameter Addresses

For more information about the Communication Parameter Addresses, please refers to the ATS480 Communication Parameter NNZ85544.

Basics

Introduction

PROFIBUS

PROFIBUS DP is the fast PROFIBUS version which is specially designed for communication in production processes and for building automation. Features of PROFIBUS DP includes simple connection of new devices in the bus and high transmission rates.

Device Identification

A controller device uses the Ident number to identify the device class of the connected device. The Ident number is a unique number assigned to each device class by the PNO.

Device Address

Each device on the network must be assigned a unique address from 1 to 126.

The controller (normally address 0 ... 2) can communicate with each device via this address.

PROFIBUS DP V1 Communication

PROFIBUS DP-V1 allows cyclic and acyclic communication between controller and device. Acyclic communication is slower than cyclic communication, however it enables the modification of parameters during operation.

The product supports acyclic communication as per PROFIBUS specification for MS0 communication.

The product supports acyclic communication for DP-V1 as per PROFIBUS specification for MS1 and MS2 communication.

The following services are available for acyclic communication:

Service	Controller Class 1	Controller Class 2
READ	Read data set	Read data set
WRITE	Write data set	Write data set
INITIATE	–	Connect to controller C2
ABORT	–	Terminate connection to controller C2

Profile

Definition of a Profile

Types of Profiles

There are 3 types of profile:

- Communication profiles
- Functional profiles
- Application profiles

Communication Profile

A communication profile describes the characteristics of a bus or network:

- Cables
- Connectors
- Electrical characteristics
- Access protocol
- Addressing system
- Periodic exchange service
- Messaging service
- ...

A communication profile is unique to a type of fieldbus (such as Modbus, PROFIBUS DP, and so on) and is used by different types of devices.

Functional Profile

A functional profile describes the behavior of a type of device:

- Functions
- Parameters (such as name, format, unit, type, and so on.)
- Periodic I/O variables
- State chart
- ...

Application Profile

Application profile defines the services to be provided by the devices on a machine.

Interchangeability

The aim of communication and functional profiles is to achieve interchangeability of the devices connected via the fieldbus.

Functional Profiles Supported by the Altivar Soft Starter

NOTE: The following document is valid if **[Control Mode]** CHCF is set to **[Standard Profile]** STD.

ATS48 Compatibility Profile

This profile allows to manage the compatibility with an Altistart ATS48.

NOTE: [Control Mode] CHCF is set to **[SE8 Profile]** SE8 **(factory setting)**.

NOTE:

Fieldbus modules are incompatibles with **[Control Mode]** CHCF set to **[SE8 Profile]** SE8.

Using the **[SE8 Profile]** SE8 with an option module (CANopen, Ethernet, PROFIBUS DP) triggers an error **[Config Change]** CFF2.

To remedy:

- Press the **OK** key to validate the message displayed on the display terminal. This action will change **[Control Mode]** CHCF from **[SE8 Profile]** SE8 to **[Standard Profile]** STD
- Or turn Off the soft starter, remove the fieldbus module and turn On the soft starter.

Standard Profile

To be in Standard Profile, **[Control Mode]** CHCF is set to **[Standard Profile]** STD.

The Standard Profile supported by the Altivar Soft Starter is based on the CiA402, which has been adapted to the characteristics of the Altivar Soft Starter and therefore to all communication ports.

The control word is compliant according to CiA402.

5 bits of the control word (bits 11...15) can be assigned to a function.

NOTE:

- Altivar Soft Starter starts up following a command sequence
- After switching on and when an operating mode is started, Altivar Soft Starter goes through several operating states

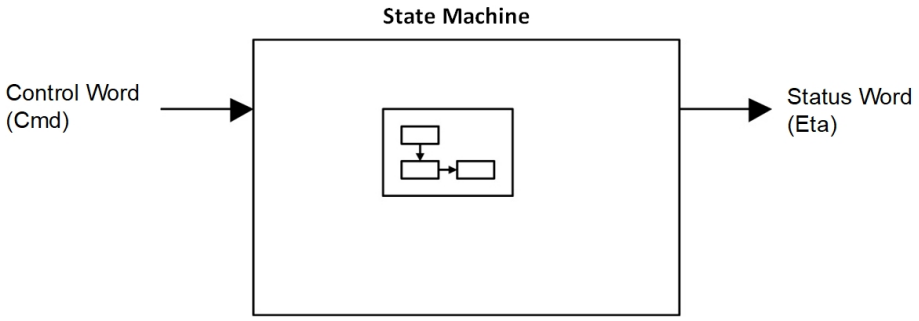
Functional Description

Introduction

Soft starter operation involves one main function, which is illustrated in the diagrams below.

Altivar Soft Starter

The following figure shows the control diagram for soft starter operation:



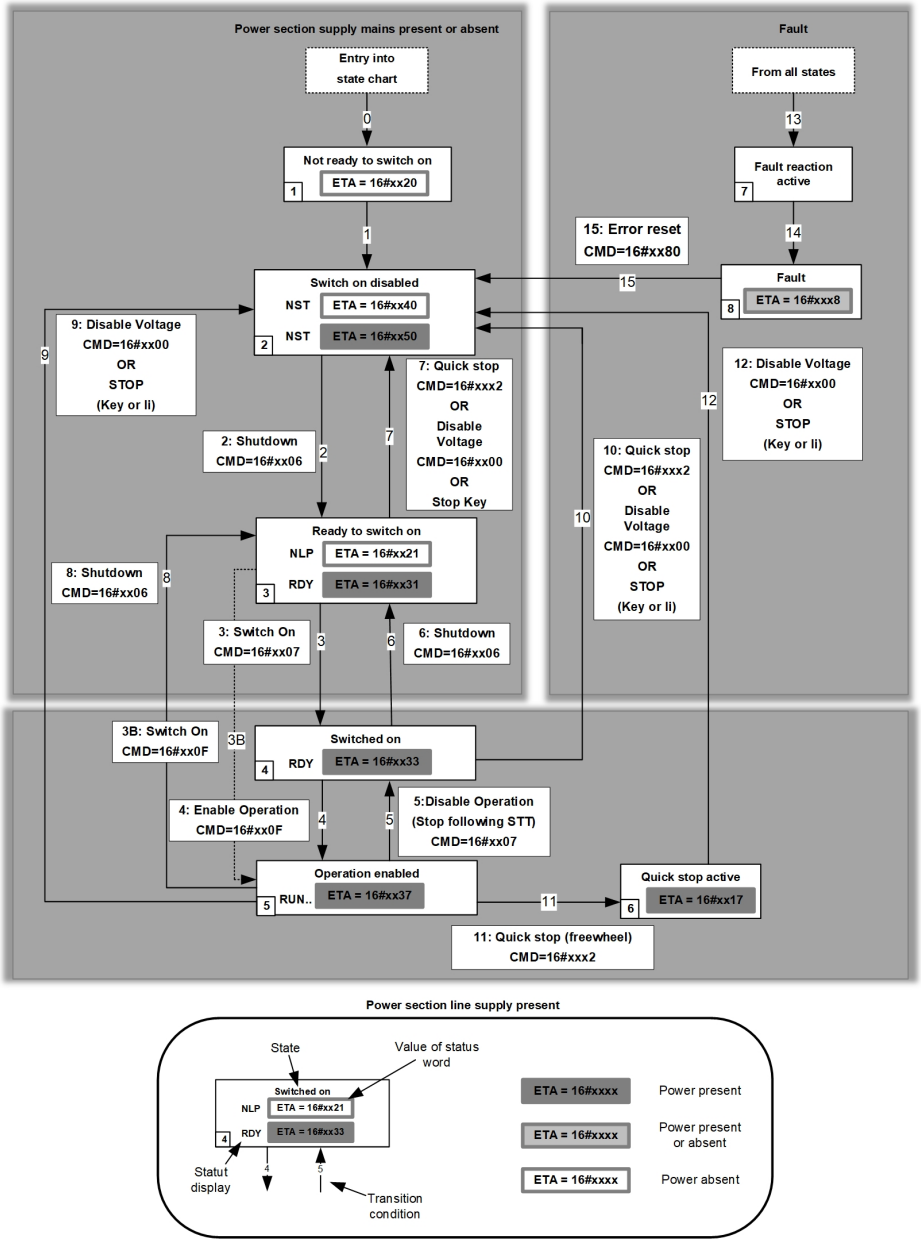
Standard Mode Operating State Diagram

State Diagram

After switching on and when an operating mode is started, the product goes through a number of operating states.

The state diagram (state machine) shows the relationships between the operating states and the state transitions. The operating states are internally monitored and influenced by monitoring functions.

The following figure shows the Standard Mode state diagram:



Description of Operating States

Soft starter Operating State

Each state represents an internal reaction by the soft starter.

The operating state of the soft starter changes depending on whether the control word is sent to CMD or an event occurs (an error detection, for example).

The soft starter operating state can be identified by the value of the status word ETA .

Operating State	Description
1 - Not ready to switch on	Initialization starts. This is a transient state invisible to the communication network.
2 - Switch on disabled	The power stage is not ready to switch on. The soft starter is locked, no power is supplied to the motor. The configuration and adjustment parameters can be modified.
3 - Ready to switch on	The power stage is ready to switch on and awaiting power stage supply mains. The soft starter is locked, no power is supplied to the motor. The configuration and adjustment parameters can be modified. **NOTE:** If mains contactor is wired on a relay (**[R1 Assignment]** R1 is set to **[Isolating Relay]** ISOL or **[R3 Assignment]** R3 is set to **[Mains Contactor]** LLC), mains contactor is not closed and we stay in this state until a run command is given.
4 - Switched on	Power stage is switched on. The power stage of the soft starter is ready to operate, but voltage has not yet been applied to the output. The adjustment parameters can be modified. **NOTE:** By default, Relay R1 **[R1 Assignment]** R1 is set to **[Operating State Fault]** FLT then the mains contactor is closed. The soft starter is locked, no power is supplied to the motor. **NOTE:** If mains contactor is wired on a relay (**[R1 Assignment]** R1 is set to **[Isolating Relay]** ISOL or **[R3 Assignment]** R3 is set to **[Mains Contactor]** LLC), we reach temporarily this state once Run command is applied and mains contactor is closed allowing presence of power stage before switching to *5 - Operation enabled*.
5 - Operation enabled	Power stage is enabled. The soft starter is in running state For a separate control stage with mains contactor, the contactor is closed. The soft starter is unlocked, power is supplied to the motor. The soft starter functions are activated and voltage is applied to the motor terminals. If the Halt command is applied, no power is supplied to the motor. The adjustment parameters can be modified. The configuration parameters cannot be modified. The reaction of the soft starter to a Disable operation command is to stop following to the **[Type of stop]** STT.
6 - Quick stop active	The soft starter performs a freewheel stop and remains locked in the operating state *6-Quick stop active*. Before restarting the motor, it is required to go to the operating state *2-switch on disabled*. The soft starter stops according to freewheel stop and then remains in state *6 - Quick stop active* until: • The **STOP** key is pressed or • A freewheel stop command via the digital input of the terminal.
7 - Fault reaction active	Transient state during which the soft starter performs a stop due to a detected error. If behavior of the detected error is configurable, then the reaction will depend on setting of it's **error response**.
8 - Fault	End of the stop caused by change to the previous state *7 - Fault reaction active*. Power stage is disabled. The soft starter is locked, no power is supplied to the motor if an error detection has been triggered. Else the soft starter change to the step *2- switch on disable*. The soft starter function is disabled

Summary

Device Status Summary

Operating State	Power Supply to Power Stage	Power Supplied to Motor	Modification of Configuration Parameters
1 - Not ready to switch on	Not required	No	Yes
2 - Switch on disabled	Not required	No	Yes
3 - Ready to switch on	Not required	No	Yes
4 - Switched on	Required	No	Yes
5 - Operation enabled	Required	Yes	No
6 - Quick stop active	Required	No	No
7 - Fault reaction active	Depends on error response configuration	Depends on error response configuration	No
8 - Fault	Not required	No	Yes

NOTE:

- Configuration parameters are described in communication parameter file as R/WS access type parameters. Other parameters can be accessed whatever the operating state.
- A Setting parameter can be accessed in all operating state of the soft starter.

Command Register CMD

Bit Mapping of the Control Word

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault reset	Reserved (=0)	Reserved (=0)	Reserved (=0)	Enable operation	Quick stop	Enable voltage	Switch on
0 to 1 transition = Error is reset (after cause of error is no longer active)				1 = Run command	0 = Quick stop active	Authorization to supply AC power	Mains contactor control

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific assignable	***Decelerated stop order*** *(factory setting)*. The Bit can be set to an other function. **NOTE:** If no function is assigned, the Bit will return to his factory setting.	***Dynamic braking stop*** *(factory setting)*. The Bit can be set to an other function. **NOTE:** If no function is assigned, the Bit will return to his factory setting.	Manufacturer specific assignable	Manufacturer specific assignable	Reserved (=0)	Reserved (=0)	Halt 0 = run asked 1 = stop asked

Command	State Transition	Final Operating State	Bit 7 Fault Reset	Bit 3 Enable Operation	Bit 2 Quick Stop	Bit 1 Enable Voltage	Bit 0 Switch On	Example Value
Shutdown	2, 6, 8	*3 - Ready to switch on*	X	X	1	1	0	0006 hex
Switch on	3	*4 - Switched on*	X	X	1	1	1	0007 hex
Enable operation	4	*5 - Operation enabled*	X	1	1	1	1	000F hex
Disable operation	5	*4 - Switched on*	X	0	1	1	1	0007 hex
Disable voltage	7, 9, 10, 12	*2 - Switch on disabled*	X	X	X	0	X	0000 hex
Quick stop	11	*6 - Quick stop active*	X	X	0	1	X	0002 hex
Fault reset	15	*2 - Switch on disabled*	0 → 1	X	X	X	X	0080 hex
X: Value is of no significance for this command. 0→1: Command on rising edge.								

Stop Commands

Halt Command

The Halt command enables movement to be interrupted without having to leave the *5 - Operation enabled* state. The stop is performed in accordance with the **[Type of stop]** StT parameter.

If the Halt command is active, no power is supplied to the motor and no torque is applied.

Regardless of the assignment of the **[Type of stop]** STT parameter (**[Freewheel]** F, **[Deceleration]** D, or **[Braking]** B) the soft starter remains in the *5 - Operation enabled* state.

Freewheel Command

A Freewheel Stop command using a digital input of the terminal or a bit of the control word assigned to Freewheel Stop causes a change to operating state *2 - Switch on disabled*.

Assigning Control Word Bits

Function Codes

In the Standard profile, fixed assignment of a function input is possible using the following codes:

Bit	
Bit 11	C311
Bit 12	C312
Bit 13 is set to ***Dynamic braking stop*** *(factory setting)*. This Bit can be set to an other function. **NOTE:** If no function is assigned, the Bit will return to his factory setting.	C313
Bit 14 is set to ***Decelerated stop order*** *(factory setting)*. This Bit can be set to an other function. **NOTE:** If no function is assigned, the Bit will return to his factory setting.	C314
Bit 15	C315

For example, to assign the preheating to bit15 of fieldbus module, simply configure the **[Preheating Assign]** PRHA parameter with the **[C315]** C315 value.

Status Word ETA

Bit Mapping of the Status Word

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on
A warning is active	Power stage supply disabled	0 = Quick stop is active	Power stage supply present	Error detected	Running	Ready	1 = Awaiting power Stage supply

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved (=0)	Manufacturer-specific Stop via STOP key	Reserved (=0)	Reserved (=0)	Reserved (=0)	Reserved (=0)	Remote (local mode control) Command via fieldbus	Reserved (=0)

Operating State	Bit 6 Switch On Disabled	Bit 5 Quick Stop	Bit 4 Voltage Enabled	Bit 3 Fault	Bit 2 Operation Enabled	Bit 1 Switched On	Bit 0 Ready to Switch On	ETA Masked by 006F H (1)
1 -Not ready to switch on	0	X	0	0	0	0	0	0020 hex
2 -Switch on disabled	1	X	X	0	0	0	0	0040 hex 0050 hex
3 -Ready to switch on	0	1	X	0	0	0	1	0021 hex 0031 hex
4 -Switched on	0	1	1	0	0	1	1	0033 hex
5 -Operation enabled	0	1	1	0	1	1	1	0037 hex
6 -Quick stop active	0	0	1	0	1	1	1	0017 hex
7 -Fault reaction active	X	X	X	0	1	1	1	–
8 -Fault	X	X	X	1	0	0	0	0008 hex(2)... 0028 hex

(1) This mask can be used by the PLC program to test the diagram state.

(2) Detected error following operating state *6 - Quick stop active*.

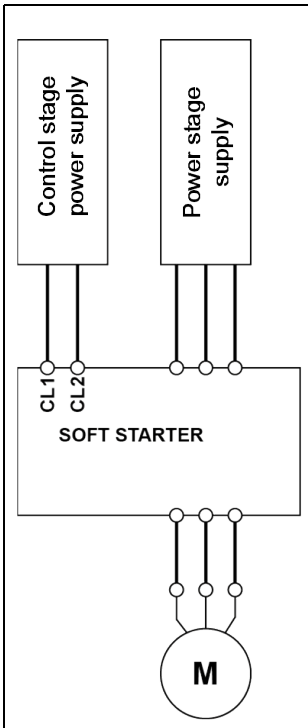
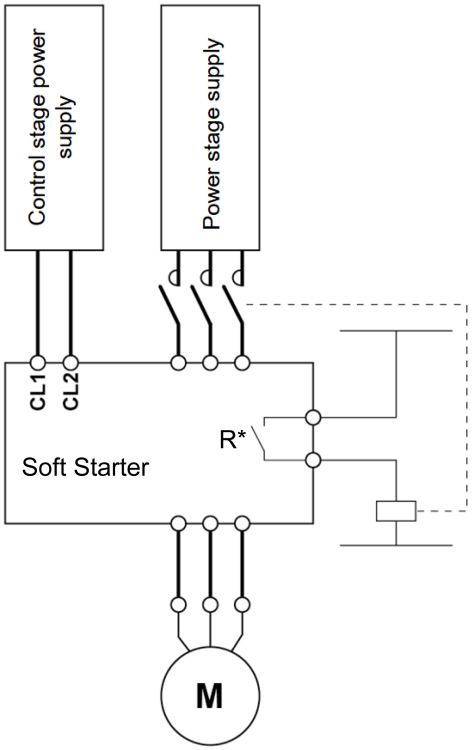
X: In this state, the value of the bit can be 0 or 1.

Starting Sequence

Description

The command sequence in the state diagram depends on how power is being supplied to the soft starter.

There are 2 possible scenarios:

		
Power stage supply	Mains contactor controlled by another device	Mains contactor controlled by the soft starter (1)

(1) R*: `R1` or `R3`:

- **[R1 Assignment]** `R1` is set to **[Isolating Relay]** `ISOL`

  NOTE: If `R1` is set to **[Isolating Relay]** `ISOL`, `R3` can't be set to **[Mains Contactor]** `LLC`.

- **[R3 Assignment]** `R3` is set to **[Mains Contactor]** `LLC`

  NOTE: If `R3` is set to **[Mains Contactor]** `LLC`, `R1` can't be set to **[Isolating Relay]** `ISOL`.

Sequence for a Soft starter

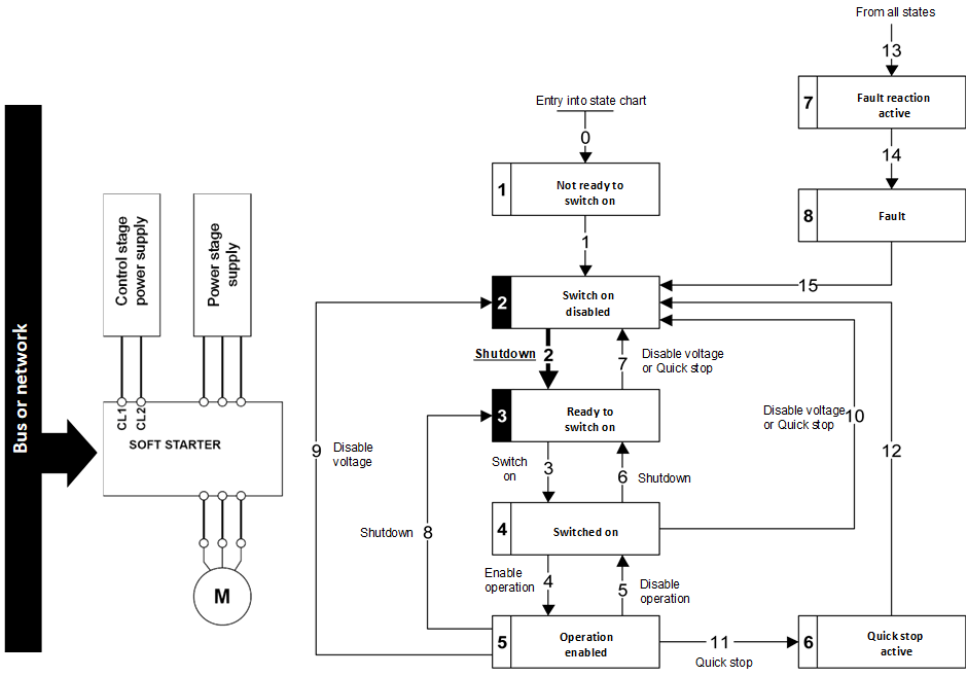
Description

Power is supplied separately to the power and control stages.

If power is supplied to the control stage, it does not have to be supplied to the power stage as well. The following sequence must be applied:

Step 1

- The power stage supply is not necessarily present.
- Apply the *2 - Shut down* command.

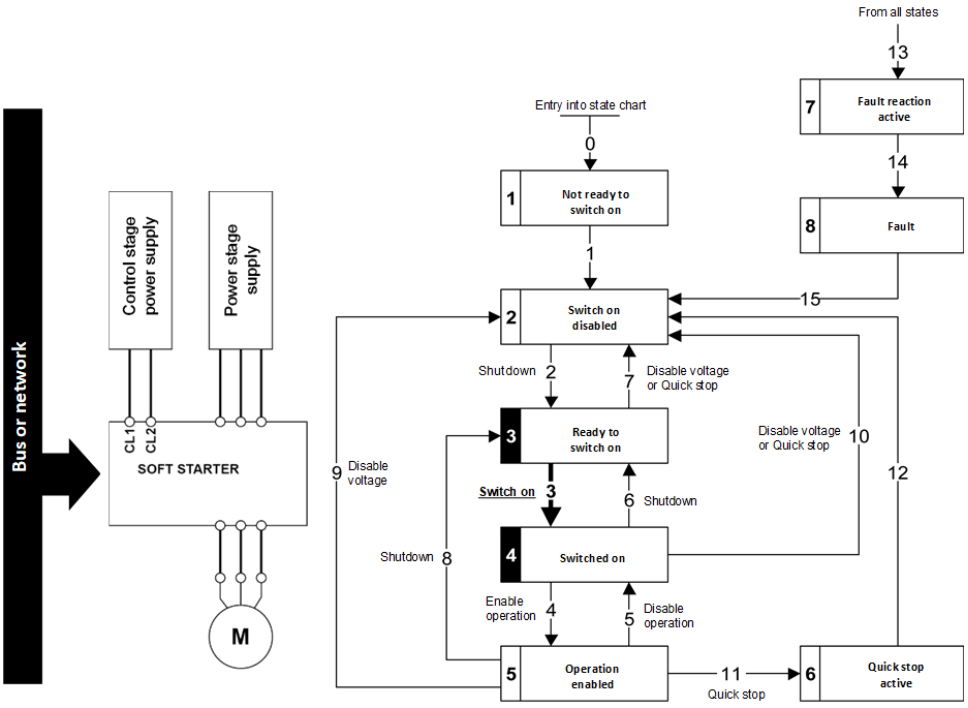


Step 2

- Check that the soft starter is in the operating state *3 - Ready to switch on*.
- The power stage supply could be present (*Voltage enabled* of the status word).

Power Stage Supply	Terminal Display	Status Word
Absent	NLP	21 hex
Present	RDY	31 hex

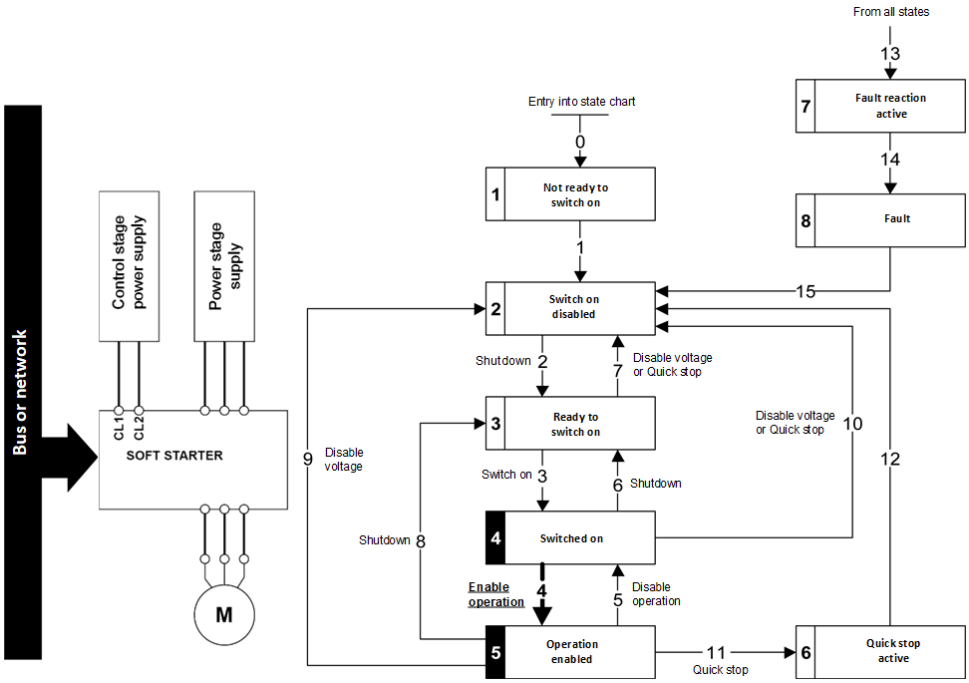
- Apply the *3 - Switch on* command



Step 3

- If power supply is present; check that the soft starter is in the operating state *4 - Switched on*.

  NOTE: If power supply is not present, we stay in *3 - Ready to switch on*.
- Then apply the *4- Enable operation* command.
- The motor can be started.



Sequence for a Soft starter with Mains Contactor Control

Description

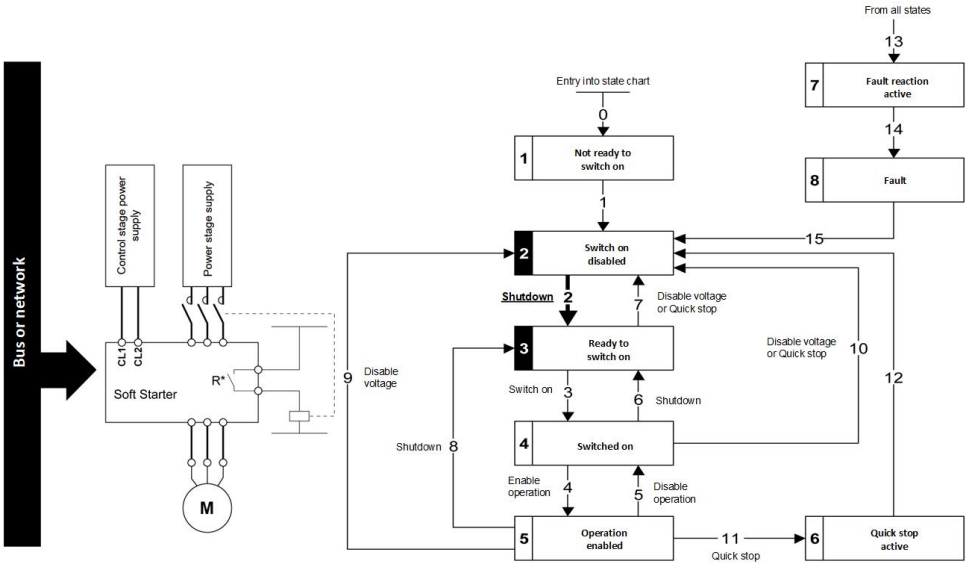
Power is supplied separately to the power and control stages.

If power is supplied to the control stage, it does not have to be supplied to the power stage as well. The soft starter controls the mains contactor.

The following sequence must be applied:

Step 1

- The power stage supply is not present as the mains contactor is not being controlled.
- Apply the *2 - Shut down* command.



NOTE:

R*: `R1` or `R3`:

- **[R1 Assignment]** `R1` is set to **[Isolating Relay]** `ISOL`

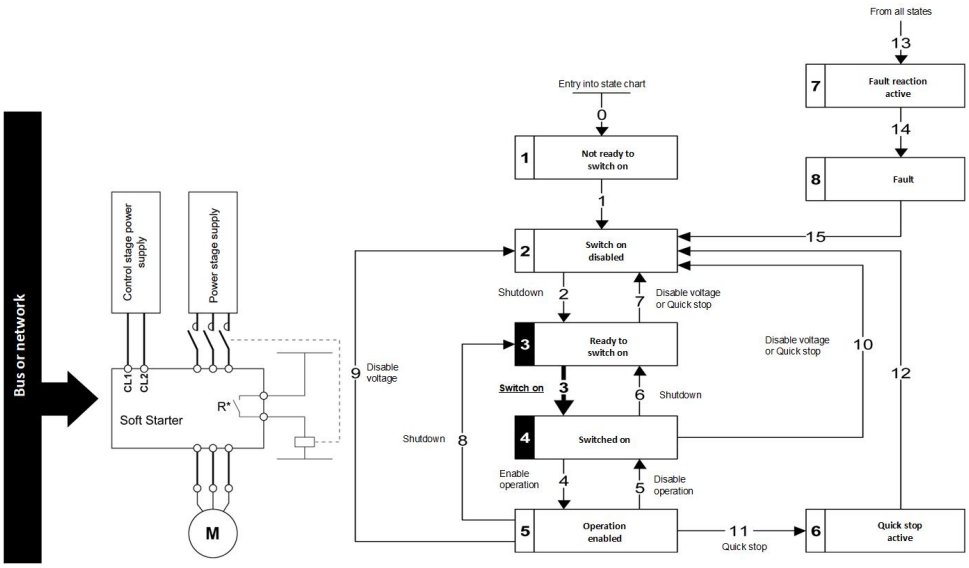
  NOTE: If `R1` is set to **[Isolating Relay]** `ISOL`, `R3` can't be set to **[Mains Contactor]** `LLC`.

- **[R3 Assignment]** `R3` is set to **[Mains Contactor]** `LLC`

  NOTE: If `R3` is set to **[Mains Contactor]** `LLC`, `R1` can't be set to **[Isolating Relay]** `ISOL`.

Step 2

- Check that the soft starter is in the operating state *3 - Ready to switch on*.
- Apply the *3 - Switch on* command, which closes the mains contactor and switch on the power stage supply by giving RUN command.
- If the power stage supply is still not present in the operating state *4 - Switched on* after a time delay **[Mains V. time out]** LCT, the soft starter triggers an error **[Input Contactor]** LCF.



NOTE:

R*: R1 or R3:

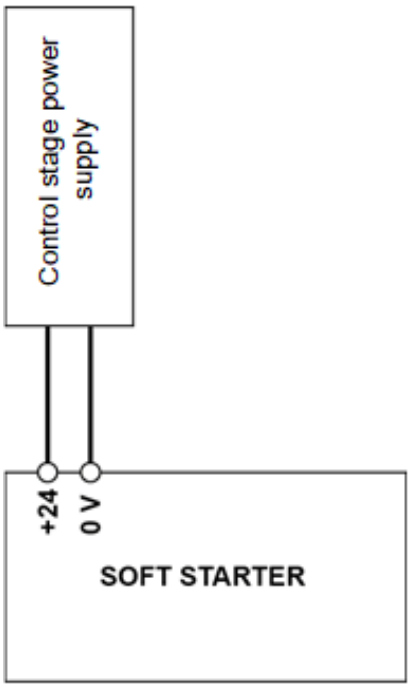
- **[R1 Assignment]** R1 is set to **[Isolating Relay]** ISOL

  NOTE: If R1 is set to **[Isolating Relay]** ISOL, R3 can't be set to **[Mains Contactor]** LLC.

- **[R3 Assignment]** R3 is set to **[Mains Contactor]** LLC

  NOTE: If R3 is set to **[Mains Contactor]** LLC, R1 can't be set to **[Isolating Relay]** ISOL.

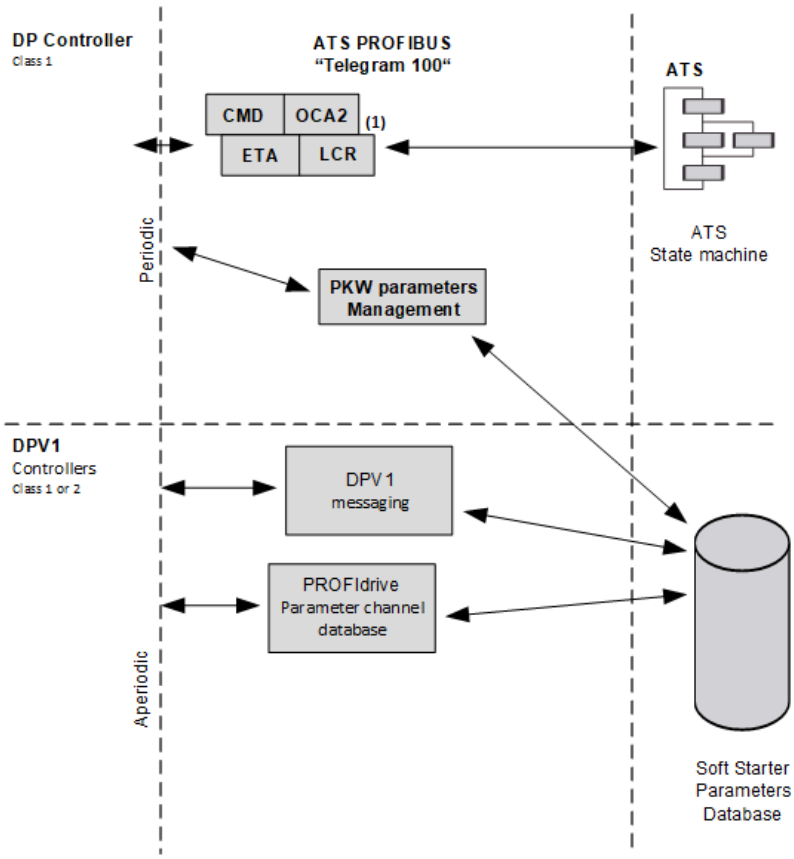
Automation Commissioning Only

Control stage supplied via +24 V of the control board	Use case
	In case of no electrical accreditation to work on the product with the presence of the supply mains, it is possible to connect a separate 24V supply to commission the soft starter with no supply mains applied to the product.

Description Telegram 100, 101, 102, 106, 107

Overview

The following diagram shows the native modes for telegram 100:

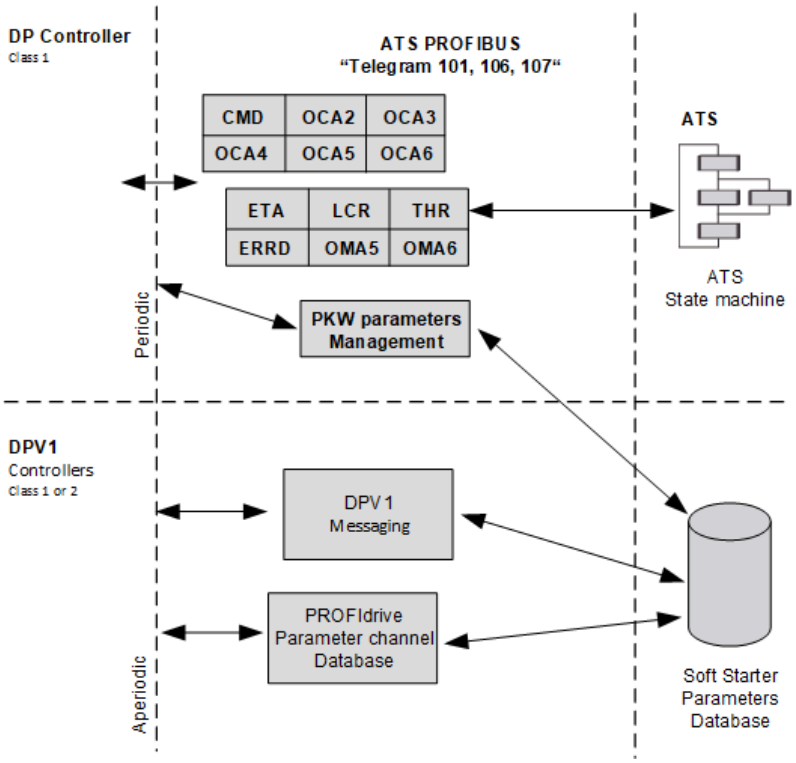


The native mode of the PROFIBUS DP VW3A3607 is used when telegram 100 is used.

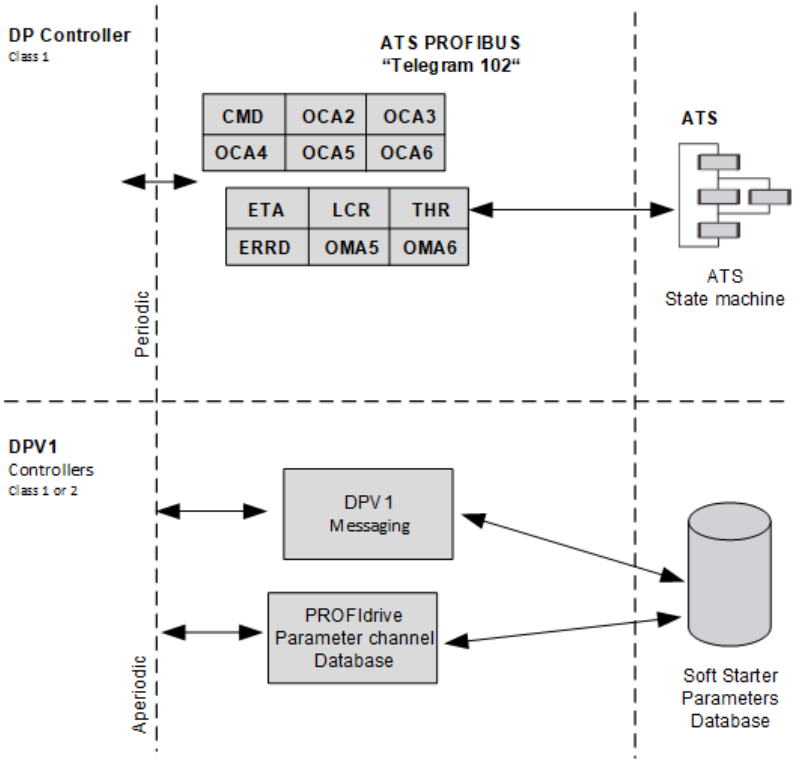
The PKW area of telegram 100, which is used for a simple parameter management, is compliant with the PKW mechanism used with the PROFIBUS DP fieldbus module.

NOTE: After switching from one telegram to another, the soft starter shall be restarted to validate the new configuration.

The following diagram shows the native modes for telegram 101, 106, 107:



The following diagram shows the native modes for telegram 102:



Periodic Exchanges

The following table provides the details of telegram 100, 101, and 102

	Telegram 100		**Telegram 101**		**Telegram 102**	
	PLC>Soft Starter	Soft Starter>PLC	PLC>Soft Starter	Soft Starter>PLC	PLC>Soft Starter	Soft Starter>PLC
PKW 1	**PKE**	**PKE**	**PKE**	**PKE**	–	
PKW 2	**R/W**	**R/W**	**R/W**	**R/W**		
PKW 3	**PWE**	**PWE**	**PWE**	**PWE**		
PKW 4	**PWE**	**PWE**	**PWE**	**PWE**		
Cyclic data 1	OCA1 address of CMD =8501*	OMA1 address of ETA =3201*	OCA1 address of CMD =8501*	OMA1 address of ETA =3201*	OCA1 address of CMD =8501*	OMA1 address of ETA =3201*
Cyclic data 2	OCA2 default =0	OMA2 address of LCR=3204*	OCA2 default =0	OMA2 address of LCR=3204*	OCA2 default =0	OMA2 address of LCR=3204*
Cyclic data 3			OCA3 default =0	OMA3 adress of THR = 9630*	OCA3 default =0	OMA3 adress of THR =9630*
Cyclic data 4			OCA4 default =0	OMA4 adress of ERRD = 8606*	OCA4 default =0	OMA4 adress of ERRD =8606*
Cyclic data 5			OCA5 default =0	OMA5 default =0	OCA5 default =0	OMA5 default =0
Cyclic data 6			OCA6 default =0	OMA6 default =0	OCA6 default =0	OMA6 default =0
*:default Modbus address.						

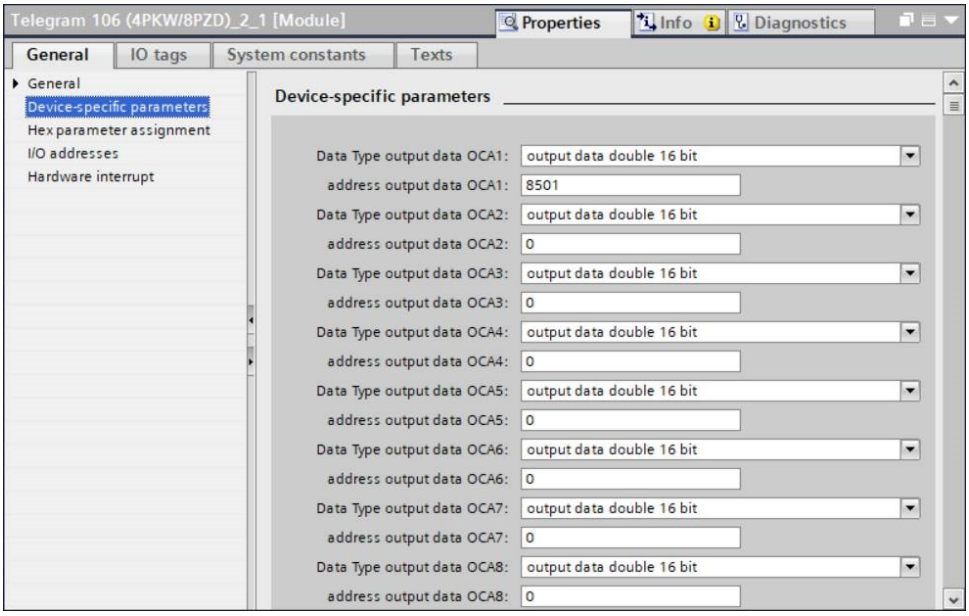
The following table provides the details of telegram 106 and 107

	Telegram 106		**Telegram 107**	
	PLC>Soft Starter	Soft Starter>PLC	PLC>Soft Starter	Soft Starter>PLC
PKW 1	**PKE**	**PKE**	**PKE**	**PKE**
PKW 2	**R/W**	**R/W**	**R/W**	**R/W**
PKW 3	**PWE**	**PWE**	**PWE**	**PWE**
PKW 4	**PWE**	**PWE**	**PWE**	**PWE**
Cyclic data 1	OCA1 address of CMD =8501*	OMA1 address of ETA =3201*	OCA1 address of CMD =8501*	OMA1 address of ETA =3201*
Cyclic data 2	OCA2 default =0	OMA2 address of LCR= 3204*	OCA2 default =0	OMA2 address of LCR= 3204*
Cyclic data 3	OCA3 default =0	OMA3 adress of THR = 9630*	OCA3 default =0	OMA3 adress of THR = 9630*
Cyclic data 4	OCA4 default =0	OMA4 adress of ERRD = 8606*	OCA4 default =0	OMA4 adress of ERRD = 8606*
Cyclic data 5	OCA5 default =0	OMA5 default =0	OCA5 default =0	OMA5 default =0
Cyclic data 6	OCA6 default =0	OMA6 default =0	OCA6 default =0	OMA6 default =0
Cyclic data 7	OCA7 default =0	OMA7 default =0	OCA7 default =0	OMA7 default =0
Cyclic data 8	OCA8 default =0	OMA8 default =0	OCA8 default =0	OMA8 default =0
Cyclic data 9			OCA9 default =0	OMA9 default =0
Cyclic data 10			OCAA default =0	OMAA default =0
Cyclic data 11			OCAB default =0	OMAB default =0
Cyclic data 12			OCAC default =0	OMAC default =0
Cyclic data 13			OCAD default =0	OMAD default =0
Cyclic data 14			OCAE default =0	OMAE default =0
Cyclic data 15			OCAF default =0	OMAF default =0
Cyclic data 16			OCAG default =0	OMAG default =0
*:default Modbus address.				

The configuration of the cyclic data is made with the PROFIBUS DP controller configuration tool. The Modbus address of the parameter linked to each cyclic data must be defined as in the following example with the HW configuration software:

Input cyclic data 1 and output cyclic data 1 / 2 / 3 / 4 are already preconfigured to **[Cmd Register]** CMD (8501); **[Status Register]** ETA (3201), **[Motor Current]** LCR (3204), **[Motor Therm State]** THR (9630) and **[CiA402 Error Code]** ERRD (8606).

If a null address Modbus is entered, no link between the related cyclic data and the soft starter is established. In any case, the 6 cyclic data are not disabled and the 6 cyclic data takes place in the I/O memory image of the controller.



1 Modbus address is entered in this field

2 Data type is entered in this field

Configuring the soft starter with TIA Portal

GSD Installation

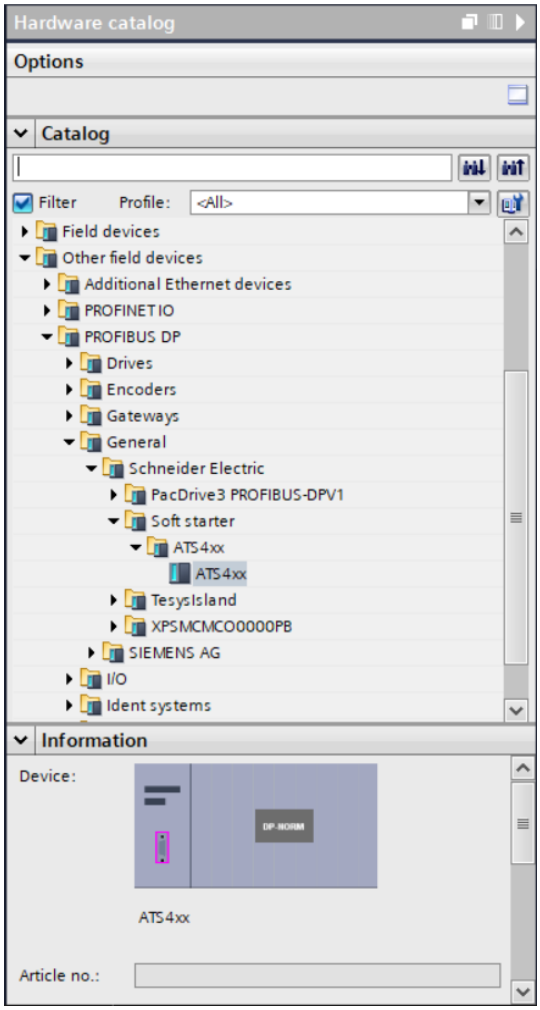
First download, and install the GSD file of the soft starter in the hardware configuration tool of the TIA Portal software.

NOTE: SIMATIC STEP7® is supported by TIA Portal.

You can find the GSD file and its associated picture on www.se.com.

From the menu > **Options** > **Install GSD File...**

Once installed you can see the soft starter, in the library, as follow:

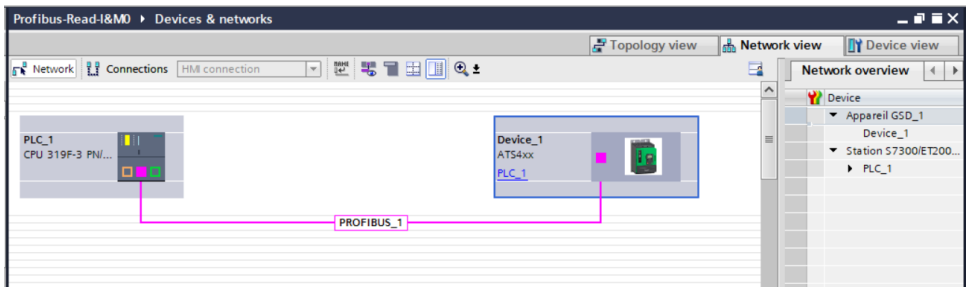


Configuration of a soft starter with the Telegram 100

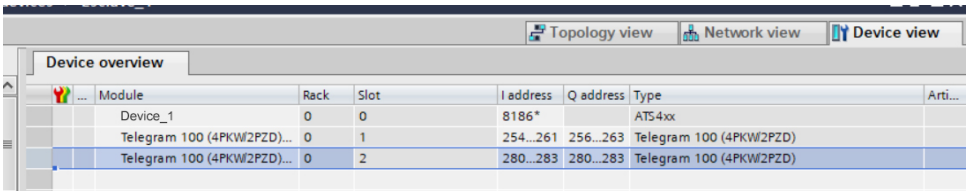
Description

With this telegram, the soft starter is controlled with two process data.

Configure the PLC and its PROFIBUS DP network. Then select and place the soft starter from the library to the bus:



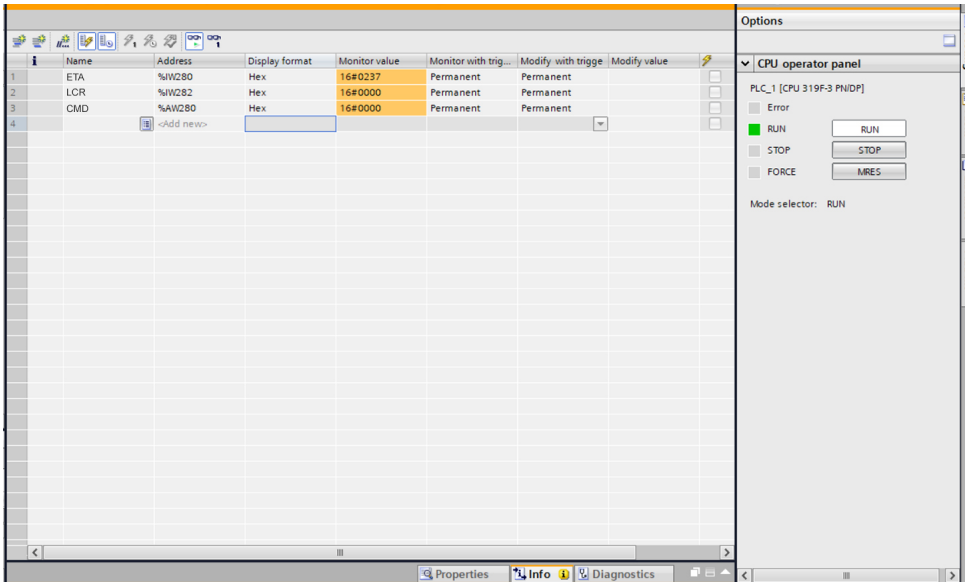
Define the addresses of the cyclic data (PZD) and PKW data in the PLC periphery:



NOTE: On this example, Telegram 100 Slot 1 shows the PKW and Telegram 100 Slot 2 shows the PZD.

By default, the process data are linked to **[Cmd Register]** CMD; **[Status Register]** ETA and **[Motor Current]** LCR.

Check that the exchanges are working properly with the **Watch and force tables**:

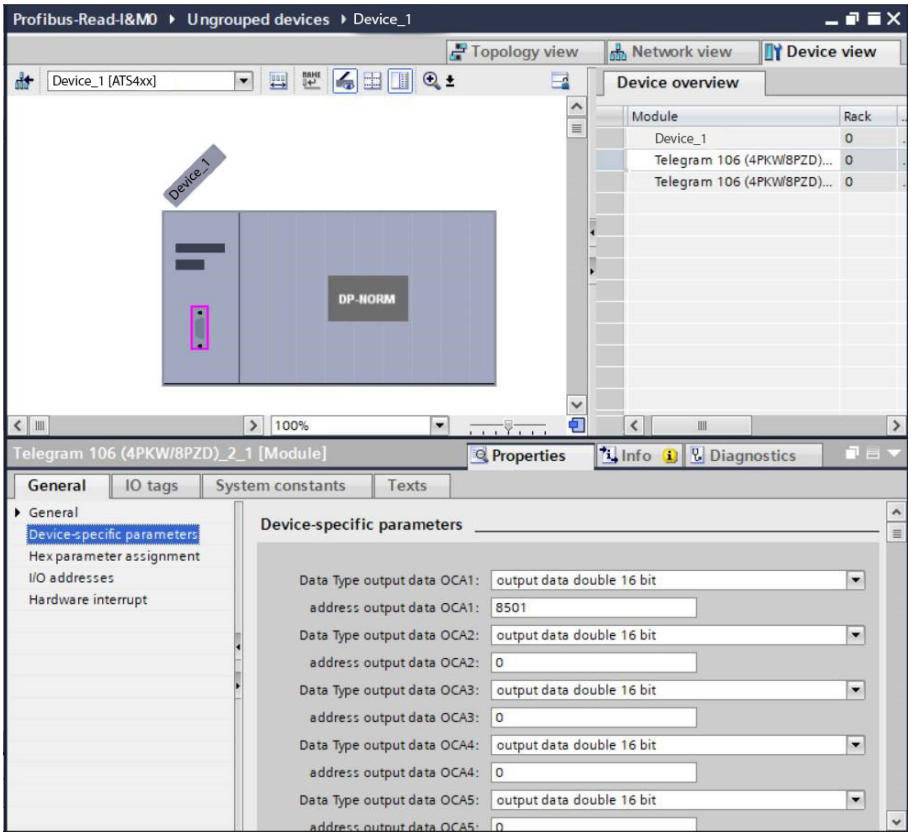


Configuring a soft starter with the Telegram 101, 102, 106, or 107

Configuring the soft starter Communication Scanner

The configuration of the fieldbus module is defined by the controller, by default the 2 first read and write are linked to the default parameters: **[Cmd Register]** CMD; **[Status Register]** ETA, **[Motor Current]** LCR, **[Motor Therm State]** THR and **[CiA402 Error Code]** ERRD. The 4 next read or write parameters are not configured.

To add new parameters or modify the default configuration of the communication scanner, open the properties dialog box of the device and configure the OCA/OMA values in the parameter assignment tab.



1 Internal Modbus address

2 Data type is entered in this field

New parameters are added or modified by entering the soft starter Modbus address.

Parameters Management with the Telegram 100, 101, 102, 106, 107

Description

In native modes several accesses to the soft starter parameters are possible:

- The standard acyclic requests from PROFIdrive, for more information see PROFIdrive Parameters Channel , page 46.
- PKW mechanisms for 16-bit data.

Parameter Management Through the PKW Area

With telegram 100, 101, 106, 107 you can read or write any soft starter parameter by using this PKW area. (This addressing format is identical to the PKW mechanism).

NOTE: The management of the parameters (compatibility with series 1 product) is Schneider Electric specific. Actually, previous versions of PROFIdrive also specified parameter management thought PKW, are not compatible with Schneider Electric method. In recent versions, parameters are managed with acyclic messages, and the PNO PKW method is obsolete.

The PKW area is made of four input words and four output words.

The table lists the controller-to-soft starter parameters in the input PKW area:

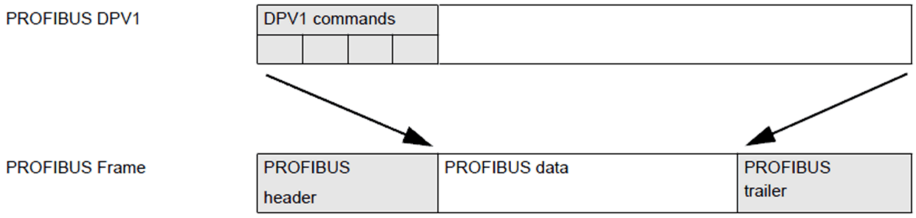
PKW Number	PKE Name	Description
PKW1	PKE	The Modbus address of the parameter is detailed here.
PKW2	R/W	Request code: 0: no request 1: read 2: write (16 bit) 3: write (32 bit)
PKW3	PWE	Parameter is used when PKW2 = 3
PKW4	PWE	Parameter value in case of write request

The table lists the soft starter-to-controller parameters in the output PKW area:

PKW Number	PKE Name	Description
PKW1	PKE	Copy of the input PKE
PKW2	R/W	Response code: 0: no request 1: read done (16 bit) 2: write done (16 bit) 3: request in progress 4: read done (32 bit) 5: write done (32 bit) 7: read or write error
PKW3	PWE	Parameter is used when PKW2 = 4 or 5
PKW4	PWE	If the request is successful, the parameter value is copied here.

DP V1 / Acyclic Messaging - Schneider Electric Specific

The PROFIBUS DPV1 telegram includes a header, described in the following diagram:



The following table lists the content of the DPV1 header:

DU	Byte - nr
Function code	0
Slot_num	1
Index	2
Length	3
Data	4 - 5

An indirection mechanism is used:

- Step 1:

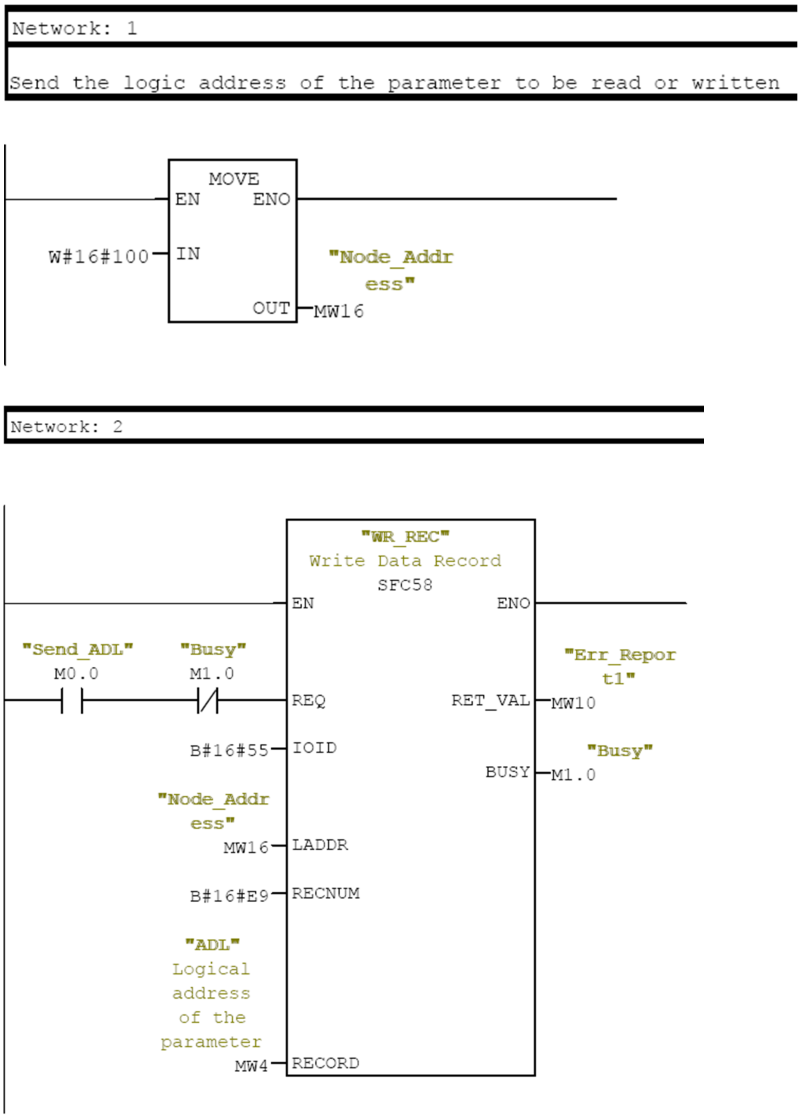
DU	Bytes	Request	Positive answer	Negative answer
Function code	0	5E hex (read) 5F hex (write)	5E hex (read) 5F hex (write)	DF hex (read) DE hex (write)
Slot_num	1	1	1	80 hex
Index	2	E9 hex	E9 hex	XX hex (error type)
Length	3	2	–	YY hex (error type)
Data	4 - 5	ZZZZ hex (ZZZZ is the Modbus address	–	0

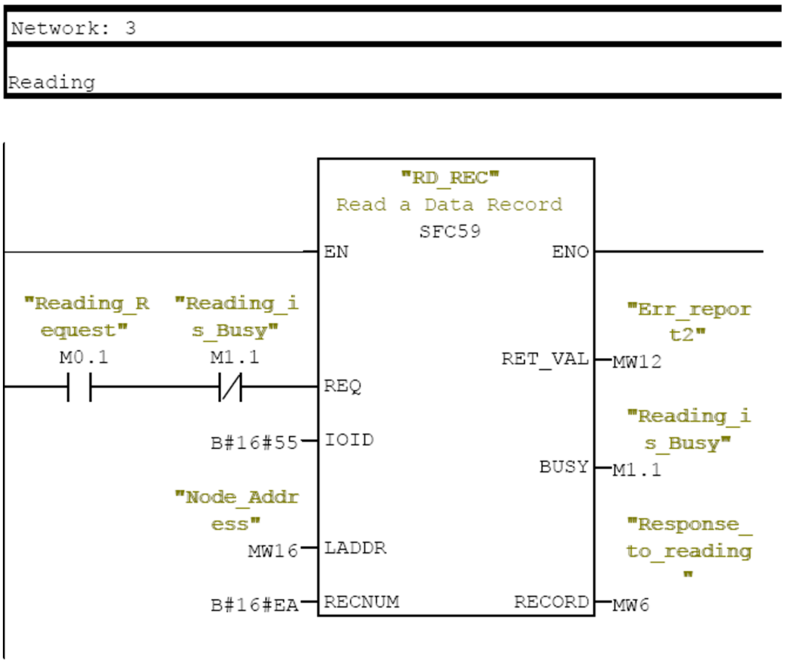
- Step 2:

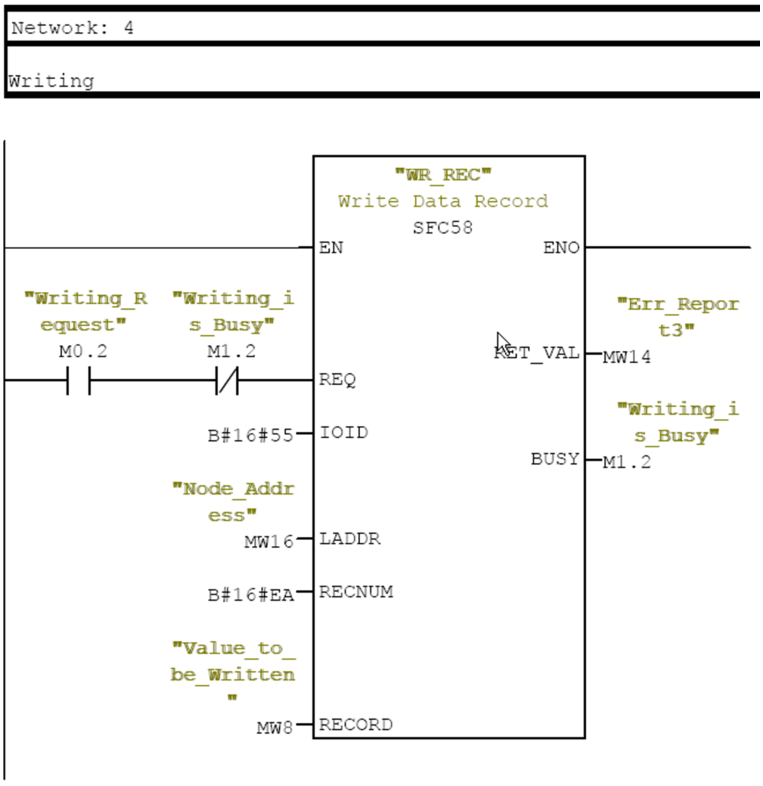
DU	Bytes	Request	Positive answer	Negative answer
Function code	0	5E hex (read) 5F hex (write)	5E hex (read) 5F hex (write)	DF hex (read) DE hex (write)
Slot_num	1	1	1	80 hex
Index	2	EA hex	E9 hex	XX hex (error type)
Length	3	2	–	YY hex (error type)
Data	4 - 5	Read: - Write: 0010 hex	–	0

Basic DPV1 Messaging with Standard SFCs

The example below relies on the SFC58 and 59 (Integrated functions blocks of Simatic® PLC). The read or write operation is processed in two steps. In a first time, the Modbus address parameter is sent, and in a second step the value is either written or read.




Network: 3
Reading
"RD_REC"
Read a Data Record
SFC59
EN
ENO
"Reading_Request"
M0.1
"Reading_is_Busy"
M1.1
REQ
B#16#55
IOID
"Node_Address"
MW16
LADDR
B#16#EA
RECNUM
RET_VAL
MW12
"Err_report2"
BUSY
M1.1
"Reading_is_Busy"
RECORD
MW6
"Response_to_reading"


Network: 4
Writing
"WR_REC"
Write Data Record
SFC58
EN
ENO
"Writing_Request"
M0.2
"Writing_is_Busy"
M1.2
REQ
B#16#55
IOID
"Node_Address"
MW16
LADDR
B#16#EA
RECNUM
"Value_to_be_Written"
MW8
RECORD
RET_VAL
MW14
"Err_Report3"
BUSY
M1.2
"Writing_is_Busy"

Identification and Maintenance Data

Overview

Identification & maintenance (I&M) is established through PNO.

Supports the user during various scenarios of the device life cycle, such as:

- Configuration
- Commissioning
- Repair and update
- Operation and visualization

NOTE: These fields are read only (index AFF0 hex).

The access to the identification & maintenance data can be achieved using the PROFIBUS DPV1 mechanisms (IEC 61158-6).

I&M Record

Description

The table provides the details of I&M record:

Champ	Number of Bytes	Value	Description
HEADER_MANUF_SPEC	10 bytes	(string)	Manufacturer-specific field
MANUFACTURER_ID	2 bytes	01 hex, 29 hex	129 hex: Schneider Electric
ORDER_ID	20 bytes	Identification object ID 1	Commercial name of the soft starter
SERIAL_NUMBER	16 bytes	Serial number	C1P1, C1P2, C1P3, C1P4
HARDWARE_REVISION	2 bytes	00 hex	–
SOFTWARE_REVISION	4 bytes	'V', A, B, C	A = MSB of software version B = LSB of software version C = MSB of software revision
REVISION_COUNTER	2 bytes	xx hex, yy hex	Rev xy
PROFILE_ID	2 bytes	–	Defined by the PNO (3A00...3AFF, PROFIdrive)
PROFILE_SPECIFIC_ TYPE	2 bytes	–	Profile specific number
IM_VERSION	2 bytes	01 hex, 02 hex	Version I&M: 1.2
IM_SUPPORTED	2 bytes	00 hex, 01 hex	Managed index I&M → I&M0

PROFIdrive Parameters Channel

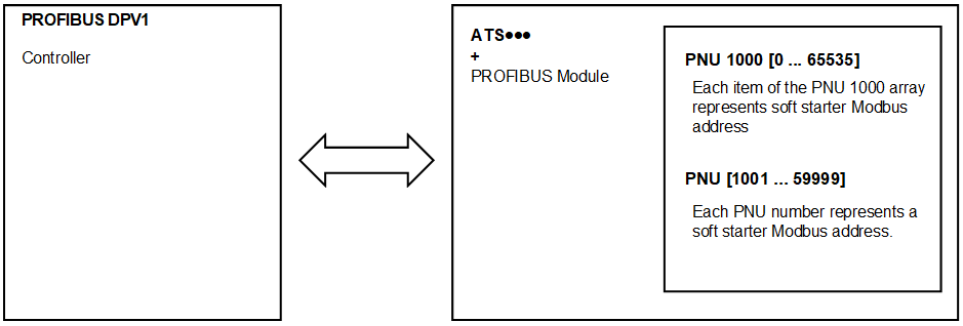
PROFIdrive Profile

Overview

When operated with the PROFIdrive profile, the soft starter parameters are organized as defined by PNU numbering and addressing modes. However, this addressing mode keeps the native structure of the device (based on Modbus addressing). PNU is numbered from 0...65535 and each PNU represents a parameter (from single type as words to complex data structure or arrays). PROFIdrive parameters from PNU 900 ...PNU 999 are not accessible for the soft starter. All others PNUs are manufacturer-specific.

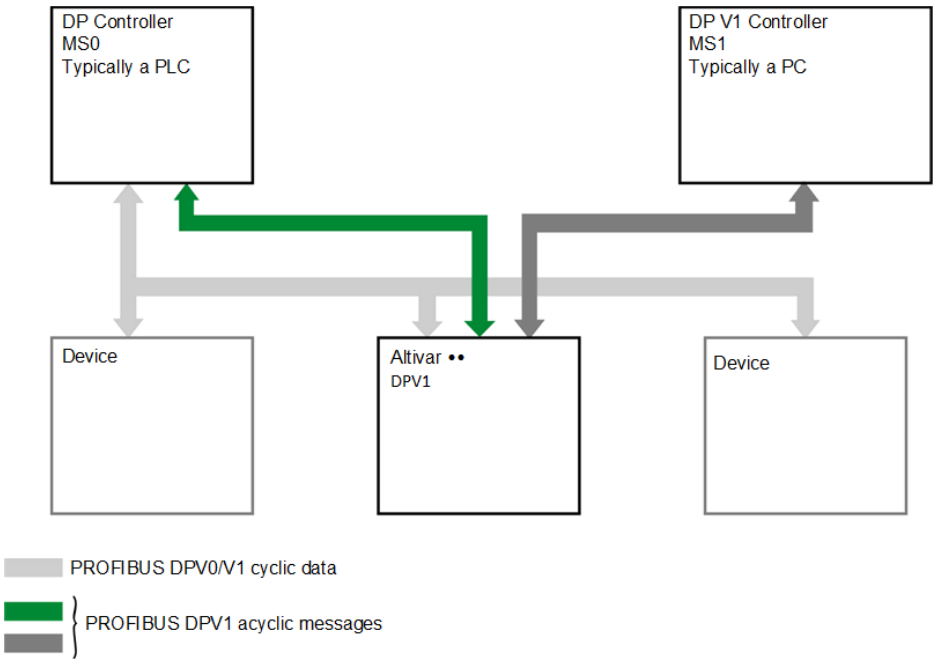
In the case of this soft starter, parameters can be separated in two groups:

- Soft starter parameters which are gathered in a single PNU entry point: PNU1000 and Modbus address as subindex. It is also possible to access the parameters using the Modbus address as PNU for each parameter (1001...59999) and 0 as subindex.



PROFIdrive Based on PROFIBUS

When the soft starter is operated in PROFIdrive profile, the parameter management takes benefit of the PROFIBUS acyclic messaging features. With PROFIBUS, it is possible to exchange messages of variable length between both controllers (MS0 or MS1). These messages come in addition of the periodic data exchange.



Parameter Structure

PROFIdrive Parameter Structure

A parameter is defined with its PNU number from 1...65535.

Each parameter consists of 3 main areas:

- **PWE**: the value
- **PBE**: describes the parameter attributes
- Text area

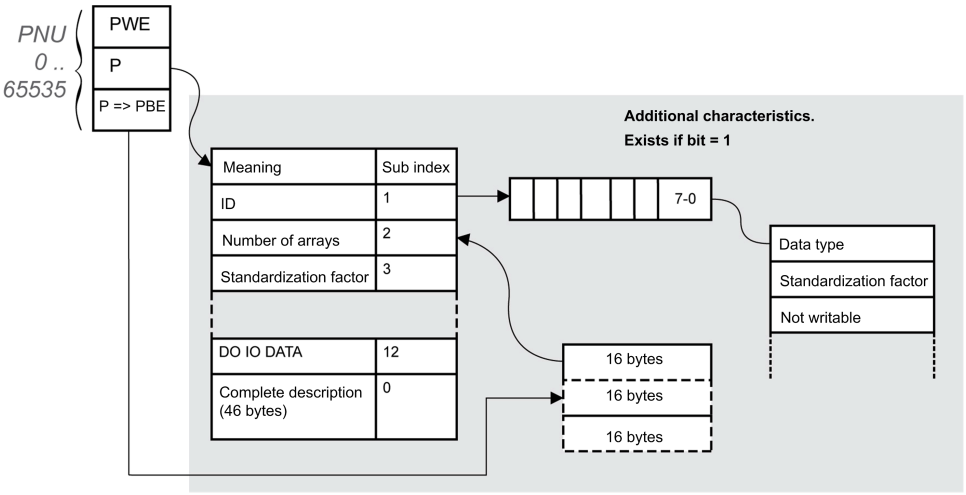
The access to the 3 different areas of a parameter is specified by the **attribute field** of the parameter request.

The parameters and their sub parts are identified as follows:

PNU number + attribute	10 hex	PWE	**+ Sub index**
	20 hex	PBE	**+ Sub index**
	30 hex	Text	**+ Sub index**

Detail of the PBE Attribute

The diagram describes the PBE attribute:



Soft Starter Parameters

Each soft Starter parameter can be represented according to the PNU standard structure. Soft Starter parameters are part of the PNU 1000 or can be accessed using the Modbus address as PNU number.

The table provides the possible values of a parameter according to the PNU properties:

Parameter Property	Soft Starter Implementation	Example
PNU number	1000	–
Sub index	Modbus address	CMD address: 8501
PWE	Value of the parameter 0...65535	–
PBE	Describes an array of 65535 words	Constant
Text	–	Soft Starter parameter

PROFIdrive Parameter Access

Parameters Requests

There are 2 types of request:

- Request parameter (parameters are PNU number, attribute, and sub index)
- Change parameter (parameters are PNU number, attribute, and sub index)

These requests are able to manage one or more parameters or several attributes of one parameter. In order to access to a specific attribute of a parameter, the request header contains: the PNU, the sub index, and an attribute. This attribute defines whether the request mentions the value, the description area, or the text area.

Parameter Reading

Request

	Byte n+1	Byte n
Request data	Request reference = 01	Request ID = 01
	Axis = 01 hex	Number of parameters = 01
	Attribute = 10 hex *	Number of elements = 01
	PNU number = 3E8 hex	
	Sub index = C81 hex (3201) ETA Modbus address	
*refers to field value (PWE), 20 hex refers to the description field (PBE) and 30 hex to the text field.		

Response

	Byte n+1	Byte n
Response header	Request reference = 01	Request ID = 01
	Axis = 01 hex	Number of parameters = 01
Response data	Format = 42 hex *	Number of elements = 01
	PNU value = xxxx hex (value of ETA)	
*format 42 hex specifies that the returned value is a WORD.		

NOTE: Format is defined by the following returned value: byte 41 hex, word: 42 hex, standard integer: 03 hex, double word: 43 hex.

Parameter Writing

Request

	Byte n+1	Byte n
Request header	Request reference = 01	Request ID = 02
	Axis = 01 hex	Number of parameters = 01
Parameter number	Attribute = 10 hex *	Number of elements = 01
	PNU number = 3E8 hex	
	Sub index = 2329 hex (9001) ACC Modbus address	
Parameter value	Format = 42 hex	Amount values = 01
	Value = 50 (ACC is set to 5 s)	
*refers to field value (PWE), 20 hex refers to the description field (PBE) and 30 hex to the text field.		

Response

	Byte n+1	Byte n
Response header	Request reference = 01	Request ID = 02
	Axis = 01 hex	Number of parameters = 01

Request for Negative Response

The table lists the items of a negative response:

	Byte n+1	Byte n
Request header	Request reference = 01	Request ID = 82*
	Axis = 01 hex	Number of parameters = 01
Parameter number	Format = error 44 hex	Number of values
Value	0x00: Impermissible PNU 0x01: Cannot change value 0x02: Low or high limit exceeded + sub index 0x03: Sub index detected error + sub index 0x04: No array 0x05: Incorrect data type 0x06: Setting not permitted + sub index 0x07: Cannot change description + sub index 0x09: No description 0x0B: No operation priority 0x0F: No text array available 0x11: Cannot execute the request. Reason not specified 0x14: Value impermissible 0x15: Response too long 0x16: Parameter address impermissible 0x17: Illegal format 0x18: Number of values inconsistent 0x19: Axis/DO nonexistent 0x20: Cannot change text 0x65: Invalid request reference 0x66: Invalid request ID 0x67: Invalid axis number / DO-ID 0x68: Invalid number of parameters 0x69: Invalid attribute 0x6B: Request too short	
*for all negative responses the ID equals to response code or 80 hex.		

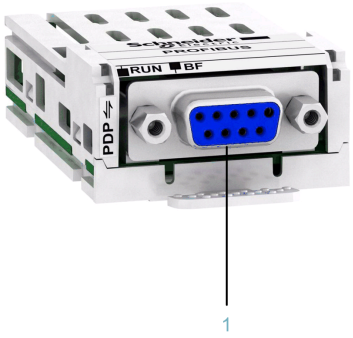
With the sub index in addition to the detected error value, the total length of the answer is 10 bytes.

Hardware Setup

Hardware Presentation

PROFIBUS DP Fieldbus Module

The figure shows the PROFIBUS DP fieldbus module equipped with a Sub-D 9 connector:



1 Sub-D 9 connector

Firmware Version

Compatibility

The VW3A3607 fieldbus module version 1.16IE08 and higher is compliant with all Altivar process product range.

The associated GSD is named as the following example: SE100E2E.GSD.

The files are available on www.se.com..

Installation of the Module

Before Starting

Verify that the catalog number printed on the label corresponds to the purchase order.

Remove the fieldbus module from its packaging and check that it has not been damaged in transit.

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

⚠⚠DANGER

ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION

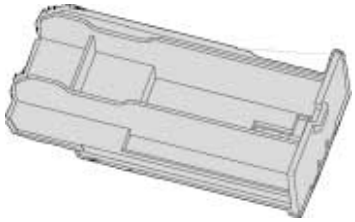
Do not use damaged products or accessories.

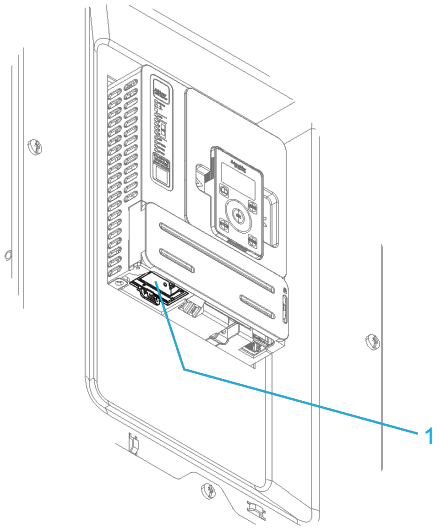
Failure to follow these instructions will result in death or serious injury.

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

Insertion of the Fieldbus Module

The table provides the procedure for insertion of the PROFIBUS DP fieldbus module in the soft starter:

Step	Action
1	Ensure that the power is off.
2	Locate the fieldbus module slot on the bottom of the control part.
3	Remove the false module (VY1G480C01) with the help of a screwdriver. 
4	Insert the module.
5	Check that the module is correctly inserted and locked mechanically in the soft starter.
6	Add the corresponding sticker on the LED front panel of the soft starter.



1 Fieldbus Module Slot

Removal of the Fieldbus Module

The table provides the procedure for removal of the PROFIBUS DP fieldbus module from the soft starter:

Step	Action
1	Ensure that the power is off.
2	Press the strip. 
3	Remove the module while maintaining the strip pressed.

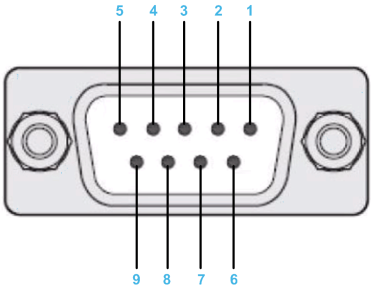
Electrical Installation

Pin Layout

The VW3A3607 fieldbus module is equipped with a sub-D 9 female connector for the PROFIBUS DP connection.

Use only validated PROFIBUS connectors.

- The PROFIBUS connectors are suitable for connecting the fieldbus signal.
- The PROFIBUS connectors are galvanically isolated.
- Connect the PROFIBUS signals.
- If the device is at the end of the network, use a PROFIBUS connector with a terminating resistor.
- Fasten the cables to the cable guide. The cable guide is not a strain relief.



The table provides the pin out details of the sub-D 9 connector:

Pin	Signal	Meaning
1	Shield	Shield protective ground
2	–	Not connected
3	RxD/TxD-P	Receive/Transmit-data-P
4	CNTR-P	Control-P
5	DGND	Data ground
6	VP	Voltage plus
7	–	Not connected
8	RxD/TxD-N	Receive/Transmit-Data-N
9	–	Not connected

Cable Specification

Cable specifications are as follows:

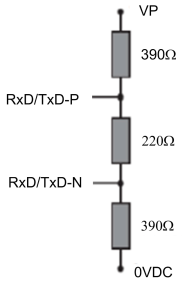
- Use equipotential bonding conductors.
- Use pre-assembled cables to reduce the wiring mistakes.
- Shield: both end grounded.
- Twisted-pair cable.
- Verify that wiring, cables, and connected interfaces meet the PELV requirements.
- The maximum cable length depends on the baud rate and the signal propagation delay, that is, shorter bus cable for higher baud rate.

Data rate (kbps)	9.6	19.2	93.75	187.5	500	1500	3000	6000	12000
Distance m (ft.)	1200 (4000)	1200 (4000)	1200 (4000)	1000 (3300)	400 (1300)	200 (650)	100 (330)	100 (330)	100 (330)

Terminating Resistor

Both ends of the entire PROFIBUS DP network must be terminated with a terminating resistor. Use PROFIBUS connectors with integrated terminating resistors at both ends of the network.

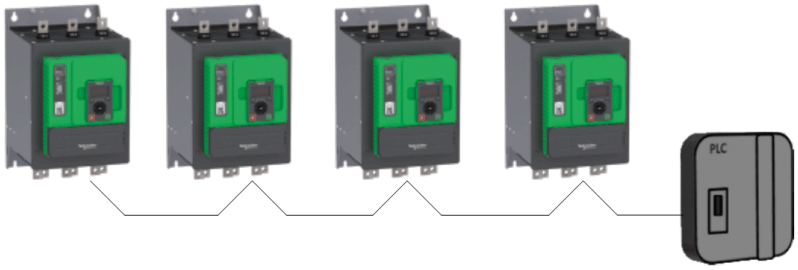
The schematic diagram shows the terminating resistor combination:



Cable Routing Practices

Installation Topology

The following figure shows an example of a wiring solution between a controller and devices using VW3A3607 fieldbus modules. The connector and cable for connection to the PROFIBUS DP network must be ordered separately.



Accessories Presentation

Information

Connection accessories should be ordered separately (See the catalog).

SUB-D male connection

The SUB-D male connection (LU9AD7) is available on se.com.

Software Setup

Basic Settings

Structure of the Parameter Table

General Legend

Pictogram	Description
	This parameter can be set during operation or when stopped. **NOTE:** It is advisable to stop the motor before modifying any of the settings
	The motor must be stopped to set this parameter.
	Power cycle must be performed after setting this parameter.
	Read only parameter, mainly used for monitoring.
	Expert mode required to access this parameter.

Menu Presentation

Below an example of a menu presentation:

[Short Label] CODE

Access path: **[Menu]** ➡ **[Sub-menu]**

About this menu
Description of the menu.

Parameter Presentation

Below an example of a parameter presentation:

HMI label	Setting or Display	Factory setting
[Short Label] CODE (pictogram)	XXX...XXX **[unit]** **[additional informations]**	**Factory setting**: **[Short Label]** CODE
[Long label] Access path: **[Menu]** ➡ **[Sub-menu]** Reference exclusivity and required optional modules. Example: Fieldbus Module VW3A3607 is required. Description of the parameter. Parameter incompatibilities and / or required configuration. Example: This parameter can be accessed it **[Short Label]** CODE is set to **[Short Label]** CODE. This parameter is not compatible with **[Short Label]** CODE. Impact on other parameters. Example: If this parameter is modified, the parameter **[Short Label]** CODE is set to factory settings.		

Finding a Parameter in This Document

Display on HMI Tools

A parameter is identified by:

- Its short label displayed on the Plain Text Display Terminal, and on the Graphic Display Terminal
- Its long label displayed on SoMove DTM Parameter list tab, on the Graphic Display Terminal by pressing  , and on the Webserver
- Its code displayed on SoMove DTM Parameter list tab, on the Graphic Display Terminal by pressing  , and on the Webserver

Example: **[Acceleration]** is a short label, its code is ACC and its long label is ***Acceleration ramp time***.

With the Manual

It is possible to use either the parameter name or the parameter code to search in the manual the page giving details of the selected parameter.

PROFIBUS Communication Parameters

[Profibus] PBC

Overview

Configuration of the Modbus communication functions of the soft starter can be accessed from**[Communication]** COM.

The modification of communication parameters is taken into account after a power cycle of the soft starter.

Possible Settings

The table presents the menu settings:

HMI label	Setting	
[Address] ADRC	Logic address: 19C9 hex = 6601 Range: 1...126 Factory setting: 126	Type: UINT (Unsigned16) Read/write: R/WS
Device address This parameter defines the PROFIBUS DP device address. If **[Address]** ADRC is set to 126, the restart of the soft starter is not required. If **[Address]** ADRC is set to [1...125], the restart of the soft starter is required.		
[Fieldbus Interrupt Resp] CLL	Logic address: 1B67 hex = 7015 Factory setting: **[Freewheel Stop]** YES	Type: WORD (Enumeration) Read/write: R/WS
Response to Fieldbus module communication interruption This parameter defines the PROFIBUS DP error stop mode. • **[Ignore]** NO : Detected error ignored (in this case, the warning **[Fieldbus Com Warn]** CLLA is activated). • **[Freewheel Stop]** YES : Motor triggers in error and is stopped in freewheel. • **[Per STT]** STT : Motor is stopped according to **[Type of stop]** STT parameter. • **[Deceleration]** DEC : Motor is stopped in deceleration and triggers in error at the end of stop. • **[Braking]** BRK : Motor is stopped in dynamic braking and triggers in error at the end of stop.		

⚠WARNING

LOSS OF CONTROL

If this parameter is set to **[Ignore]** NO, fieldbus module communication monitoring is disabled.

- Only use this setting after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Only use this setting for tests during commissioning.
- Verify that communication monitoring has been re-enabled before completing the commissioning procedure and performing the final commissioning test.

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

HMI label	Setting	
[Product restart] RP	Logic address: 1BD8 hex = 7128 Factory setting: **[No]**	Type: WORD (Enumeration) Read/write: R/WS

Product restart

Restart the device. Can be used to clear a detected error or refresh a modified parameters that requires a device restart.

- **[No]** NO: No restart.
- **[Yes]** YES: Restart the device.

The Restart function performs a Fault Reset and then restarts the device. During this Restart procedure, the device goes through the same steps as if it had been switched off and on again. Depending on the wiring and the configuration of the device, this may result in immediate and unanticipated operation.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

The Restart function performs a Fault Reset and restarts the device.

- Verify that activating this function does not result in unsafe conditions.

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

[PROFIBUS DIAG] PRB

Overview

Configuration of the Modbus communication functions of the soft starter can be accessed too from:

[Communication] COM ➡ **[Communication map]** CMM

The modification of communication parameters is taken into account after a power cycle of the soft starter.

Possible Settings

The table presents the menu settings:

HMI label	Setting	
[Data rate used] BDRU 	Logic address: 1A04 hex = 6660 Factory setting: **[Automatic]** AUTO	Type: WORD (Enumeration) Read/write: R
Data rate used This parameter displays the current baud rate. This parameter can be: • **[Automatic]** AUTO • **[9600 bps]** 9600 • **[10 Kbps]** 10000 • **[19200 bps]** 19200 • **[45.45 Kbps]** 45450 • **[93.75 Kbps]** 93750 • **[187.5 Kbps]** 187K5 • **[500 Kbps]** 500K • **[1.5 Mbps]** 1M5 • **[3 Mbps]** 3M • **[6 Mbps]** 6M • **[12 Mbps]** 12M		
[PPO profile used] PRFL 	Logic address: 1A09 hex = 6665 Factory setting: **[Not Configured]** UNCG	Type: WORD (Enumeration) Read/write: R
PPO profile used This parameter is used to select the actual profile for the device. This parameter can be: • **[Not Configured]** UNCG • **[100]** 100 • **[101]** 101 • **[102]** 102 • **[106]** 106 • **[107]** 107		

HMI label	Setting	
[DP Master Active] DPMA 	Logic address: 1A0A hex = 6666 Factory setting: **[Master 1]** 1	Type: WORD (Enumeration) Read/write: R
DP Master active This parameter displays the active PROFIBUS DP master. This parameter can be: • **[Master 1]** 1 • **[Master 2]** 2		
[Fieldbus Error] EPF2 	Logic address: FBBA hex = 64442	Type: WORD (Enumeration) Read/write: R
External error detected by Fieldbus An external error has been triggered. The parameter can be: • Bit 4: Configuration file error		
[Fieldbus Com Interrupt] CNF 	Logic address: 1BE8 hex = 7144	Type: UINT (Unsigned16) Read/write: R
Fieldbus communication interruption This error is caused by the timeout and appears when the communication is stopped or interrupted with the option module. The parameter can be: • 0: No error detected • 1: Network timeout for received requests destined for the soft starter • 2: Identification error between the device and the controller • 3: Controller in clear mode • 4: Controller class 2 timeout		
[InternCom Error1] ILF1 	Logic address: 1BDE hex = 7134	Type: UINT (Unsigned16) Read/write: R
Internal communication interruption 1 Communication interruption between the option module and the soft starter. The parameter can be: • 0 No error detected • 1 Internal communication interruption with the soft starter • 2 Hardware error detected • 3 Error found in the EEPROM checksum • 4 EEPROM • 5 Flash memory • 6 RAM memory • 7 NVRAM memory • 101 Unknown module • 102 Communication interruption on the soft starter internal bus • 103 Time out on the soft starter internal bus (500 ms)		

Communication parameters

About this Section

This section shows the I/O parameters and their communications addressees.

For more information about the Communication Parameter Addresses, please refers to the ATS480 Communication Parameter NNZ85544.

Comportment when an communication error occurs

If an error appears, the device return to his initial state.

For example, if:

- a pump is connect to R3.
- the pump is assign to OL1R.
- the pump is in run state.

If an communication error occurs, the pump is set to stop mode.

Logic I/O

Code	Settings	
[Logic Inputs States] IL1R	Logic address: 1452 hex = 5202	Type: WORD (BitString16) Read/write: R Unit: -
Logic inputs states • Bit0 : "DI1" Digital inputs real image • Bit1 : "DI2" Digital inputs real image • Bit2 : "DI3" Digital inputs real image • Bit3 : "DI4" Digital inputs real image		
[Logic Outputs States] OL1R	Logic address: 145C hex = 5212	Type: WORD (BitString16) Read/write: R/W Unit: -
Logic outputs states • Bit0 : "R1" relay real image • Bit1 : "R2" relay real image • Bit2 : "R3" relay real image • Bit8 : "DQ1" digital outputs real image • Bit9 : "DQ2" digital outputs real image The relay or logic outputs can be controlled via the network. Simply write this parameter. The outputs to be controlled must not be assigned to a soft starter function, otherwise the write operation has no effect.		

Analog inputs

Code	Settings	
[AI1] AI1C	Logic address: 147A hex = 5242	Type: INT (Signed16) Read/write: R Unit: -
Physical value AI1 AI1 customer image (1mV, 0.001mA) • (AI1T == "PTC") : 0.01 kOhm • (AI1T == "1PT2") : 0.1 Ohm • (AI1T == "1PT23") : 0.1 Ohm • else : 0.001 V		
[Analog Input 1 Standardized Value] AI1R	Logic address: 1470 hex= 5232	Type: INT (Signed16) Read/write: R Unit: -
Analog input 1 standardized value AI1 real application image		

Analog outputs

The analog outputs can be controlled via the network. Simply write these parameters. The outputs to be controlled must not be assigned to a soft starter function, otherwise the write operation has no effect

Code	Settings	
[AQ1] AO1C	Logic address: 1497 hex = 5271	Type: INT (Signed16) Read/write: R/W Unit: -
AQ1 physical value AQ1 customer image (1mV, 0.001mA)		
[Analog Output 1 Standardized Value] AO1R	Logic address: 148D hex = 5261	Type: INT (Signed16) Read/write: R/W Unit: -
Analog output 1 standardized value AQ1 real application image		

Base Monitoring

Code	Settings	
[Status Register] ETA	Logic address: 0C81 hex = 3201	Type: WORD (BitString16) Read/write: R Unit: -
Status Register • Bit0 = 1 : Ready to switch on • Bit1 = 1 : Switched on • Bit2 = 1 : Operation enabled • Bit3 = 1 : Detected error • Bit4 = 1 : Voltage enabled • Bit5 = 0 : Quick stop active • Bit6 = 1 : Switch on disabled • Bit7 = 1 : Alarm present • Bit8 : Reserved • Bit9 = 0 : Local mode control • Bit10 to Bit13: Reserved • Bit14 = 1 : Stop imposed by STOP key • Bit15 : Reserved		
[Motor Current] LCR	Logic address: 0C84 hex = 3204	Type: UINT (Unsigned16) Read/write: R Unit: 0.1 A
Motor current RMS Motor current. Average of the three line currents based on the measurement of the fundamental of the motor line currents.		
[Motor Therm State] THR	Logic address: 259E hex = 9630	Type: UINT (Unsigned16) Read/write: R Unit: 1 %
Motor thermal state This parameter monitors the motor thermal state. 100% corresponds to the nominal thermal state at the nominal motor current set to **[Motor Nom Current]** IN. Refers to the ATS480 User Manual NNZ85515 for more information.		
[Motor Run Time] RTH	Logic address: 0CAC hex = 3244	Type: UINT (Unsigned32) Read/write: R Unit: 1 s
Motor run time This parameter monitors how long the motor has been energized.		
[Elc Energy Cons] OCK	Logic address: 299C hex = 10652	Type: UINT (Unsigned32) Read/write: R/WS Unit: kWh
Electrical energy consumed by the motor (kWh)		

Code	Settings	
[Active Command Channel] CCC	Logic address: 20FA = 8442	Type: WORD (BitString16) Read/write: R Unit: -
Active command channel Active command channels status • Bit0 = 1 : Terminal board • Bit2 = 1 : Deported keypad • Bit3 = 1 : Modbus • Bit6 = 1 : CANopen • Bit9 = 1 : COM option board • Bit14 = 1 : Indus • Bit15 = 1 : SoMove		

Command Register

Code	Settings	
[Cmd Register] CMD	Logic address: 2135 hex = 8501	Type: WORD (BitString16) Read/write: R/W Unit: -
• Bit0 = 1 : ***Switch on*** Mains contactor control • Bit1 = 1 : ***Enable voltage*** Authorization to supply power • Bit2 = 0 : ***Quick Stop*** active • Bit3 = 1 : ***Enable Operation*** Run command active • Bit4 to Bit6: ***Reserved*** • Bit7 : ***Error reset request*** : active on rising edge • Bit8 to Bit10: ***Reserved*** • Bit11 : ***Specific function assignment*** • Bit12 : ***Specific function assignment*** • Bit13 : ***Dynamic braking stop*** *(factory setting)*. The Bit can be set to an other function. **NOTE:** If no function is assigned, the Bit will return to his factory setting. • Bit14 :***Decelerated stop order*** *(factory setting)*. The Bit can be set to an other function. **NOTE:** If no function is assigned, the Bit will return to his factory setting. • Bit15 : ***Specific function assignment***		

Extended Control Word

Code	Settings	
[Extended Control Word] CMI	Logic address: 2138 hex = 8504	Type: WORD (BitString16) Read/write: R/W Unit: -

- Bit0 – ***Restore factory settings request***: Active on rising edge when motor is powered off. Once request is considered, this bit is automatically reset
- Bit1 – ***Store customer parameters request***: Active on rising edge when motor is powered off. Once request is considered, this bit is automatically reset
- Bit2 – ***Restore saved customer parameters***: Active on rising edge when motor is powered off. Once request is considered, this bit is automatically reset
- Bit3 = 1 : ***External error***: Active on rising edge
- Bit4 to Bit12: ***Reserved***
- Bit13 = 1 : ***Lock device when motor stopped***
- Bit14 = 1 : ***Disable line monitoring***
- Bit15 : ***Disable parameter consistency check***
  - Bit15 = 1 : no check of parameter consistency and device is locked when stopped
  - Bit15 = 0 : all parameters are validated

Fieldbus Integration Using Control Expert (M580)

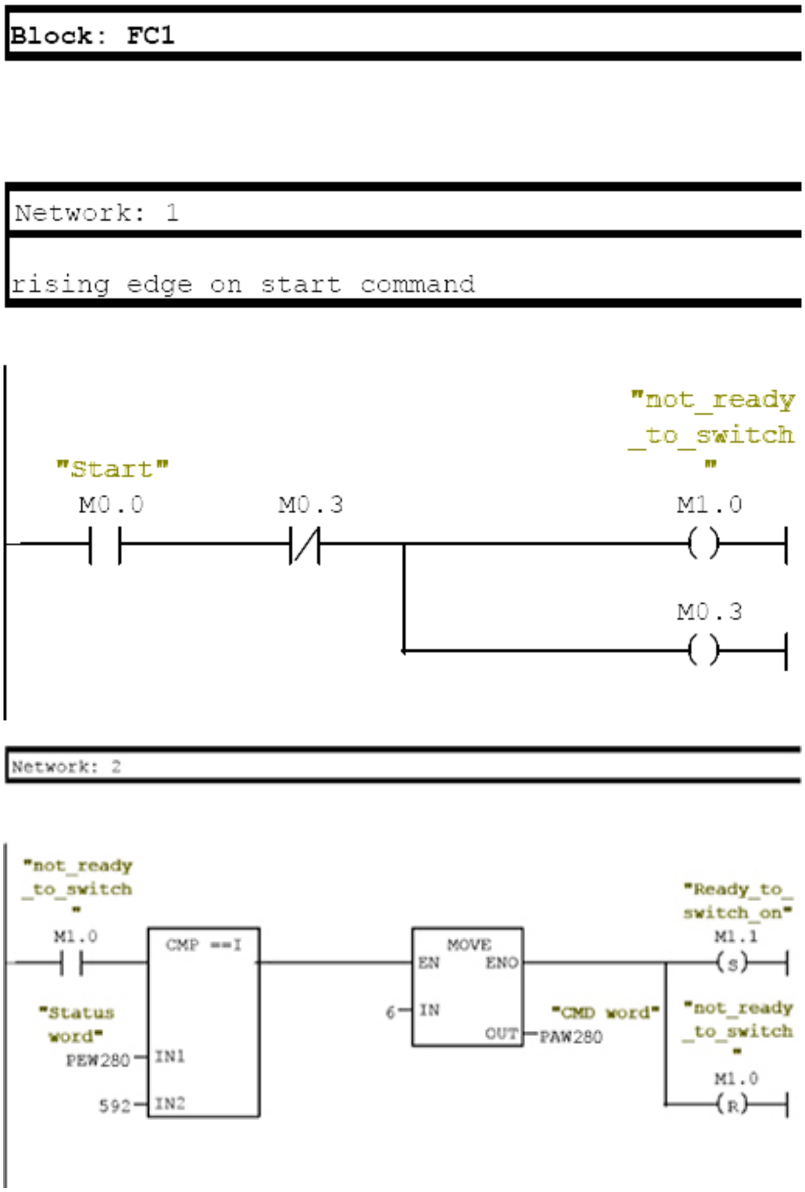
How to video

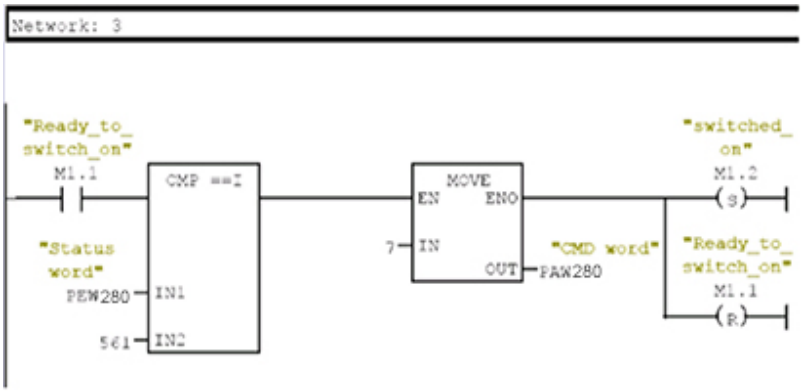
The procedure is available on (FA384569).

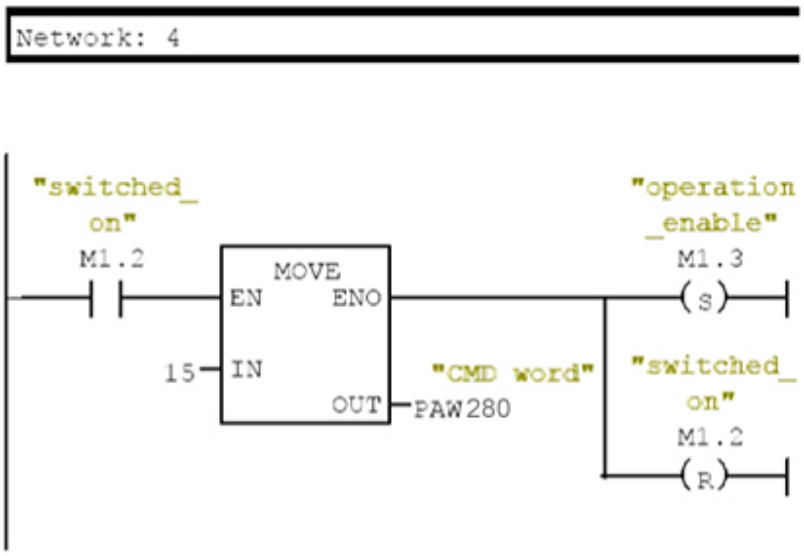
Fieldbus Integration Tutorial

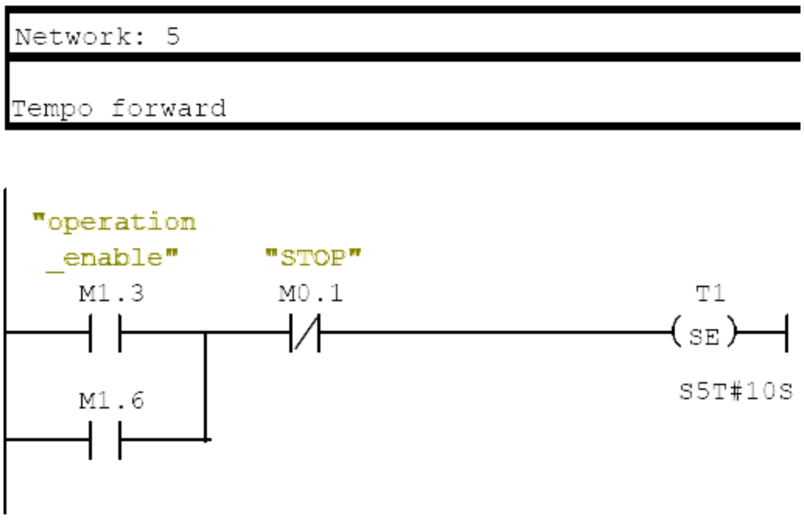
Simple LAD Language FC (Controlling the soft starter in Standard Mode)

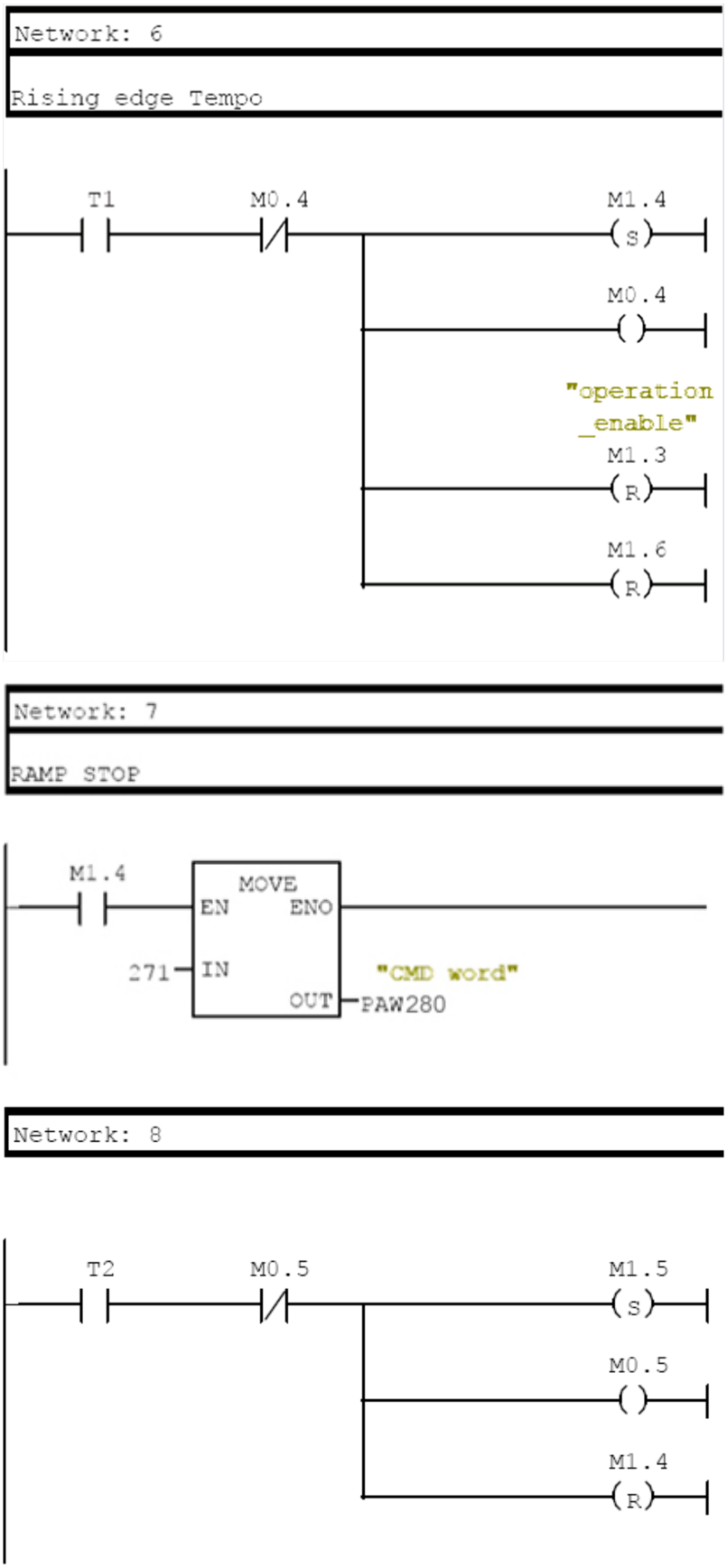
The following example shows a simple LAD language FC for controlling the soft starter in Standard Mode with Telegram 100:

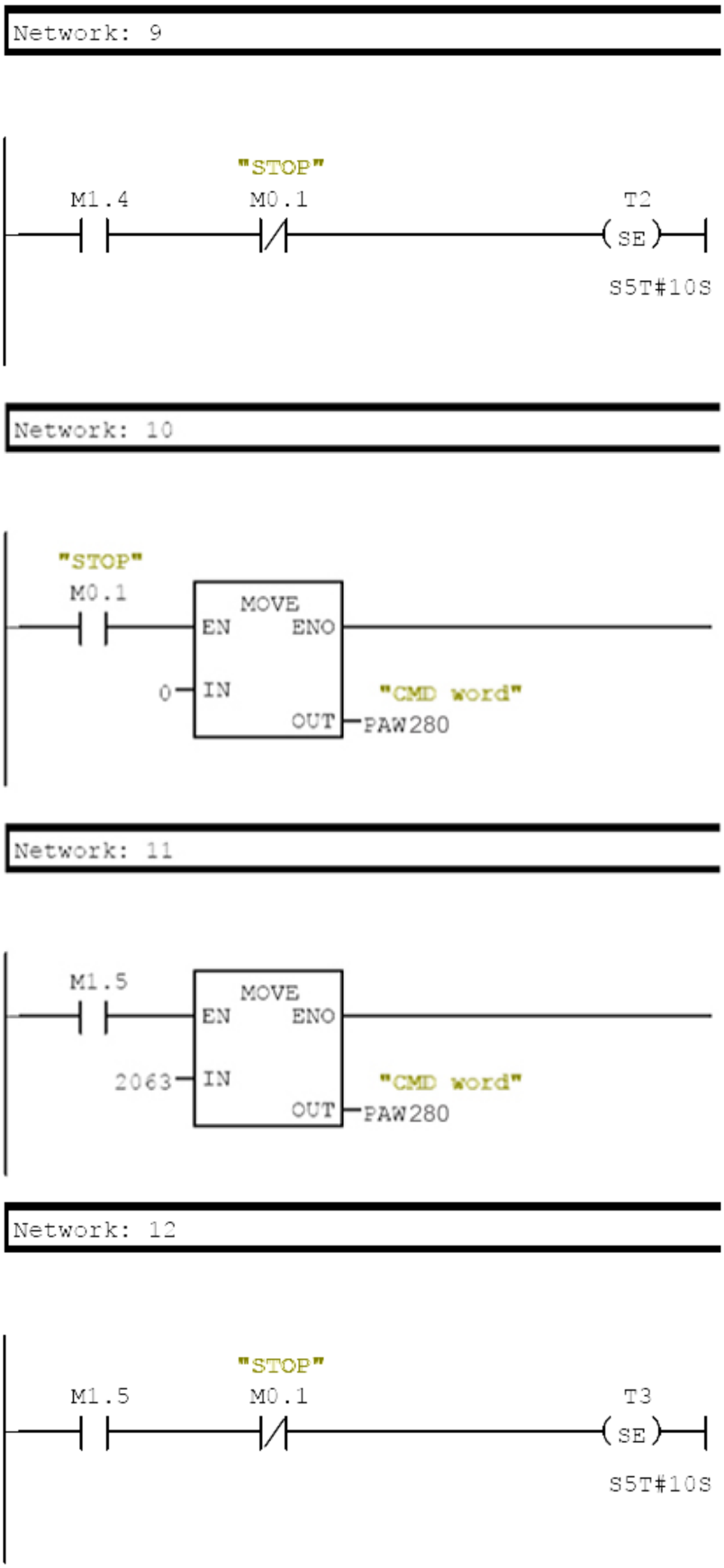


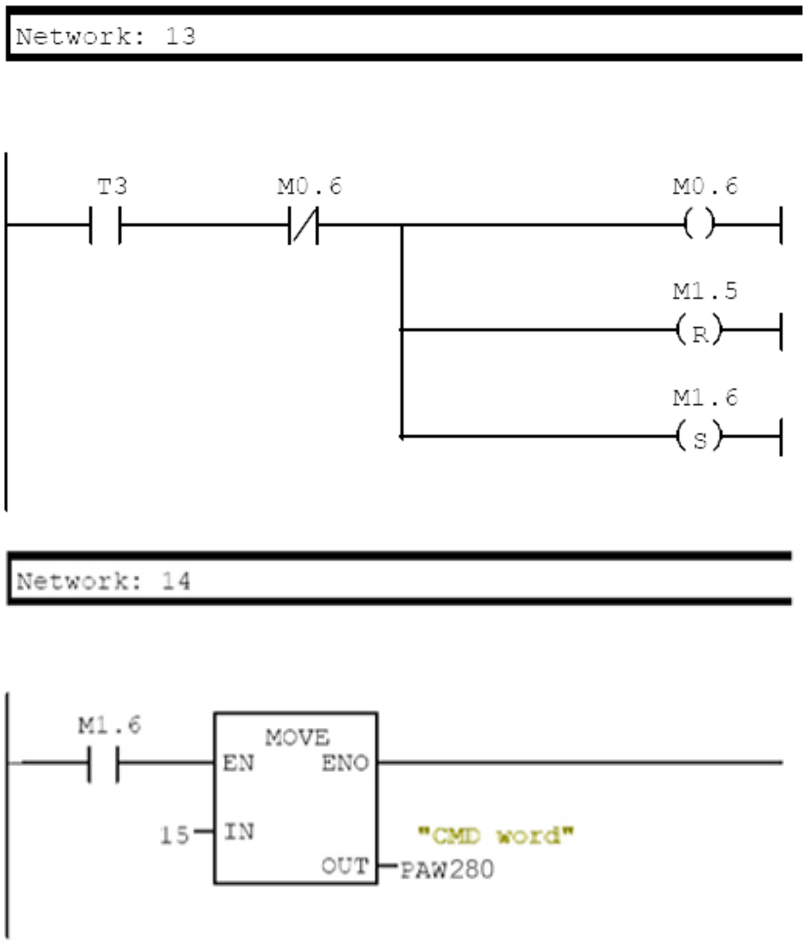

Network: 3
"Ready_to_ switch_on"
M1.1
CMP ==I
"Status word"
PEW280
IN1
561
IN2
MOVE
EN
ENO
7
IN
OUT
PAW280
"CMD word"
"switched_ on"
M1.2
S
"Ready_to_ switch_on"
M1.1
R


Network: 4
"switched_ on"
M1.2
MOVE
EN
ENO
15
IN
OUT
PAW280
"CMD word"
"operation _enable"
M1.3
S
"switched_ on"
M1.2
R


Network: 5
Tempo forward
"operation _enable"
M1.3
"STOP"
M0.1
T1
SE
S5T#10S
M1.6


Network: 6
Rising edge Tempo
T1
M0.4
M1.4
S
M0.4
"operation _enable"
M1.3
R
M1.6
R
Network: 7
RAMP STOP
M1.4
MOVE
EN
ENO
271
IN
"CMD word"
OUT
PAW280
Network: 8
T2
M0.5
M1.5
S
M0.5
M1.4
R


Network: 9
"STOP"
M1.4
M0.1
T2
SE
S5T#10S
Network: 10
"STOP"
M0.1
MOVE
EN
ENO
0
IN
"CMD word"
OUT
PAW280
Network: 11
M1.5
MOVE
EN
ENO
2063
IN
"CMD word"
OUT
PAW280
Network: 12
"STOP"
M1.5
M0.1
T3
SE
S5T#10S


Network: 13
T3
M0.6
M0.6
M1.5
R
M1.6
S
Network: 14
M1.6
MOVE
EN
ENO
15
IN
"CMD word"
OUT
PAW280

Operations

Operating States

⚠WARNING
LOSS OF CONTROL Perform a comprehensive commissioning test to verify that communication monitoring properly detects communication interruptions **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Configuring Communication Error Response

The response of the soft starter in the event of a communication interruption can be configured.

Configuration can be performed using the display terminal from:

[Communication] COMO ➡ **[Communication Module]** COMO

Via the **[Fieldbus Interrupt Resp]** CLL parameter.

The values of the **[Fieldbus Interrupt Resp]** CLL parameter, which triggers a soft starter detected error **[Fieldbus Com Interrupt]** CNF are:

Value	Meaning
[Freewheel Stop] YES	Motor triggers in error and is stopped in freewheel. **Factory setting**
[Deceleration] DEC	Motor is stopped in deceleration and triggers in error at the end of stop. The values are set to **[Deceleration]** DEC and **[End Of Deceleration]** EDC.
[Braking] BRK	Motor is stopped in dynamic braking and triggers in error at the end of stop. The values are set to **[Braking Level]** BRC and **[DC Braking To Stop]** EBA.

The values of the **[Fieldbus Interrupt Resp]** CLL parameter which does not trigger a detected error are:

Value	Meaning
[Ignore] NO	Detected error ignored (in this case, the warning **[Fieldbus Com Warn]** CLLA is activated).
[Per STT] STT	Motor is stopped according to **[Type of stop]** STT parameter.

⚠WARNING

LOSS OF CONTROL

If this parameter is set to **[Ignore]** NO, fieldbus module communication monitoring is disabled.

- Only use this setting after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Only use this setting for tests during commissioning.
- Verify that communication monitoring has been re-enabled before completing the commissioning procedure and performing the final commissioning test.

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

Detected errors

Access via :**[Communication]** COMO ➡ **[Communication map]** CMM ➡ **[PROFIBUS DIAG]** PRB

Parameter	Description	Possible Value
[InternCom Error1] ILF1	Internal communication interruption 1	• 0 No error detected • 1 Internal communication interruption with the soft starter • 2 Hardware error detected • 3 Error found in the EEPROM checksum • 4 EEPROM • 5 Flash memory • 6 RAM memory • 7 NVRAM memory • 101 Unknown module • 102 Communication interruption on the soft starter internal bus • 103 Time out on the soft starter internal bus (500 ms)
[Fieldbus Error] EPF2	Fieldbus external error	Bit 4: Configuration file error
[Fieldbus Com Interrupt] CNF	This parameter is used to indicate that fieldbus error has been detected. When the detected error is active, the value corresponds to the cause of the error. When the cause of the error is no longer active, the value is reset to 0.	• 0: No error detected • 1: Network timeout for received requests destined for the soft starter • 2: Identification error between the device and the controller • 3: Controller in clear mode • 4: Controller class 2 timeout

Operating Modes

Configuration of the Soft starter for Operation with STD Profile

This section describes how to configure the settings of the soft starter if it is controlled in STD mode.

In the **[Complete settings]** CST- menu, **[Command channel]** CCP- submenu:

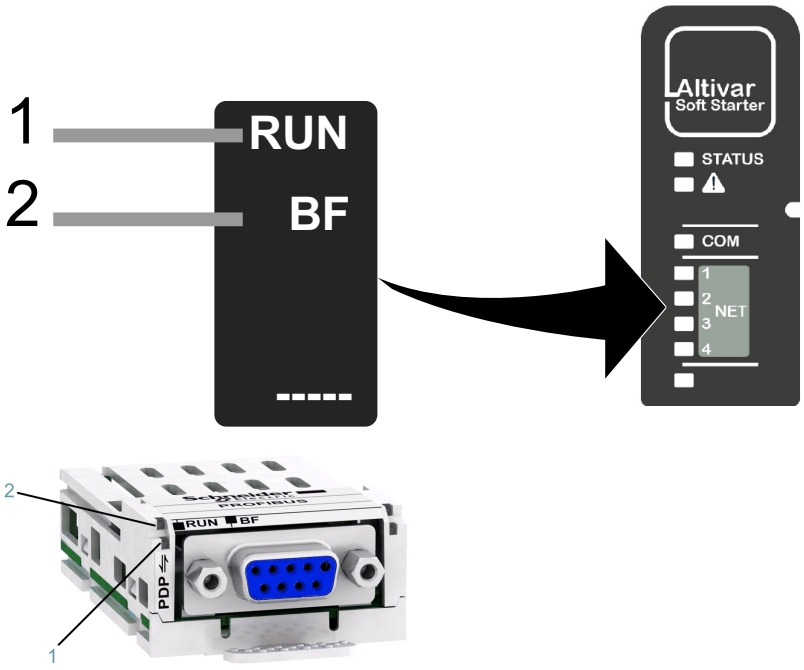
- **[Control Mode]** CHCF is set to **[Standard Profile]** STD.
- Check if **[Cmd channel 1]** CD1 (or **[Cmd channel 2]** CD2) is set on according to the communication source (**[Com. Module]** NET).

Diagnostics and Troubleshooting

Fieldbus Status LEDs

LED Indicators

The following figure describes the LEDs status module:



LED Description

Item	LED	Description
1	RUN	Module status
2	BF	Network Error status

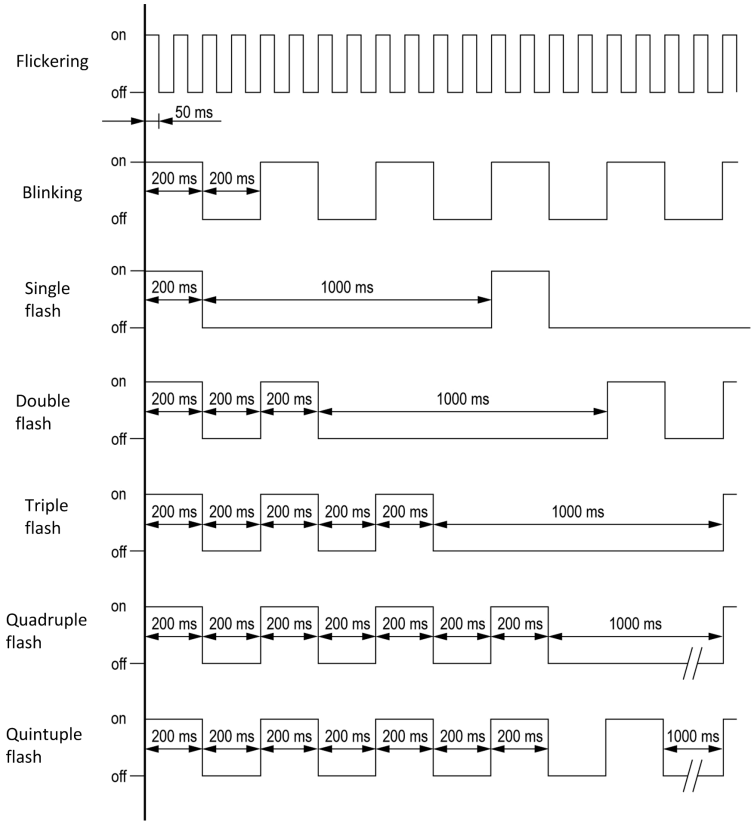
Module Status

This LED indicates the module status:

Color & Status	Description
OFF	The device is powered off
Green ON	Fieldbus communication active

Network Error Status

Color & Status	Description
OFF	The device does not have a server address or is powered off
Red ON	Fieldbus error is detected
Red flashing	Incorrect configuration



Connection problem with the fieldbus module

Description

If the product cannot be addressed via the fieldbus, first check the connections. The product manuals contains the technical data of the device and information on fieldbus and device installation.

Verify the following:

- Power connections to the device.
- Fieldbus cable and fieldbus wiring.
- Fieldbus connection to the device.

Fieldbus Response Test

Description

If the connections are correct, check the settings for the fieldbus addresses. After correct configuration of the transmission data, test the fieldbus mode.

In addition to the controller that knows the device via the data in the GSD file and its address, a bus monitor should be installed. As a passive device, it can display messages.

- Switch off or on the supply voltage of the soft starter system.
- Observe the network messages shortly after switching on the soft starter. A bus monitor can be used to record the elapsed time between telegrams and the relevant information in the telegram.

Possible Errors: Addressing, Parameterization, Configuration

If it is impossible to connect to a device, check the following:

- Addressing: The address of the network device must be a valid IP address (between 2 to 126). Each network device must have a unique address.
- Parameterization: The parameterized ident number and the user parameters must match the values stored in the GSD file.
- Configuration: The data length in input and output direction must be identical to the length specified in the GSD file.

Communication Interruption

Description

The soft starter triggers an error **[Internal Link Error]** ILF when the following events occur:

- Hardware error is detected on the PROFIBUS DP module
- Communication interruption between the PROFIBUS DP module and the soft starter

The response of the soft starter in the event of an **[Internal Link Error]** ILF error cannot be configured, and the soft starter stops in freewheel. This detected error requires a power reset.

The diagnostic parameter can be used to obtain more detailed information about the origin of the **[Internal Link Error]** ILF (**[InternCom Error1]** ILF1 if the detected error has occurred on fieldbus module).

The **[InternCom Error1]** ILF1 parameter can be accessed on the graphic display terminal in: **[Communication]** COMO ➡ **[Communication map]** CMM ➡ **[PROFIBUS DIAG]** PRB

Value	Description of the values of the [Internal Link Error] ILF parameter
0	No error detected
1	Internal communication interruption with the soft starter
2	Hardware error detected
3	Error found in the EEPROM checksum
4	EEPROM
5	Flash memory
6	RAM memory
7	NVRAM memory
101	Unknown module
102	Communication interruption on the soft starter internal bus
103	Time out on the soft starter internal bus (500 ms)

Diagnostic (PROFIBUS DP Service)

PROFIBUS DP diagnostic is associated with specific data which can be helpful during maintenance:

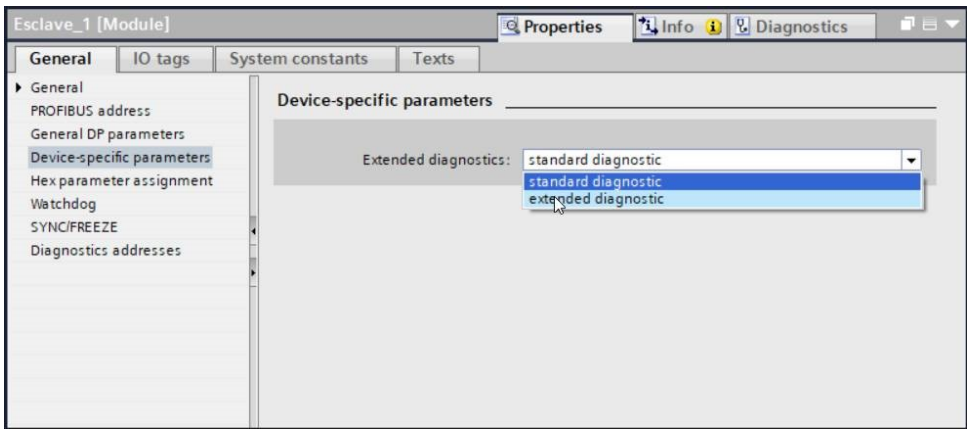
- The error code, if a detected error is present,
- The value of ETA operating state word,
- The value of the output frequency.

This data report and gives an indication on the soft starter status when the diagnostic event was triggered.

Byte	Description	
1…6	Reserved	
7	Header byte	Length of block (length byte included) = 12
8…10	Reserved	
11	Additional manufacturer specific status info.	External diagnostic data length = 8
12		If [ALD_ETA.bit 3] = 1, the value is equal to the LSB of the ADL_LFT. Otherwise, the value is equal to 0.
13		[ALD_ETA] LSB
14		[ALD_ETA] MSB
15		[ADL_LCR] LSB
16		[ADL_LCR] MSB
17		[ADL_THR] LSB
18		[ADL_THR] MSB

Enabling Diagnostics

By default, extended diagnostics are disabled. They can be activated during the configuration phase as shown below:



Monitoring of Communication Channel

Command Channels

All the soft starter command parameters are managed on a channel-by-channel basis.

Parameter Name	Parameter Code			
	Taken Into Account by the Soft Starter	**Modbus Serial**	**CANopen**	**Fieldbus Module (PROFIBUS & Ethernet IP/MODBUS TCP)**
Control word	**[Cmd Register]** CMD	**[Modbus Cmd]** CMD1	**[CANopen Cmd]** CMD2	**[COM. Module cmd.]** CMD3
Extended Control word	**[Extended Control Word]** CMI	**[Extended Control Word]** CMI	**[Extended Control Word]** CMI	**[Extended Control Word]** CMI

Network Monitoring Criteria

The table provides the details of the detected errors

Protocol	Criteria	Error Code
PROFIBUS module	External error from the fieldbus module	**[Fieldbus Error]** EPF2
	0: No error detected	**[Fieldbus Com Interrupt]** CNF
	1: Network timeout for received requests destined for the soft starter	
	2: Identification error between the module and the controller	
	3: Controller in clear mode	
	4: Controller class 2 timeout	
	EEPROM detected error	**[Internal Link Error]** ILF

Monitoring of Communication Channels

Communication channels are monitored if they are involved in one of the following parameters:

- The control word **[Cmd Register]** CMD from the active command channel
- The control word containing the command switch bit configured on **[Command Switching]** CCS

As soon as one of these parameters has been written once to a communication channel, it activates monitoring for that channel.

If a communication warning is sent (in accordance with the protocol criteria) by a monitored port or fieldbus module, the soft starter triggers a communication interruption.

The soft starter reacts according to the communication interruption configuration (operating state Fault, maintenance, fallback, and so on).

If a communication warning occurs on a channel that is not being monitored, the soft starter does not trigger a communication interruption.

Enabling of Communication Channels

A communication channel is enabled once one parameter involved has been written at least one time. The soft starter is only able to start if the channel involved in command value is enabled.

Example:

A soft starter in STD profile is connected to an active communication channel.

It is mandatory to write at least one time the command in order to switch from *4-Switched on* to *5-Operation enabled* state.

A communication channel is disabled in *forced local* mode.

On exiting *forced local* mode:

- The soft starter copies the `run` commands value to the active channel (maintained).
- Monitoring of the active channels for the command resumes following a time delay **[Time-out forc. local]** `FLOT`.
- Soft starter control only takes effect once the soft starter has received the command from the active channels.

Control-Signal Diagnostics

Introduction

On the display terminal, the **[Communication]** COM — **[Communication map]** CMM submenu can be used to display control-signal diagnostic information between the soft starter and the controller:

- Active command channel **[Command Channel]** CMDC
- Value of the control word **[Cmd Register]** CMD from the active command channel **[Command Channel]** CMDC
- Value of the operating state word **[Status Register]** ETA
- Specific data for all available fieldbusses are in dedicated submenus.
- In the **[Command word image]** CWI submenu: control words from all channels

Control Word Display

The **[Command Channel]** CMDC parameter indicates the active command channel.

The **[Cmd Register]** CMD parameter indicates the hexadecimal value of the control word (CMD) used to control the soft starter.

The **[Command word image]** CWI submenu (**[COM. Module cmd.]** CMD3) parameter is used to display the hexadecimal value of the control word from the fieldbus.

Operating State Word Display

The **[Status Register]** ETA parameter gives the value of the operating state word (ETA).

The table provides the bit details of ETA parameter:

Bit	Description
Bit0 = 1	Ready to switch on
Bit1 = 1	Switched on
Bit2 = 1	Operation enabled
Bit3 = 1	Detected error
Bit4 = 1	Voltage enabled
Bit5 = 0	Quick stop active
Bit6 = 1	Switch on disabled
Bit7 = 1	Warning
Bit8	Reserved
Bit9 = 0	Local mode control
Bit10	Reserved
Bit11	Reserved
Bit12	Reserved
Bit13	Reserved
Bit14 = 1	Stop imposed via **STOP** key
Bit15	Reserved

Glossary

A

Abbreviations:

Req. = Required

Opt. = Optional

AC:

Alternating Current

C

Controller:

A **controller** is a device that is actively polling for data from one or multiple devices.

D

DC:

Direct Current

dec.:

Decimal

Device:

A **device** is the passive device, waiting for the **controller** to poll for data to actually send it.

DPWS:

Device Profile for Web Service

E

Error :

Discrepancy between a detected (computed, measured, or signaled) value or condition and the specified or theoretically correct value or condition.

F

Factory setting:

Factory settings when the product is shipped

Fault Reset:

A function used to restore the soft starter to an operational state after a detected error is cleared by removing the cause of the error so that the error is no longer active.

Fault:

Fault is an operating state. If the monitoring functions detect an error, a transition to this operating state is triggered, depending on the error class. A "Fault reset" is required to exit this operating state after the cause of the detected error has been removed. Further information can be found in the pertinent standards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

H

hex:

Hexadecimal

L

LSB:

Least Significant Byte

M

MEI:

Modbus Encapsulated Interface

MS0, MS1:

Number of a Controller in the network.

MSB:

Most Significant Byte

N

NMT:

Network Management. One of the service elements of the application layer in the CAN Reference Model. The NMT serves to configure, initialize, and handle detected errors in a CAN network.

P

PDO:

Process Data Object

Q

QoS:

Quality of Service

Quick Stop:

The quick Stop function can be used for fast deceleration of a movement as a response to a detected error or via a command.

R

R/WS:

Read and write (write only possible when the soft starter is not in RUN mode). It is not possible to write these parameters in "5-Operation enabled" or "6-Quick stop active" states. If the parameter is written in the "4-Switched on" state, transition to "2-Switch on disabled" is activated.

RPDO:

Receive PDO

S

SNMP:

Simple Network Management Protocol

SNTP:

Simple Network Time Protocol

SYNC:

Synchronization Object

T

TPDO:

Transmit PDO

W

Warning:

If the term is used outside the context of safety instructions, a warning alerts to a potential error that was detected by a monitoring function. A warning does not cause a transition of the operating state.

Z

Zone of operation:

This term 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.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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