SIEMENS

Industrial Controls

SIRIUS 3RW55 Soft Starter with PROFINET - Field Device Integration (FDI) Package V1.0

Programming and Operating Manual

05/2021
A5E49849068002A/RS-AA/001

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Smart Infrastructure
Electrical Products
Postfach 10 09 53
93009 Regensburg
GERMANY

A5E49849068002A/RS-AA/001
Ⓟ 06/2021 Subject to change

Table of contents

Security information

1

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/industrialsecurity.

Information on data protection

2

Siemens observes standard data protection principles, in particular the principle of privacy by design.

For this product this means:

This product does not process or store any personal data, only technical function data (e.g. time stamps). If you link this data with other data (e.g. shift schedules) or store personal data on the same storage medium (e.g. hard disk), and thus establish a link to a person or persons, then you are responsible for ensuring compliance with the relevant data protection regulations.

Configuration 3

3.1 Configure and Control a 3RW55 PROFINET device using the 3RW55 PN FDI package

The 3RW55 PN FDI package provides the user with a Soft Starter Configuration wizard which helps the user to:

- Choose and configure a Soft Starter 3RW55 Basic Unit variant
- Configure the PROFINET communication module
- Configure the HMI HF module

The information on the usage of this wizard is available as part of the "Getting Started" document available on the internet (https://support.industry.siemens.com/cs/document/109780216).

3.2 Parameterize a 3RW55 device with other Communication variants using the 3RW55 PN FDI package

The Soft starter configuration wizard extends the function of the Soft Starter 3RW55 PN FDI package to parameterize 3RW55 Soft Starter devices configured with:

- PROFINET communication module
- PROFIBUS communication module
- EtherNet/IP communication module
- Modbus TCP communication module
- Modbus RTU communication module

via the HMI HF PROFINET interface.

The information on the extended function of this wizard is available as part of the "Getting Started – Extended Parameterization" document available on the internet (https://support.industry.siemens.com/cs/document/109780216).

Parameter

4

4.1 Identification

4.1.1 Description

In the "Identification" window the identification and maintenance information can be added and modified. During the loading process the entered data is stored permanently in the device.

4.1.2 Device

Description

The **Identification > Device** dialog provides an overview of the device-specific information. The overview can be used for system documentation purposes.

Identification

The table below contains the data stored for the Soft Starter, HMI and PROFINET IO:

Parameter	Meaning
Manufacturer description	Display vendor.
Article Number	This parameter contains the complete order number or at least a relevant part that allows unambigous identification of the device/module.
Serial Number	Serial Number.
HW Version	Product version.
FW Version	Firmware version.
Revision counter	Provides information about the parameterized changes on the device.
Profile-ID	Gives information about the profile supported by the device and the line of products belonging to the device.
Profile details	Used to supplement the object "PROFILE_ID" and contains further information on the profile.
I&M Version	Provides information about the version of the identification data (0x0101 = Version 1.1)
Supported I&M	Provides information about the available identification data (I&M Data 0..4).

4.1.3 Identification & Maintenance

Description

Parameter	Meaning
Plant designation	Uniquely identifies the module within the plant. Max. number of characters: 32
Location identifier	Uniquely identifies the location of the module. Max. number of characters: 22
Installation date(YYYY-MM-DD HH:MM)	Date of installation of the module. Max. number of characters: 16 (YYYY-MM-DD HH:MM).
Additional information	Free entry of additional information, for example, the intended use of the module. Max. number of characters:54

You can use these descriptions for system documentation. The data is read out directly from the switching device, or from the device, via an online connection.

A maximum of 124 characters are permitted here.

Note

When you add a new device, the information that is still missing is grayed out.

4.2 Parameter sets

Parameter	Parameter set 1	Parameter set 2	Parameter set 3
Rated operational current I_e	X	X	X
Non volatile tripping status	X	-	-
Response to overload thermal motor model	X	-	-
Response to faulty main power direction	X	-	-
Tripping class	X	X	X
Recovery time	X	-	-
Response to overload temperature sensor	X	-	-
Temperature sensor	X	-	-
Response to overload switching element	X	-	-
Asymmetry limit error	X	-	-
DC braking torque	X	X	X
Starting voltage	X	X	X
Starting mode	X	X	X
Stopping mode	X	X	X
Substitute value	X	-	-
Response to CPU/Master Stop	X	-	-
Motor connection type	X	-	-

Parameter	Parameter set 1	Parameter set 2	Parameter set 3
Permissible main power rotation	X	-	-
Input 1-Action	X	-	-
Input 2-Action	X	-	-
Input 3-Action	X	-	-
Input 4-Action	X	-	-
Output 1-Action	X	-	-
Output 2-Action	X	-	-
Output 4-Action	X	-	-
Output 1 - ON delay	X	-	-
Output 2 - ON delay	X	-	-
Output 4 - ON delay	X	-	-
Alternative stopping mode	X	-	-
Breakaway time	X	X	X
Breakaway voltage	X	X	X
Maximum starting time	X	X	X
Ramp-up time	X	X	X
Stopping time	X	X	X
Starting torque	X	X	X
Limiting torque	X	X	X
Stopping torque	X	X	X
Motor heating power	X	X	X
Dynamic braking torque	X	X	X
Creep speed factor right	X	X	X
Creep speed factor left	X	X	X
Creep speed torque right	X	X	X
Creep speed torque left	X	X	X
Ex application	X	-	-
Alternative stopping time	X	-	-
Current limiting value	X	X	X
Service factor	X	X	X
Motor heating warning limit	X	-	-
Remaining time for tripping warning limit	X	-	-
Asymmetry limit warning	X	-	-
Ground fault limit warning	X	-	-
DC braking delay	X	-	-
Alternative DC braking delay	X	-	-
Ground fault limit error	X	-	-
Alternative stopping torque	X	-	-
Output 1 - OFF delay	X	-	-
Output 2 - OFF delay	X	-	-
Output 4 - OFF delay	X	-	-

Parameter	Parameter set 1	Parameter set 2	Parameter set 3
Current limiting value - maximum	X	X	X
Bypass operation mode	X	-	-
Parameters of CPU / master disabled	X	-	-
Automatic parameterization	X	X	X
Preset starting time	X	X	X
Alternative dynamic braking torque	X	-	-
Alternative DC braking torque	X	-	-

More information about each feature and parameter of the 3RW55 Soft Starter can be found in the user manual on the internet

See also

manual (https://support.industry.siemens.com/cs/document/109753752/)

4.3 Automatic Parameterization

Parameters

The function 'automatic parameterization' only influences the following parameters. All further parameters are unaffected by the activated 'automatic parameterization' and can still be parameterized.

Operating principle

When 'automatic parameterization' is activated, the Soft Starter optimizes the starting parameters each time the motor is started. The recommended parameters of the selected application are automatically accepted as the start value for 'automatic parameterization'. For the preset starting time the ramp-up time is adopted as the start value and, for the current limiting, the preset value of the application. The parameters are selected in such a way that the motor starts immediately with minimum current and does not falter during run-up. 'automatic parameterization' can be set for each of the parameter sets.

Then adjust the rated operational current I_e of the motor connected to the Soft Starter.

Once the parameters have been stored, the automatically determined values are available in the parameter settings of the respective parameter set. 'Automatic parameterization' is deactivated, the stored values are no longer modified. The learned parameters in the device are only overwritten if the device is parameterized again.

Automatic parameterization - Modes

Select the mode depending on the selected application, depending on whether current limiting is recommended or not. The mode can be changed manually at any time.

Off (factory setting)	The function is deactivated.
ON - with preset starting time	The motor should have reached the rated operating speed after a specified starting time.
ON - with preset starting time and current limiting	The motor should reach the rated operating speed after a specified starting time if the current value is limited.

Rated operational current I_e

The rated operational current Ie is the current that can be continuously conducted by the feeder(switching devices and motor). Normally this is the rated current Ie of the motor. The setting range depends on the rating class of the Soft Starter.

Preset starting time

The time after which the motor should have reached its rated operating speed. If the parameter has the value "0", there is no 'automatic parameterization'. (Identical with the parameter of the Starting time monitoring (Page 31)) For the preset starting time the ramp-up time is adopted as the start value. Change the preset values as required.

- Factory setting: 10 s
- Setting range: 0 ... 360 s
- Increment: 0.1 s

Current limiting value - maximum

This parameter only takes effect in connection with the parameter: ON - with preset starting time and current limiting.

Depending on the selected application, the corresponding preset values are used for this parameter. Change the preset values as required.

- Factory setting: 400%
- Setting range: 125 ... 800%
- Increment: 1%

4.4 Motor Parameter

Rated operational current I_e

The rated operational current I_e is the current that can be continuously conducted by the feeder (switching devices and motor). Normally this is the rated current I_e of the motor. The setting range depends on the rating class of the Soft Starter.

Note

Motor overload protection

If motor overload protection is to be ensured by the Soft Starter, you must set the rated operational current I_e. The motor overload protection can be switched off. In this case, motor overload protection must be ensured by means of a temperature sensor in the motor (thermistor motor protection with temperature sensor).

Service factor

The service factor determines the maximum permissible overload factor of the motor in the ramped-up status. At values above 1.05 the motor overload protection trips later.

If there is a service factor specified by the manufacturer, please select it.

If no service factor is specified, select the service factor 1.0.

Setting range	Factory setting	Increment
1.0 ... 1.15	1.0	0.01

Rated operating speed

The rated speed of the motor is determined by means of the line frequency (f) and the number of pole pairs (p) of the motor.

The rated operating speed is required for calculating the current rated torque.

Setting range	Factory setting	Increment
500 ... 3600 rpm	1500 rpm	1 rpm

Rated torque

The rated torque of the motor, which is part of the technical data of the motor and is usually stated on the nameplate, is to be entered here.

If the motor's rated torque is not indicated on the rating plate, it can be calculated:

Rated torque (Nm) = Power (kW) × (9550 / rated operating speed (rpm))

Setting range	Factory setting	Increment
0 ... 10000 Nm	0 Nm	1 Nm

Type of connection

Type of connection	Description
Automatic detection	The Soft Starter detects the type of connection (in-line circuit or inside-delta circuit) automatically if the load voltage is applied and the motor is connected to the device. Thus, no parameterization of the type of connection is necessary.
Standard	The connections of the Soft Starter are wired into the motor feeder between the motor starter protector and the motor.
Inside-delta	The inside-delta circuit makes it possible to increase the operable motor power of the individual devices by a factor of root 3. Operation in the inside-delta circuit is not possible for 690 V.

4.5 Start setting

4.5.1 Starting mode

Starting mode	Meaning
Direct	If the "Direct" starting mode is set, the motor voltage is increased immediately to approximately the level of the supply voltage once the start command has been issued. This is equivalent to the starting behavior with a contactor.
Voltage ramp	The motor terminal voltage is raised from a programmable starting voltage to the supply voltage over a definable starting time.
Torque control	Torque control means that the torque generated in the motor is linearly increased from a parameterizable starting torque up to a parameterizable end torque within an adjustable starting time. The advantage compared to the voltage ramp is an improved mechanical startup behavior of the machine. The Soft Starter controls the torque generated at the motor continuously and linearly according to the set parameters until the motor has completed its run-up.
Motor heating	The "motor heating" starting mode heats up the motor. No startup takes place. The motor heating remains switched on for as long as the control command "Motor CW" or "Motor CCW" is present.

Starting mode	Meaning
Voltage ramp + Current limiting	In conjunction with the "Voltage ramp" start type, the Soft Starter continuously measures the phase current using integrated current transformers. A current limiting value can be set on the Soft Starter while the motor is running up. Once this value has been reached, the motor voltage is controlled by the Soft Starter to prevent the current from exceeding the set value. Current limiting has priority over the "Voltage ramp" start type.
Torque control + Current limiting value	In conjunction with the "Torque control" start type, the Soft Starter continuously measures the phase current using integrated current transformers. A current limiting value can be set on the Soft Starter while the motor is running up. The set current limiting value is high enough to ensure that sufficient torque is created in the motor to bring the drive into rated operation.

4.5.2 Starting voltage

The starting voltage determines the switch-on voltage that the Soft Starter generates at the beginning of the voltage ramp. A lower starting voltage results in a lower locked-rotor torque and a lower starting current. Select a sufficiently high starting voltage to ensure that the motor starts immediately and smoothly when the start command is issued to the Soft Starter.

- Setting range: 20% to 100%
- Factory setting: 30%
- Increment: 5%

4.5.3 Starting torque

The starting torque determines the switch-on torque of the motor. A lower starting torque results in a lower switch-on torque and a lower starting current.

Select a sufficiently high starting torque to ensure that the motor starts immediately and smoothly when the start command is issued to the Soft Starter.

- Setting range: 10% to 100%
- Factory setting: 10%
- Increment: 5%.

4.5.4 Limiting torque

The limiting torque value specifies the maximum torque to be generated in the motor during run-up. This value also functions as an adjustable torque limit.

The parameter value should be set to approx. 150% to start the motor. It should be high enough to ensure that the motor does not falter during run-up. This ensures that enough acceleration

torque is generated throughout the motor run-up phase. The rated torque of the motor serves as the reference value.

- Setting range: 20% ... 200%
- Factory setting: 150%
- Increment: 5%

4.5.5 Current limiting value

Set the current limiting value, as a factor of the rated motor current, to the maximum current required during startup. Once the set current limiting value has been reached, the motor voltage is reduced or controlled by the Soft Starter to prevent the current from exceeding the set current limiting value.

Select a minimum current limiting value that is high enough to ensure that the torque generated in the motor is sufficient to enable the drive to operate under nominal conditions. Three to four times the value of the motor's rated operational current (I_e) can be assumed as typical here.

- Factory setting: 400%
- Setting range: 125 ... 800%
- Increment: 1%

4.5.6 Ramp-up time

The ramp-up time determines the time taken to increase the motor voltage from the parameterized starting voltage to the line voltage. This has an influence on the motor's acceleration torque which drives the load during the ramp-up operation. A longer ramp-up time results in a shorter acceleration torque across the motor ramp-up time. The motor therefore runs up more slowly and smoothly.

Set the length of the ramp-up time such that the motor can reach its rated speed by the time the end of the ramp is reached. The actual motor starting time is load-dependent and can differ from the parameterized ramp-up time. If you choose a time that is too short, the ramp-up time ends before the motor has accelerated to speed. If the time selected is too short, a very high starting current that equals the direct starting current at the same speed will occur. In this case, the Soft Starter can switch itself off via the internal overload protection function and go into fault mode.

If parameter value "0" is set, the motor is switched on with a ramp-up time of approx. 100 ms.

- Setting range: 0 ... 360 s
- Factory setting: 10 s
- Increment: 0.1 s

4.5.7 Maximum starting time

This time determines the period after which the drive must have completed its run-up. If the drive is not operating under nominal conditions after the specified interval has expired, the current limiting is interrupted and the motor is switched to 100%.

Maximum starting time ≥ ramp-up time

- Setting range: 0 ... 1000 s
- Factory setting: 0 s
- Increment: 0.1 s

4.5.8 Breakaway time

The breakaway time determines the period during which the breakaway voltage is to be present. On expiry of the breakaway time the Soft Starter continues its ramp-up process with the selected start type, e.g. voltage ramp or torque control.
Select a breakaway time that is at least long enough to ensure that, after the set time has elapsed, the motor does not stop again but continues to accelerate in the selected start type immediately. The parameter value "0" deactivates the breakaway pulse function.

- Setting range: 0 ... 2 s
- Factory setting: 0 s
- Increment: 0.01 s

4.5.9 Breakaway voltage

The breakaway voltage is used to set the breakaway torque to be generated. The breakaway torque can be up to 100% of the switch-on torque generated during direct-on-line starting.

Select a breakaway voltage that is high enough to ensure that the motor starts rotating as soon as the start command is issued to the Soft Starter.

- Factory setting: 40 %
- Setting range: 40 ... 100 %
- Increment: 5%

4.5.10 Motor heating power

The motor heating power determines the power with which the motor windings are heated. To activate the motor heating power, select "Motor temperature rise" in the starting mode.
Set the parameter so that the motor is not damaged. 100% motor heating power corresponds to a comparable motor current of about 30% of the rated motor current.

- Setting range: 1 to 100%
- Factory setting: 20%
- Increment: 1%.

4.6 Stopping mode settings

4.6.1 Sensorless motor standstill detection

The 3RW55 Soft Starter supports the sensorless standstill detection function that senses the motor shaft is at a standstill without using external motor standstill detection.

Parameters

Parameters	Meaning
Sensorless motor standstill detection	• Enable (factory setting) • Disable

4.6.2 Stopping mode

Stopping mode	Meaning
Coasting down	In the "Coasting down" mode, the power supplied to the motor via the Soft Starter is interrupted when the ON command is removed at the Soft Starter. The motor coasts down to a standstill being driven only by the mass inertia (centrifugal mass) of the rotor and load. A larger centrifugal mass means a longer coasting down time.
Voltage ramp	With the "voltage ramp" stopping function, the motor voltage is decreased along a linear, negative voltage ramp until the motor stops.
Torque control	The time during which the motor coasts down is extended when a torque ramp is used. The function is used if the load is to be prevented from stopping abruptly. This is typical for applications with a low mass inertia or a high counter-torque (e.g. conveyor belts)
Pump stopping mode	This function is set if there is a need to prevent the load from being stopped abruptly. This is typical in applications with a low mass inertia or a high counter-torque.

Stopping mode	Meaning
DC braking	With DC braking, the time during which the motor coasts down is shortened. The Soft Starter impresses a direct current in two phases of the motor stator. This current generates a permanent magnetic field in the stator. Since the rotor is still rotating due to its mass inertia, currents are induced in the short-circuited rotor winding that generate a DC braking torque. An external brake contactor is necessary for this stopping method. **Note**: Select "DC Brake Contactor" in any output action, in order to display this option in the dropdown menu.
Dynamic DC braking	The braking process takes place in two phases. In the first phase, the motor is braked by controlled DC braking pulses. In the second phase, the motor is brought to a standstill with a constant DC braking. Use the DC braking function to achieve a uniformly long braking time. In order to guarantee a secure premature cancelation of the braking process, an external motor standstill detection can be used to detect the motor standstill before the stopping time has elapsed. To do this, activate the input action "Motor standstill" or the associated bit in the process image output "Motor standstill".
Reverse DC braking	In the Reversing DC braking stopping mode, the motor is strongly braked with an external reversing contactor assembly. Braking is performed in 2 braking phases. In the first braking phase, the motor is disconnected from the line power supply.In the second braking phase, the switching status of the reversing contactor is retained. In this state, a DC braking current is applied to the motor. The motor is prevented from restarting in the opposite direction.

Alternative stopping

With the aid of a control command, you can switch from the parameterized stopping mode to a parameterizable alternative stopping mode. Every stopping mode can be combined with every alternative stopping mode. The switchover to alternative stopping must take place before the start of the planned stopping. You cannot switch to alternative stopping while stopping.

Note

The alternative stopping mode is applicable for active parameter set.

4.6.3 Stopping time

The length of the stopping time defines the time within which the motor voltage is reduced from line voltage to 0 V.

It may take longer for the motor to actually coast down to a standstill. The parameter value "0" causes the motor to be shut down immediately without a down ramp.

- Setting range: 0 ... 360 s
- Factory setting: 10 s
- Increment: 0.1 s

4.6.4 Stopping torque

The amount of stopping torque determines the tripping torque of the motor, e.g. when the pump stops. If the selected stopping torque is too high, the time during which the pump stops may end too early. This can result in high mechanical loads. The motor torque is "controlled" until the stopping torque is reached and then switched off.

- Setting range: 10% to 100%
- Factory setting: 10%
- Increment: 5%.

4.6.5 DC braking torque

The motor's braking force can be set with the amount of the DC braking torque. The dynamic braking torque must be increased if the motor is to accelerate again during DC braking.

- Setting range: 20 ... 100%
- Factory setting: 50%
- Increment: 5%

4.6.6 DC braking delay

The DC braking delay time starts when the motor OFF command (motor CW and motor CCW = 0) is detected. While the DC braking delay time is elapsing, the motor is coasting freely. After the DC braking delay time has elapsed, DC braking is started.

This parameter is used for "Stopping mode" and ignored for "Alternative stopping mode".

- Factory setting: 0 s
- Setting range: 0 ... 360 s
- Increment: 0.1 s

4.6.7 Dynamic braking torque

The dynamic braking torque determines the braking effect at the start of the braking process to reduce the speed of the motor. Following this, the braking process is continued automatically with the DC braking function.

- Factory setting: 50%
- Setting range: 20 ... 100%
- Increment: 5%

4.7 Creep speed control function

Description

The creep speed function enables the motor to be controlled at low speed in both directions during operation. The result of this function, however, is that only a reduced torque can be generated in the motor. Due to possible temperature rise of the motor, this function is not suitable for continuous operation and the use of a measuring sensor (thermoclick or PTC thermistors type A) is advisable. Furthermore, the creep speed causes mechanical vibrations, which can reduce the lifetime of the bearings. The creep speed function is active for as long as the "Creep speed" control command is set.

Creep speed factor - right/left

The speed is reduced by the creep speed factor, in other words the rotational speed in creep mode is the quotient derived from rated speed and creep speed factor.

The creep speed function operates ideally at a creep speed factor of 7 ... 9.

- Factory setting: 7
- Setting range: 3...21
- Increment: 1

Creep speed torque: right/left

The torque generated in the motor is influenced with the creep speed function. The maximum torque that can be generated depends on the selected creep speed. 100% creep speed torque corresponds to approximately 30% of the rated motor torque.

- Factory setting: 50%
- Setting range: 20 ... 100%
- Increment: 5%

4.8 Motor protection

The 3RW55 Soft Starter has two functions for protecting the motor:

- Electronic motor overload protection
- Thermistor motor protection with temperature sensor

Use combination of both functions to implement full motor protection.

4.8.1 Electronic motor overload protection

Operating principle

The winding temperature of the motor is calculated using the measured motor currents and the device parameters "Rated operational current" and "Tripping class". This indicates whether the motor is overloaded or is functioning in the normal operating range.

Tripping class

The tripping class (CLASS) specifies the maximum time within which a protective device must trip from a cold state at 7.2 x the rated operational current (motor protection to IEC 60947). The tripping class defines the start time at a particular current before the trip occurs.

The different tripping characteristics can be set according to the startup class. The higher the class, the longer the permitted starting time.

Settings: CLASS 10A, CLASS 10E (factory setting), CLASS 20E, CLASS 30E, CLASS OFF.

Response to overload thermal motor model

The parameters specifies how the Soft Starter behaves in the event of an overload. One of the following options may be selected:

- Turn Off without restart (factory setting)
  On the occurrence of the motor overload, an error message is generated and the motor is tripped. When the parameterized recovery time (cooling time) has elapsed, the error message and the trip can be acknowledged with the "Reset" function.
- Turn Off with restart
  On the occurrence of the motor overload, an error message is generated and the motor is tripped. When the parameterized recovery time (cooling time) has elapsed, the error message and the motor trip are automatically canceled.

Note

Restart means that, if an ON command is present, the Soft Starter switches on automatically when the cause of the fault has been rectified (auto reset).

Motor heating warning limit

Parameter to preset a motor heating value in percent as a warning limit.

The parameter value "0" deactivates the function.

- Factory setting: 0%
- Setting range: 0 ... 99%
- Increment: 1%

Remaining time for tripping warning limit

The 3RW55 Soft Starter warns about imminent motor overload tripping within the set time if the present operating conditions are retained. The parameter value "0" deactivates the function.

- Factory setting: 0 s
- Setting range: 0 ... 500 s
- Increment: 1 s

Recovery time

Minimum cooling down time for the motor after an overload trip. Reset signals present during the recovery time have no effect.

- Factory setting: 300 s
- Setting range: 60 ... 1800 s
- Increment: 30 s

Non-volatile tripping status

If the non-volatile tripping status is activated, and the control supply voltage fails during a trip, the current tripping state of the electronic motor overload protection and the current recovery time are stored in the Soft Starter.

- Yes (factory setting)
- No

4.8.2 Temperature sensor

Description

Temperature sensors are located directly in the stator winding of the motor. They are used to monitor the temperature of the motor windings. This indicates whether the motor is functioning normally or overloaded.

The temperature sensor of a motor can be connected to the Soft Starter and evaluated. If a specific motor-dependent temperature is exceeded, the Soft Starter recognizes this and reacts accordingly. You can set the reaction. The sensor cables can be monitored for open-circuit and short-circuit.

Temperature sensor

Parameter can be deactivated if the motor is fitted with a temperature sensor. The temperature sensor can be set to "Deactivated", "Thermoclick" and "PTC Type A".
Two types of temperature sensor are supported:

- Deactivated (factory setting): The motor protection function is deactivated.
- Thermoclick: This is a switch that opens at a certain winding temperature.
- PTC Type A: This type of sensor describes a temperature-dependent resistor.

Response to overload temperature sensor

If the temperature sensor detects an overload on the motor, this is signaled to the Soft Starter. You can set the response to this:

- **Turn off without restart** (factory setting)
  If the temperature is exceeded, an error message is generated and the motor is tripped. After the motor has cooled down, the error message and the trip can be acknowledged with the "Reset" function.
- **Turn off with restart**
  If the temperature is exceeded, an error message is generated and the motor is tripped. After the motor has cooled down, the error message and the motor trip are automatically canceled.
- **Warning**
  If a specific limit value is exceeded, only a warning message is issued. If the value falls below this limit again, the warning message is automatically canceled.

4.9 Condition monitoring

Condition monitoring monitors the plant and can detect imminent wear at an early stage. This enables to avoid unplanned plant downtimes and loss of production. To do this, specify the response to limit violations of the following functions:

- Current monitoring
- Active power monitoring
- Switching frequency monitoring
- Starting time monitoring
- Pump cleaning function

4.9.1 Current monitoring

Description

The current flow is influenced by the loading status of the motor.

- If the motor current is increased, this indicates bearing damage, for example.
- If a very low motor current is flowing, this can indicate a broken conveyor belt or a motor in no-load operation.
- If a very high motor current is flowing, this can indicate a blocked system or an overloaded motor.

The current monitoring is deactivated automatically during starting and stopping. The rated operational current I_e acts as a reference value for the current limit monitoring function.

Upper / Lower limit - error

The currently measured current value is compared with the respective limit value. If this limit is undershot (with respect to lower limit value) or overshot (with respect to upper limit value) then an error is generated. In dependency to the parameter an internal trip command can be generated. The parameter value "0" deactivates the monitoring of the limit value.

Upper limit error	Lower limit error
• Factory setting: 0% • Setting range: 50 ... 400 % • Increment: 1%	• Factory setting: 0% • Setting range: 19 ... 100 % • Increment: 1%

Upper / Lower limit - maintenance demanded

The currently measured current value is compared with the respective limit value. If this limit is undershot (with respect to lower limit value) or overshot (with respect to upper limit value) then a warning is generated. In dependency to the parameter an internal trip command can be generated. The parameter value "0" deactivates the monitoring of the limit value.

Upper limit - maintenance demanded	Lower limit - maintenance demanded
• Factory setting: 0% • Setting range: 50 ... 400 % • Increment: 1%	• Factory setting: 0% • Setting range: 19 ... 100 % • Increment: 1%

Response to Upper / Lower limit error

- **Do not turn off** (factory setting): The motor is not turned off.
- **Turn off** : The motor is turned off.

4.9.2 Active power monitoring

Description

The active power P is influenced by the loading status of the motor. Depending on the limit that is exceeded, a warning or an error is signaled.

- Load monitoring for over-dimensioned motors
- If pumps are running in no-load operation, the pump wheels can be damaged.
- To avoid load peaks
- To derive production quality data from energy data

The active power monitoring is deactivated during starting and stopping.

Reference value

The reference value (rated motor power) is compared with the amount of active power actually available. The rated motor power can be obtained from the motor data. The parameter value "0" deactivates the active power monitoring.

- Setting range: 0 W ... 2000 kW
- Factory setting: 0 W
- In steps of: 1 W

Upper / Lower limit - error

If the active power overshoots or undershoots the respective set reference value, an error is generated. If the parameter value is "0", the limit as a percentage of the reference value is not monitored.

Upper limit error	Lower limit error
• Factory setting: 0% • Setting range: 0 ... 400 % • Increment: 1%	• Factory setting: 0% • Setting range: 0 ... 100 % • Increment: 1%

Upper / Lower limit - maintenance demanded

If the active power overshoots or undershoots the respective set reference value, a warning is generated. If the parameter value is "0", the limit as a percentage of the reference value is not monitored.

Upper limit - maintenance demanded	Lower limit - maintenance demanded
• Factory setting: 0% • Setting range: 0 ... 400 % • Increment: 1%	• Factory setting: 0% • Setting range: 0 ... 100 % • Increment: 1%

Response to Upper / lower limit maintenance demanded error

- **Do not turn off** (factory setting): The motor is not turned off.
- **Turn off** : The motor is turned off.

4.9.3 Switching frequency monitoring

Description

If motors are started frequently, this can cause the motor to overheat. The Soft Starter monitors the switching frequency in order to adhere to the wait and cooling down times.

Switching frequency monitoring

- **Deactivated** (factory setting): The switching frequency monitoring is deactivated.
- **Mode 1 (ON-ON)**
  The switching frequency monitoring always relates to the start time of the preceding Motor ON command and the start time of the new Motor ON command. The switching frequency monitoring time t_1 or t_2 starts as soon as an effective switch-on command is present. If the time between 2 motor ON commands is longer than t2, the counter for the number of starts begins at "1" again.
- **Mode 2 (OFF-ON)**
  The switching frequency monitoring always relates to the end time of the preceding Motor ON command (Motor OFF) and the starting time of the new Motor ON command. The switching frequency monitoring time t_1 or t_2 starts as soon as no effective switch-on command is present.

Maximum number of starts

This parameter is only relevant in combination with the switching frequency - monitoring time t_2. If the parameter for the switching frequency-monitoring time t_2 has the value "0" (= deactivated), then this parameter is irrelevant and its value has no meaning.

If the parameter for the switching frequency-monitoring time t_2 has a value not equal to "0" (= activated), then this parameter defines the maximum number of starts, until which the switching frequency-monitoring time t_2 does not have to be observed. At the latest upon reaching the maximum number of starts, the switching frequency monitoring time t_2 must be observed once. If the switching frequency monitoring time t_2 is observed before reaching the maximum number of starts, then the counter for the number of starts begins again at "1".

- Setting range: 2 ... 255
- Factory setting: 2
- Increment: 1

Switching frequency-monitoring time t_1 / t_2

The time t_1 must be shorter than the time t_2. The parameter value "0" deactivates the switching frequency-monitoring time t_1 / t_2.

- Setting range: 0 ... 65535 s
- Factory setting: 0 s
- Increment: 1 s

Response to an ON command during active monitoring time

- **Turn off with restart**
  The trip is automatically acknowledged if no monitoring time is still active.
  If an ON command is still pending, the motor is switched on.
- **Turn off without restart**
  The trip must be acknowledged with the "Reset" function.
- **Warning without lock-out**
  If an ON command for the motor is issued during the switching frequency monitoring time t_1 or t_2, the motor is switched on quite normally without a lock-out.
- **Warning with lock-out** (factory setting)
  If an ON command for the motor is issued during the switching frequency-monitoring time t_1 or t_2, the motor is not switched on (locked-out). After expiry of t_1 or t_2, the motor is switched on if an ON command is still pending.
  The trip can be bypassed using the "emergency start". If the emergency start function is activated in advance, the motor is switched on despite the error message.

4.9.4 Starting time monitoring

Description

An over/undershoot of the preset starting time can indicate an overload or underload of the system.

Preset starting time

The preset starting time is compared with the value of the present actual starting time. If the parameter has the value "0", there is no limit monitoring.

- Setting range: 0 ... 360 s
- Factory setting: 10 s
- Increment: 0.1 s

Upper limit - maintenance demanded

During the startup phase of the motor, the present actual starting time is checked against this limit. If it is exceeded, a warning is generated and the motor is not switched off.

If this limit has not been reached or exceeded at the latest at the end of the motor starting phase, then any pending warning is reset. If the parameter has the value "0", there is no limit monitoring.

- Setting range: 0 ... 400%
- Factory setting: 0%
- Increment: 1%

Lower limit - maintenance demanded

During the starting phase of the motor, the current actual starting time is checked against this limit and, if it is exceeded, any pending warning is reset.

If this limit has not been exceeded at the latest by the end of the motor starting phase, then a warning is generated and the motor is not switched off. If the parameter has the value "0", there is no limit monitoring.

- Setting range: 0 ... 100%
- Factory setting: 0%
- Increment: 1%

4.9.5 Pump cleaning function

Description

The 3RW55 Soft Starter supports a pump cleaning function that can prevent an imminent blockage or, within certain limits, can also clear an existing blockage.

Precondition:

Pump cleaning is only possible if the motor or pump is switched on, i.e. one of the control commands Motor CW or Motor CCW is present and there is no internal trip command (e.g. shutdown due to motor overload trip).

The cancelation of the control command or the occurrence of an internal trip command results in the pump cleaning process being aborted.

Note

For initiating consecutive pump cleaning processes without stopping the motor, user has to uncheck and check the checkbox of 'Pump cleaning start' Process Image Outputs in Control Station Online menu, after a pump cleaning process is complete.

Completion of pump cleaning process can be verified from the status of the 'Pump cleaning active' parameter in Soft Starter Diagnosis Online menu.

Pump cleaning - mode

- **Deactivated** (factory setting): The pump cleaning function is deactivated.
- **Manual:** The pump cleaning function is started with the aid of a control command by means of an input action at the digital input or in the process image outputs.

Pump cleaning - time

During the cleaning time, the pump runs at reduced speed and the maximum possible torque.

- Setting range: 1 ... 30 s
- Factory setting: 20 s
- Increment: 1 s

Pump cleaning - cycles

During a cycle, the pump rotation changes direction several times.

- Setting range: 1 ... 10
- Factory setting: 3
- Increment: 1

Pump cleaning - start/stop parameters

Parameters for starting and stopping the pump for different cleaning processes. For example, different settings for starting and stopping in parameter set 2 for the normal starting and stopping procedure.

- **Parameter set 1**
  The pump cleaning function is carried out with the starting and stopping parameters of parameter set 1.
- **Parameter set 2**
  The pump cleaning function is carried out with the starting and stopping parameters of parameter set 2.
- **Parameter set 3**
  The pump cleaning function is carried out with the starting and stopping parameters of parameter set 3.
- **Operating parameters (factory setting)**
  The pump cleaning function is carried out with the starting and stopping parameters of the currently selected parameter set.

4.10 Parameters

4.10.1 Asymmetry

Description

In certain phases of the motor, an asymmetrical current consumption can cause a reduction in power or damage to the motor. Possible causes for this are a different line or phase voltage or an already damaged motor winding. The asymmetry monitoring monitors the 3 phase currents and issues a warning or switches the motor off at parameterizable limits.

Asymmetry limit warning

If the asymmetry exceeds this limit, a warning is generated and the motor is not switched off. The parameter value "0" (factory setting) deactivates the limit.

- Factory setting: 0%
- Limit value: 10 ... 60%
- In steps of: 5%

Asymmetry limit error

If the asymmetry exceeds this limit, an error is generated and the motor is switched off. The parameter value "0" deactivates the limit.

- Factory setting: 30%
- Limit value: 10 ... 60%
- In steps of: 5%

4.10.2 Ground fault

Description

The "ground fault" function of the Soft Starter records and monitors all three phase currents. By evaluating the summation current of the three current values, the motor feeder can be monitored for a possible residual current or ground fault.

Ground fault limit warning

If the ground fault current exceeds this limit, a warning is generated and the motor is not switched off. The parameter value "0" deactivates the monitoring of the limit value.

- Factory setting: 0%
- Limit value: 10 ... 95%
- In steps of: 5%

Ground fault limit error

If the ground fault current exceeds this limit, an error is generated and the motor is switched off. The parameter value "0" deactivates the monitoring of the limit value.

- Factory setting: 20%
- Limit value: 10 ... 95%
- In steps of: 5%

4.10.3 Emergency start

Description

With the emergency start function the system can continue to be operated in the case of system faults. The emergency start is activated only if it has been enabled and a trip command exists due to a system fault. The motor is switched on by means of a normal control command.

- **Disable** The emergency start is disabled and cannot be enabled.
- **Manual disable / enable** (factory setting)
  The emergency start can be disabled or enabled by means of command, PIQ bit or input action.
  In the event of device faults, intrinsic device protective shutdown, process mapping errors or stall protection, no emergency start is possible, even if it has been enabled.

In the case of some faults, the motor can be started via the emergency start function despite a pending group error:

- Phase asymmetry limit exceeded
- Electronic motor overload protection
- Temperature sensor wire break
- Temperature sensor short-circuit
- Temperature sensor overload
- Maximum starting time exceeded
- I_e upper/lower limit value violation
- Ground fault detected
- Impermissible I_e Class setting

4.10.4 Inputs

Description

Using the "Inputs" device function, the Soft Starter can carry out different actions that you can parameterize. The signals at the digital inputs are evaluated for this purpose. You can connect the inputs directly to the sensors (PNP) in 2- and 3-wire circuits.
The input actions of the individual digital inputs and their impact on the Soft Starter functions are independent of one another (= OR function).

The Soft Starter has 4 digital inputs DI1 - DI4, to which you can assign one input function each.

Input n action

Different actions can be triggered when an input signal is present. You can parameterize the following actions:

Input n* action	Description
No action	Input has no function.
Manual operation local	Soft Starter can be controlled locally via the local interface, the 3RW5 HMI High Feature or via the digital inputs.
Emergency start	In the case of some faults, the motor can be started via the emergency start function despite a pending group fault. An emergency start action is assigned to one input, and, for example, "Motor CW > Parameter set 1" to another. The emergency start is active as long as the input is activated. It can also be activated during operation.
Creep speed	The motor starts with the values set in the "Creep speed" parameters menu item when the "Creep speed" input and the "Motor CW/CCW parameter set 1/2/3" input are activated at the same time.
Quick-stop	If the input is activated, normal tripping with the currently set stopping function is executed. No group error appears and the quick stop is executed independently of the control priority.
Reset	The fault can be acknowledged after it has been remedied. The "Reset" input is edge-controlled. The level change from 0 to 24 V DC is evaluated at the input. All other input functions are evaluated at the already pending 24 V DC level.
Motor CW with parameter set 1/2/3	The motor starts with rotation in line phase direction and stops with the values stored in the respective parameter set.
Motor CCW with parameter set 1/2/3	This function is active only when the "Creep speed" parameter or reversing mode with external reversing contactors is active at the same time. The motor starts with the values stored in the "Creep speed parameters" menu item (with rotation opposite to the line phase direction).
Motor standstill	The 3RW55 Soft Starter evaluates the signal from an external motor standstill detection at the input.
Use alternative stopping mode	For more information, refer Alternative stopping.
Pump cleaning	For more information, refer Pump cleaning function.

* n - Input number

Input n = Input 1 to Input 4

4.10.5 Digital outputs

Description

Using the output actions, an output action can be assigned to each digital output. Output 3 is permanently assigned to the output action "Group error". Each output can be independently assigned an output action. The Soft Starter has four digital outputs with which external actuators, such as a braking contactor or a signal lamp are controlled.

ON delay time / OFF delay time

The switching of the output is delayed by this time.

- Factory setting: 0 s
- Setting range: 0 ... 6500 s
- Increment: 0.1 s

Output n* action	Description
No action	_
Activation by means of external control sources	
Control source PIQ-DQ 1.0 output 1	Output is activated by control command "Output 1".
Control source PIQ-DQ 1.1 output 2	Output is activated by control command "Output 2".
Control source PIQ-DQ 2.0 output 3	Output is activated by control command "Output 3".
Control source input 1 / 2 / 3 / 4	Output is activated by "Digital input 1 / 2 / 3 / 4".
Activation by means of Soft Starter	
Startup	The output contact closes once the start command has been issued and remains closed during the startup procedure. The contact opens after the Soft Starter has detected that the motor has started up.
Operation / Bypass	The output contact closes after the Soft Starter has detected that the motor has started up. The contact opens when the start command is removed. The output switches at the same time as the integrated bypass contacts (for bypassing the thyristor).
Operation / Rundown	The output contact opens after the Soft Starter has detected that the stop command has been issued.
External bypass	Contact Technical Support for operating with an external bypass.
Run-down	The output contact closes once the start command has been removed and remains closed while the motor runs down. The contact opens when the selected stopping time expires.
On time motor (RUN)	The output contact closes once the start command has been issued and remains closed during the operating phase (startup, bypass, run-down).
Control command motor ON	The output is activated for as long as the control command "Motor CW" or "Motor CCW" is present.
DC brake contactor	An additional brake contactor can be controlled via the output.
Device ON	The output is active for as long as the electronic supply is present at the Soft Starter.
Activation by signals from the Soft Starter	

Output n* action	Description
Group warning	Group signals
Group error	
Bus error	
Device error	
Reversing switching element - right / left	The internal control signal for the reversing function is switched to the corresponding digital output of the starter.
Generator operation	Status messages
Ready to start for motor ON	
Pump cleaning active	
Alternative stopping mode active	
CM - maintenance demanded	
CM - error	

* n - Output number

Output n = Output 1, Output 2 and Output 4

4.10.6 Analog output

Description

The set measured value is displayed via the analog output using an external display device.

Parameters

Parameters	Description
Output signal type	Via the "Output signal type" parameter you can define with what type of signal the analog value will be output. • • Deactivated (factory setting) • 4 ... 20 mA • 0 ... 10 V
Measured value	Via the "Measured value" parameter, select the measured value to be transferred from the analog output. • Deactivated • Motor temperature rise • Phase current I L1 (%) • Phase current I L2 (%) • Phase current I L3 (%) • Line-to-line voltage U L1-L2 (rms) • Line-to-line voltage U L2-L3 (rms) • Line-to-line voltage U L3-L1 (rms) • Phase current I L1 (rms) • Phase current I L2 (rms) • Phase current I L3 (rms) • Switching element heating • Active power • Power factor L1..3 • Phase current average (%) • Phase current average (rms) • Active energy import (total)
Range start value	which value of the analog value to be output corresponds to the lower output signal value and which to the upper output signal value. The corresponding value depends on the coding of the measured value to be transferred (Unsigned 32). • Setting of the analog range, e.g. 4 mA = 100 • Setting of the analog range, e.g. 20 mA = 400
Range end value	

4.10.7 Cyclic send data

For "measured value 1", "measured value 2" and "measured value 3" specify one measured value from the following list in each case:

- Phase current I L1 (rms) (factory setting measured value 1)
- Phase current I L2 (rms) (factory setting measured value 2)
- Phase current I L3 (rms) (factory setting measured value 3)

- Power factor L1..3
- Phase current average (rms)
- Active energy import (total)
- Active power PL1..3

4.10.8 Ex operation

Operating principle

The function "Ex application" supports you with parameterization of the Soft Starter if you are operating a motor in a hazardous area. You can choose which of the following motor protection functions will be used to protect the motor:

- Full motor protection
- Electronic motor overload protection
- Thermistor motor protection with temperature sensor

Parameters

Parameters	Description
Ex application	No (factory setting) • All ATEX-specific function restrictions are not active. Ex parameter is not displayed.
	Yes, with full motor protection • Both motor protection functions of the Soft Starter (motor overload protection and thermistor motor protection with temperature sensor) are implemented in a safety-related manner.
	Yes, with motor overload protection • Only the motor protection function "Motor overload protection" is implemented in a safety-related manner. • The motor protection function "Thermistor motor protection with temperature measurement" is not implemented in a safety-related manner.
	Yes, with thermistor motor protection with temperature measurement • Only the motor protection function "Thermistor motor protection with temperature measurement" is implemented in a safety-related manner. • The motor protection function "Motor overload protection" is not implemented in a safety-related manner.

Parameters	Description
Ex relevant parameters[1]	**Rated operational current I_e** Set the 3RW55 Soft Starter to the rated operational current of the motor as stated on the type plate or design test certificate of the motor. The 3RW5 HMI High Feature shows the value to be enabled in parentheses.
	Tripping class Make sure that the motor and the cables are dimensioned for the selected tripping class. The rated data of the Soft Starters refers to normal starting (CLASS 10). For heavy starting (> CLASS 10), you may have to over dimension the Soft Starter because you can only set an operational current of the motor that is lower than the operational current of the Soft Starter. The 3RW5 HMI High Feature shows the value to be enabled in parentheses.
	Recovery time Set the recovery time. The 3RW5 HMI High Feature shows the value to be enabled in parentheses.
	Motor connection type Set the type of motor connection. The 3RW5 HMI High Feature shows the type of motor connection to be enabled in parentheses.
	Ex application

[1] This parameter is displayed and can be set depending on the chosen Ex application.

4.10.9 Additional parameters

Operating principle

The Soft Starter has additional parameters.

Requirements

- Access protection to the 3RW5 HMI High Feature is not active or has been reset.
- You are in menu "Additional Parameters" ("Soft Starter > Additional parameters").

Parameters

Parameters	Description
Operation with CPU / Master	
Response to CPU / Master Stop	The 3RW55 Soft Starter sets the control commands internally in the process image output according to the user-parameterized setting.
	• **Switch Substitute Value (factory setting)** The process image output is automatically changed by the Soft Starter to the values specified in the following "Switch Substitute Value" parameter.
	• **Keep Last Value** The Soft Starter does not modify the process image output. The current control commands are retained.
Substitute value*	This parameter is only visible if the "Switch Substitute Value" is selected in the parameter "Response to CPU / Master Stop". In the event of a bus failure, the 3RW55 Soft Starter can be controlled by a corresponding substitute process image output (depending on the 3RW55 Soft Starter). • Motor CW • Motor CCW • Reset • Emergency start • Creep speed • Output 1 • Output 2 • Parameter set 1 • Parameter set 2 • Parameter set 3 • Disable Quick-stop • Output 3 • Use alternative stopping mode • Motor standstill
Parameters of CPU/master disabled (depending on the 3RW5 communication module)	• **Deactivate (factory setting)** The parameter disable is deactivated.
	• **Activate** If a parameter disable is activated, all parameter values received for control via cyclic and acyclic communication channels are positively acknowledged and rejected by the Soft Starter. This prevents the parameters stored in the Soft Starter from being overwritten.
	• **Activate only for start-up parameter** The parameter disable affects all startup parameters that come from a higher-level controller.

Parameters	Description
Response to overload switching element	• **Turn off without restart (factory setting)** If an upper fault limit is violated, an error message and an internal trip command are generated. If a lower fault limit is violated, the error message and the internal trip command can be acknowledged with the "Reset" function after a cooling time of 60 seconds.
	• **Turn off with restart** If an upper fault limit is violated, an error message and an internal trip command are generated. If a lower fault limit is violated, the error message and internal trip command are automatically acknowledged or canceled after a cooling time of 60 seconds.
Bypass operation mode	• Internal bypass (factory setting)
	• External bypass Contact Technical Support for operating with an external bypass.
	• No bypass Use the "No bypass" setting for applications with high switching frequency. Please note that the "No bypass" setting is not suitable for applications in continuous duty. Contact Technical Support for operating without a bypass.
Permissible main power rotation	• **Any** direction (factory setting) The main power rotation may be "clockwise" or "counter-clockwise".
	• **Clockwise Direction** The main power rotation must be "CW".
	• **Counter-Clockwise Direction** The main power rotation must be "CCW".
Response to faulty main power	In certain applications, operation of the motor is permitted only in a specified, preset direction of rotation, to avoid damage. The 3RW55 Soft Starter detects the main power rotation via the measurement process. The required main power rotation is determined when the application is first commissioned. Via the "Response to faulty main power" parameter, you can determine the response of the 3RW55 Soft Starter to main power rotation deviations.
	• **Group error only at ON command (factory setting)** If the 3RW55 Soft Starter detects a wrong main power rotation, a fault is generated.
	• **Warning** If the 3RW55 Soft Starter detects a wrong main power direction, a warning is generated.

4.10.10 Setting the date and time

Requirements

- Select the menu "Soft Starter > Date and time".

Parameters

Parameters	Description
Display time	The time is shown in the display. • Disable (factory setting) • Enable
Time format	You can set the time format here, the time is stored in the Soft Starter. When replacing the 3RW5 HMI High Feature the date is retained in the Soft Starter. • Time format 12h (factory setting) • Time format 24h
Format of date	Date format can be set here. The date is stored in the Soft Starter. It is retained in the Soft Starter when the 3RW5 HMI high Feature is replaced. • MMDDYY (factory settings) • DDMMYY • YYMMDD

Result

Date and time are stored in the Soft Starter. When replacing the 3RW5 HMI High Feature, the date and time are retained in the Soft Starter.

4.11 Communication module

4.11.1 PROFINET Interface

PROFINET parameters

PROFINET IO is an open Ethernet standard for automation. PROFINET IO has been developed for real-time-enabled and isochronous communication in distributed networks. Within PROFINET, each station requires a MAC address as well as a unique IP address and a device name. There are three PROFINET device types:

- IO controller, e.g. an S7 controller
- IO device, e.g. a Soft Starter with PROFINET IO interface
- IO supervisor, a developer tool for parameterization and diagnostics

MAC address

Each PROFINET device is assigned a globally unique MAC address by its manufacturer. The MAC address comprises 6 bytes. These bytes are structured as follows:

- First 3 bytes: Manufacturer's identification
- Last 3 bytes: Device ID (a consecutive number)

The MAC address can be found in the Soft Starter. The MAC address is directly lasered onto the communication module.

Typical MAC Address: 08-00-06-6B-80-C0

The device can be accessed via PROFINET using this address.

The MAC address is transferred in online mode from the device to Soft Starter ES in PDM

IP parameters

With the IP parameters, a unique address to a PROFINET IO station in Industrial Ethernet must be assigned. Each IP address must be assigned once only within an Industrial Ethernet network.

The IP parameters comprise the IP address and the subnet mask. If you integrate the device into PROFINET via an additional router, you must also enter the router address. Devices that are to communicate with each other within PROFINET must have the same subnet mask. The IP address, the subnet mask, and the router address each comprise 4 decimal numbers in the range from 0 to 255. The four decimal numbers are separated from one another by dots. The IP address with subnet mask is also designated as host or network station.

Example:

- IP address: 192.168.0.3
- Subnet mask: 255.255.255.0 (Classful Network - Type C)
- No router

Automatic setting of the IP parameters:

- The IO controller assigns the IP parameters to the IO device.
- The IP parameters are queried from a DHCP server and assigned to the IO device.

Manual setting of the IP parameters:

- Enter the IP address.If no additional router is used, then the IP address acts as a gateway.
- Enter the subnet mask.
- If an additional router is used as a gateway, select "Use router" and enter the IP address of the router.

Default IP parameters:

- IP Address - Default value: 192.168.0.1
- Subnet mask - Default value: 255.255.255.0
- Address (Gateway) - Default value: 192.168.0.1

Note

- An address change is active immediately following download to the device.
- Gateway field retains the last configuration as downloaded by the user.

Station

Assign a unique device name to each station in the PROFINET IO.

- Enter a valid device name according to the configuration.
- When assigning the name, observe the restrictions of the DNS naming convention. Some restrictions are listed below:
  - The name must not be longer than 253 ASCII characters.
  - The name must start with a letter.
  - The name must not contain any special characters other than "." and "-".
  - The name must not contain any umlauts.
  - A single character string within a device name must not exceed 63 characters in length (character strings are separated by dots).

NOTICE
Commissioning a Soft Starter 3RW55 PROFINET: A) SIMATIC PDM (Process Device Manager) The SIMATIC PDM Maintenance Station integrates field devices and components via its Electronic Device Description (EDD) or Field Device Integration (FDI). It works on separate hardware, regardless of the automation projects and the automation systems used. Please go to the link (https://support.industry.siemens.com/) and search for SIMATIC PDM for latest information. B) PRONETA The Soft Starter 3RW55 PROFINET Device IP adress and subnet mask can be set using PRONETA Basic. PRONETA basic is a free PC-based software tool which provides assistance with regard to the commissioning of PROFINET device. Please refer the link (https://support.industry.siemens.com/cs/document/67460624).

4.11.2 Group diagnostics

Parameters	Description
Group diagnostics	Group diagnostics settings are mentioned below:
	Group error • Group error - Enable (factory setting) • Group error - Disable
	Group warning • Group warning - Enable (factory setting) • Group warning - Disable

4.11.3 Web server

The Integrated Web server in the 3RW55 PROFINET High Feature communication module offers the possibility to retrieve information from the 3RW55 Soft Starters from a PC or programming device using a web client. The 3RW55 PROFINET High Feature communication module provides all information and data in the form of web pages (html pages). All other functions are possible without logon. If the user controls the 3RW55 Soft Starter via the web server, the Soft Starter is in the operating mode "Manual operation bus - Webserver controlled". For more information on web-server, please refer the 3RW55 Soft Starter Equipment Manual.

Following are the parameters required to configure Web server in the 3RW55 PROFINET High Feature communication Module:

- Activate Web server: To use the web server, the function must be enabled in the 3RW5 communication module. The web server function is deactivated in the factory setting.
- If the check-box for the parameter "Web server active" is high then the Web Server is activated.

Note

This feature is supported for the following hardware specifications:

- 3RW5 PROFINET High-Feature communication module from firmware version V2.0
- 3RW55 soft starter Basic Unit from firmware version V2.1

Quintessence

4.11.4 Operation without PN controller

The parameter "Operation without PN control" determines how the 3RW55 Soft Starter behaves in relation to a PLC. The parameter is only relevant in connection with the use of the web server or OPC UA server.

Following is the description of the parameter to be configured for Operation without PN controller:

Parameter	Description
Operation without PN control	• No (factory setting) A PLC as control source ("Automatic" mode) is required. If the 3RW5 Soft Starter does not detect a bus start, an error is reported. • Yes A PLC as control source ("Automatic" mode) is not possible. Only connections with SIRIUS Soft Starter ES (TIA Portal) Premium / Professional, a web server and OPC UA server are possible via the 3RW5 PROFINET High Feature communication module.

Note

This feature is supported for the following hardware specifications:

- 3RW5 PROFINET High-Feature communication module from firmware version V2.0
- 3RW55 Soft Starter Basic Unit from firmware version V2.1

4.11.5 OPC UA server

OPC UA protocol offers the following features:

- Simple client-server principle: An OPC UA server provides a lot of information within a network. An OPC UA client retrieves this information.
- Use of open and non-platform-specific protocols for network communication.
- Integrated access control and security mechanisms at the protocol and application level.
- OPC UA and PROFINET can be used together. Both protocols use the same network infrastructure.
- Operating system independence: The OPC UA standard is platform-independent and uses an optimized, TCP-based binary protocol for high-performance applications. For example, OPC UA can be used on Windows, Linux, Mac OS X, a real-time operating system, or a mobile operating system (Android or iOS).

Following are the parameters to be configured for OPC-UA communication with 3RW55 PROFINET High Feature Communication Module :

1. Activate OPC-UA server:- To use the OPC UA server, the function must be activated in the 3RW5 communication module. The function of the OPC UA server is deactivated in the factory setting.
   If the check-box for the parameter "OPC UA server active" is high then the OPC-UA Server is activated.
2. Port:- A prerequisite for establishing a connection via OPC UA is the setting of the "Port" parameter in the 3RW55 communication module. The "Port" parameter is part of the URL of the OPC UA server.
   - Factory Setting : 4840
   - Setting Range : 1024...49151
   - Increment : 1

3. Session Time-Out :- The parameter "OPC UA Session Time-Out" determines how long an OPC UA client connection remains open without activity. If the OPC UA client does not make a service request within this time interval, the OPC UA server terminates the OPC UA client connection.
   - Factory Setting : 4840
   - Setting Range : 1024...49151
   - Increment : 1
4. Security Functions: - The OPC UA server and OPC UA client authorize each other for data exchange by exchanging certificates. Security Policy refers to encryption and hash procedures whereas MessageSecurityMode refers to security setting for messages. Following are the security services provided by the OPC UA server:

Parameter	Description	SecurityPolicy	MessageSecurity-Mode
No Security	• Disabled (factory setting) • Enabled	None	NONE
Basic128RSA15 - sign	• Disabled (factory setting) • Enabled	Basic128RSA15	SIGN
Basic128RSA15 - sign and encrypt	• Disabled (factory setting) • Enabled	Basic128RSA15	SIGNANDENCRYPT
Basic256 - sign	• Disabled (factory setting) • Enabled	Basic256	SIGN
Basic256 - sign and encrypt	• Disabled (factory setting) • Enabled	Basic256	SIGNANDENCRYPT
Basic256SHA256 - sign	• Disabled (factory setting) • Enabled	Basic256SHA256	SIGN
Basic256SHA256 - sign and encrypt	• Disabled (factory setting) • Enabled	Basic256SHA256	SIGNANDENCRYPT

Note

1. This feature is supported for the following hardware specifications:
   – 3RW5 PROFINET High-Feature communication module from firmware version V2.0
   – 3RW55 Soft Starter Basic Unit from firmware version V2.1
2. To be able to control 3RW55 Soft Starters via the Web server , user must be logged on with a user account ("Operator" or "Maintenance personnel" user role) via a secure https connection.
   The Default User account for the Soft Starter is "User Administrator". For more information on user account management, refer to the 3RW55 Soft Starter Equipment Manual.

4.12 HMI

4.12.1 Messages to show

Procedure

The following parameters refer to messages to display

Parameters	Description
Message show	The settings of the messages to show define which messages are displayed as a pop-up window on the display of the 3RW5 HMI High Feature.
	Error • Enable (factory setting) • Disable
	Warnings • Enable (factory setting) • Disable
Timer Lighting Dark	The display switches off after the specified time has elapsed. The parameter value "0" deactivates the shutdown of the display. • Factory setting: 5 min • Setting range: 0 ... 60 min • Increment: 1 min

Parameters	Description
Languages	The required language is set in the "Language" menu. • English (factory setting) • Deutsch • French • Spanish • Italian • Chinese • Portuguese
Do control after log off	This parameter describes the response after logging off while the motor is running. Continue with motor control (factory setting) 3RW5 HMI High Feature is still the master control. **Stop motor and give back control** The motor stops and the 3RW5 HMI High Feature is no longer the master control.

4.12.2 Operation display

Operating principle

The measured values are provided by the respective device functions. All measured values are stored in the measured value memory which is not secure against voltage failure. These values can be read out and evaluated by the 3RW5 HMI High Feature. You can specify up to 5 measured values, which are then shown on the status display.

Procedure

The "Phase currents (%)", "Phase currents (rms)", "Line-to-line voltages [V]" and "Power" menus contain items which you can access by pressing "OK".

Measured value	Display	Description
Phase currents [%]	• IL1 • IL2 • IL3 • Average	The phase currents are displayed as a percentage. You can monitor each phase (L1/L2/L3) individually, or the average of all 3 phases.
Phase currents (rms)	• IL1 • IL2 • IL3 • Average • IL1...IL3 max.	The phase currents are displayed in amperes. You can monitor each phase (L1/L2/L3) individually, the average of all 3 phases, or the maximum value of each phase.

Measured value	Display	Description
Asymmetry	-	The maximum deviation of one phase current relative to the average value of all 3 phase currents.
Line-to-line voltages [V]	• UL1-L2 • UL2-L3 • UL3-L1	The motor voltage is shown in Volts. You can monitor the motor voltage of each phase.
Power	Active power PL1..3	Indicates the current active power.
	Power factor L1..3	Indicates the current power factor.
Line frequency	-	-
Output frequency	-	This value is displayed only if the starting and stopping output frequencies differ from the line frequency.
Motor temperature rise	-	Current value of motor temperature rise in %. This value is recorded by means of sensors and shows the relative temperature rise of the motor.
Remaining time for motor overload protection	-	The remaining time for tripping the motor overload protection provides a dynamic prediction of the time remaining until the tripping of the motor overload protection, depending on the momentary motor current.
Remaining motor cooling time	-	The remaining recovery time after protective tripping of the motor until the Soft Starter is ready to operate again.
Remaining switching element cooling time	-	The remaining cooling time of the switching element is dependent on the thermal capacity of the power unit and the ambient conditions (temperature, air circulation, installation location etc.)
Switching element heating	-	The currently calculated switching element heating is continuously compared with the previously saved switching element heating.
Remaining switching frequency monitoring time	-	If motors are started frequently, this can cause the motor to overheat. The Soft Starter monitors the switching frequency in order to adhere to the wait and cooling down times.

4.12.3 Edit function favorites

Operating principle

Actuation of the favorites keys F1 - F9 causes the functions stored there to be executed. The favorites F1 and F2 are permanently assigned to the functions "Local / Remote" and "Reset". Additional functions can be parameterized for the favorites keys F3 - F9.

Parameters

Parameter		Description
F1 - Local / Remote		Changes master control
F2 - Reset		Acknowledge faults
Fx -...		Favorites menu
Edit function favorites	Add	Adds a favorite
	Delete	Deletes a favorite

4.12.4 Configure start key

Operating principle

As many as 4 different start functions can be assigned to the start key. In the factory setting, the start function "Motor CW" is assigned to the start key. If the start key is configured and then actuated, this opens the parameterized start functions in a pop-up window that can be selected by means of the navigation keys and activated with the "OK" button. In the "Configure start key" menu you can parameterize the functions of the Start button.

Parameters

Parameters	Description
Motor CW (factory setting)	Motor turns clockwise with the current parameter set
Motor CW - creep speed	Motor turns clockwise with active creep speed
Motor CCW[1]	Motor turns counter-clockwise
Motor CCW - creep speed	Motor turns counter-clockwise with active creep speed

[1] only visible if reversing starter is activated.

Commissioning

5

5.1 Soft Starter diagnosis

Description

This tab contains various messages for switching and control:

- Faults and warnings
- Control
- Motor Protection
- Substation Monitoring
- Communication
- Maintenance

Current Status

Faults and warnings

Faults and warnings that occur in the device are shown here. Corresponding messages offering remedies are also displayed.

Display	Meaning
Group error	At least one error is present
Group warning	At least one warning is present
Bus error	Bus error is present

Control

Display	Meaning
Operating state	
Ready (automatic)	The device can be operated via the bus, e.g. PLC
Ready to start for motor ON	No internal or external trips is detected. The device is ready to start the motor.
Normal operation active	Startup is completed and motor is in normal running mode.
Test mode active	Test with small load/Simulation is active.
Control	
Motor CW	The motor is started clockwise.
Motor CCW	The motor is started counter-clockwise.
Starting mode active	The motor is started in the selected starting mode.
Operation/bypass active	The startup is completed but the run-down has not yet begun.
Stopping mode active	The motor is stopped in the selected stopping mode.

Display	Meaning
Alternative stopping mode active	With the alternative stopping mode function an additional stopping mode can be set up in parameter set 1.
Creep speed active	The motor speed is reduced.
Motor heating active	The motor heating starting mode heats up the motor. No start-up takes place. Damage to property through motor heating in continuous operation. The "motor heating" starting mode is not a continuous operating mode. The motor must be equipped with a temperature sensor to ensure motor protection. The motor model with integrated electronic motor overload protection is not suitable for this kind of operation.
Current limiting active	The current has exceeded the parameterized current limit and the current limiting function is active.
Braking	
Dynamic DC braking active	"DC braking" stopping mode is set.
Dynamic braking active	"Dynamic braking" stopping mode is set.
Reversing DC braking active	Reversing DC ramp down mode is active.
Electrical braking active	
Electrical braking active	The brake output is controlled by the Soft Starter.
Main energy monitoring	
Main power rotation left	The permitted main power rotation must be "CCW".
Main power rotation right	The permitted main power rotation must be "CW".
Type of motor connection wrong	The type of motor connection was wrong as per configuration.
Type of motor connection standard	The connections of the Soft Starter are wired into the motor feeder between the motor starter protector and the motor.
Type of motor connection unknown	The type of motor connection was not recognized or deviates from the configuration.
Type of motor connection Inside delta	The inside-delta circuit makes it possible to increase the operable motor power of the individual devices by a factor of root 3.
Energy saving functions*	
Energy Saving mode active	Standby mode of 3RW55 Soft Starter with a 3RW55 PROFINET Communication Module due to PROFIenergy[1] Energy saving functions.
Start pause pending	Energy saving while idle mode of 3RW55 Soft Starter with a 3RW55 PROFINET Communication Module due to PROFIenergy[1] Energy saving functions.
Pump cleaning	
Pump cleaning active	Pump cleaning of the motor or pump is switched on with either one or both control commands Motor CW or Motor CCW.
Emergency mode	
Emergency start active	The emergency start is active. With the emergency start function the system can continue to be operated in the case of system faults. The motor is switched on by means of a normal control command. If the emergency start function is activated, both system defects and system protection messages are ignored. This can cause further damage in the system.
Emergency start enabled	The emergency start is permanently enabled. The emergency start function is automatically activated in the event of a system fault.

* This feature is supported from firmware version V2.1 of the Soft Starter 3RW55 Basic Unit. Refer the Equipment manual for 3RW55 Soft Starter for more details.

[1] More Information on PROFIenergy can be found in Equipment Manual for 3RW55 PROFINET Communication Module.

Motor protection

Motor Protection	
Thermal motor model deactivated	The motor overload protection is switched off. In this case, motor overload protection must be ensured by means of a temperature sensor in the motor (thermistor motor protection with temperature sensor).
Cooling time active	After an overload trip of the thermal motor model, starting of the motor is not possible for a certain period of time (parameter: recovery time) to ensure that the motor has cooled down.
Switching element cooling time active	Acknowledgment is only possible after the contact block has cooled down, i.e. after the cooling time has elapsed.
Thermal motor model	
Idle time active	Display can be activated to show whether the idle time is active here.
Ex application	
Ex application active	Indicates that the Ex operation is active. The function "Ex application" supports you with parameterization of the Soft Starter if you are operating a motor in a hazardous area.
New Ex parameter values detected	Parameter for Ex motor protection received. Solution: confirm the correctness directly at the protection device or for the protection device

Substation Monitoring

I/O monitoring	
Input 1	Signal is present.
Input 2	
Input 3	
Input 4	
Input controls	The Soft Starter is controlled via the input actions "Motor CW/ Motor CCW"
Output 1 active	Assign output action to the digital output 1 is currently active
Output 1 time active	Here it is indicated whether the "Output 1 - time function" is currently active.
Output 2 active	Assign output action to the digital output 2 is currently active.
Output 2 time active	Here it is indicated whether the "Output 2 - time function" is currently active.
Output 3 active	Assign output action to the digital output 3 is currently active.
Output 4 active	Assign output action to the digital output 4 is currently active.
Output 4 time active	Here it is indicated whether the "Output 4 - time function" is currently active.
Analog output underflow	This message is displayed if an underflow is detected by the "underflow monitoring" function.

Analog output overflow	This message is displayed if an overflow is detected by the "overflow monitoring" function.
Switching frequency monitoring	
Switching frequency time running	Wait and cooling down time between Motor ON/OFF mode is active.
Switching frequency lock active	Display can be activated to show whether the switching frequency lock is active here.
Quick stop active	
Quick stop active	The motor is ramping down.

Communication

Operating mode control	
Automatic mode	Control via PLC, cyclic and acyclic bus channel
Automatic Operation - Input controlled	In this mode, the PLC can regain master control if the previous control was through digital inputs under 'Manual Operation local- Input controlled ' mode.
Operating mode manual	You can control the Soft Starter via PC.
Operating mode manual bus	
Manual operation bus - PC controlled	You can only control the Soft Starter on-site (Fieldbus) via either SIMATIC PDM or SIRIUS Soft Starter ES Premium.
Operating mode manual local	
Operating mode manual - local	The Soft Starter can only be controlled via the local interface, 3RW5 HMI High-Feature, or via the input actions 8 and 9. The control function is deactivated via fieldbus.
Manual operation local - Input controlled	You can only control the Soft Starter on-site via the digital inputs.
Manual operation local - HMI controlled	You can only control the Soft Starter on-site via 3RW5 HMI High Feature.
Manual operation local - PC controlled	You can only control the Soft Starter on-site (Local interface) via either SIMATIC PDM or SIRIUS Soft Starter ES Premium.
Operating system functions	
Maximum pointer reset	Maximum pointer values have been reset to 0.
Parameterization	
Parameter assignment active	One or more parameter is being parameterized.
Parameter cannot be changed in ON state	The parameter cannot be changed while the motor is in the switched-on state.
Parameter disable CPU/Master active	Parameters disabled bus ON: Parameterization by master is not possible. Parameters disabled bus OFF: Parameterization by master is possible
Factory settings restored	All of the parameters are reset to their default values.
Parameter set 1 active	Parameter set currently active is displayed
Parameter set 2 active	
Parameter set 3 active	

Parameter set change not possible	It is not possible to switch a parameter set during the startup, operation and stopping phases of the motor. A switchover from one parameter set to another is only possible when the motor is switched off.
Automatic parameterization active	When 'automatic parameterization' is activated, the Soft Starter optimizes the starting parameters each time the motor is started. The 'automatic parameterization' can be set for each of the parameter sets.
Mode	
Manual operation local-web server controlled[1]	Soft Starter can be controlled via web server.
Connection abort in manual mode	If the connection to the control source is aborted, the control priority automatically switches back to the lowest priority of the current mode.
Logbook*	
Logbook application - errors deleted	Logbook entries have been deleted.
Logbook service - error deleted	
Logbook service - events deleted	
Logbook application - warnings deleted	
Logbook application - events deleted	
Parameter number error	
Faulty parameter number	It is the unique identification object number of the faulty parameters in Soft Starter 3RW55 which has caused a parameterization error in the device.

* Logbook function is not available in FDI 3RW55 Soft Starter 3RW55 PROFINET V1.0 package.

[1] Web-server control is not a feature of Soft Starter 3RW55 (PROFINET) FDI Package V1.0. However, the parameter can be used to check if the device is controlled by web-server through other host application.

Maintenance

Self test	
Self-test active	Self-test for the device and HMI is in progress.
Test mode function	
Simulation active	Indicates that the simulation is running. The Soft Starter can be configured with the STS (Simulation Tool for Soft Starters) software. The STS suggests suitable Soft Starters for the application based on the motor and load data and application requirements that you enter.
Test with small load active	Auxiliary and main circuit wiring is tested using a small load. A direction of rotation test can be performed by visually monitoring the motor shaft or the load connected to it.
Maintenance	
Missing initialization after maintenance	No correct article number was assigned to the Soft Starter after the repair.
Device error	
Device error	Unrecoverable error detected after internal diagnostics.
Generator operation	
Generator operation	Status message.

PROFINET HF - Communication Module Diagnosis

Bus Error	
Automatic mode deactivated	This diagnostic message only reflects the master control of the Soft Starter in presence of a OPC UA Server or Web Server. When deactivated, in absence of a PLC, the control source is via OPC UA.
Firmware Update Active	Status messages for the firmware updation process for 3RW55 PROFINET High-Feature Communication Module.
Firmware Update Rejected	
Firmware Update Successful	
Firmware Update Faulty	
Webserver Active*	Activation for the Soft Starter 3RW55 Webserver.
OPC UA Server active*	Activation for the Soft Starter 3RW55 OPC UA Server.
Invalid security policy settings*	Invalid Security Policy settings for OPC UA client server communication.

* These parameters are supported from Firmware versions of V2.1 of 3RW55 Soft Starter Basic Unit and V2.0 for 3RW55 PROFINET HF communication module.

5.1.1 Faults and remedial actions of the 3RW55 Soft Starter

Faults

Faults	Cause	Remedy
Switching element overload	Switching element (switch contact, power semiconductors) too hot.	• Check the ambient conditions associated with cooling. You may want to consider lowering the operating characteristics. • Check the number of switching operations. • Acknowledgment after cooling down
Switching element defective	• Power semiconductor defective • The fault is also generated if the defective switching element (bypass or power semiconductor) cannot be accurately identified.	Check the power semiconductors L1, L2 and L3 and replace any that are defective.
Supply voltage required for test	• The mains switch or the power supply is not plugged in correctly. • There is no power.	Check the cables and the cable connections and replace defective components, if necessary.

Faults	Cause	Remedy
Supply voltage missing	Missing supply voltage or connection break in supply voltage might have caused this fault.	Check the connection and ensure the supply voltage is provided.
Temperature sensor overload	The temperature of the motor is too high.	• Check the motor and the application that is driven by the motor. • After triggering, the motor can only be switched on again if the temperature has reached the release position of the temperature sensor.
Temperature sensor wire break	A wire has broken in the sensor cable of the temperature sensor.	Check the sensor line and the temperature sensor.
Temperature sensor short-circuit	A short-circuit has occurred in the sensor line of the temperature sensor.	
Thermal motor model overload	• The motor feeder is overloaded. • The motor temperature has exceeded a limit.	• Check the motor and the applications driven by the motor. • You can switch on the motor again after the cooling-off period has expired or after deleting the thermal motor model.
Thermal motor model trip	• The motor feeder has been overloaded • The temperature rise of the motor has exceeded a limit value.	• Check the motor and the applications driven by the motor. • You can switch on the motor again after the cooling-off period has expired or after deleting the thermal motor model.
Asymmetry limit error exceeded	A limit for asymmetry has been exceeded. Asymmetry can cause an overload. Possible causes: • Phase failure • Fault in the motor windings	Check the motor feeder and the motor.
Asymmetry trip	Additional tripping in the case of asymmetry.	-
Current limit error trip	The motor feeder has tripped due to current exceeding the limit value.	-
Current limit error exceeded	The current has exceeded a limit.	Check the application driven by the motor.
Current limit error undershot	The current has undershot a limit.	
Current fault limit disconnection	Additional tripping in the event of a current fault limit overshoot or undershoot.	-

Faults	Cause	Remedy
Ground fault limit error exceeded	The ground-fault monitoring has responded. An impermissibly high residual current is flowing.	Check the connecting cable of the motor for damage.
Electronics supply voltage too low	The supply voltage is below the permitted value.	Check the power supply (load rating, voltage range).
Bus error	Fault in the fieldbus communication. You will find further information in the manual for the 3RW5 communication module in question.	-
Process image error	The process image output (PIO) contains invalid control bit combinations (e.g. control bits for clockwise and counter-clockwise rotation are set at the same time).	Check and correct the process image output (PIO).
Invalid parameter	The module is not or is incorrectly parameterized or parameterization changes are denied in current operating mode.	• Correct and execute parameterization. • Switch the operating mode and repeat parameterization.
No external start parameter received	Necessary startup data for the device are missing.	Check parameterization or startup data records.
Error during self-test	Unrecoverable error detected after internal diagnostics (self-test, contactor contacts, switching element, etc.).	Replace the device.
Preset unequal actual configuration	Real and configured slot of module is different.	Ensure consistency between plugged and configured module.
Type of motor connection unknown	The motor connection variant was not recognized or is different from configuration.	Ensure correct connection.
Load missing	No current flow is detected after the motor feeder is switched on. Possible causes: • Main circuit interrupted (fuse, circuit breaker) • Motor contactor or contactor control is defective • The parameter execution time is too short • No load	-
Phase failure L1, L2 and L3	The main power monitoring detects a phase failure.	-
Overvoltage	The supply voltage is above the tolerance limit.	Change the power supply.

Faults	Cause	Remedy
Bypass defective	• Bypass defective • The error can also be generated by successive, brief interruptions of the control supply voltage.	• Check the bypasses for L1, L2 and L3 and replace any that are defective. • Contact Support Request
Bypass protective trip	In bypass operation the current was too high. Fault resetting is only possible after cooling down.	• Check motor. • Check dimensioning of the Soft Starter. • Acknowledgment after cooling down
Phase angle control failure	1. Error appears without motor start: – Motor incorrectly connected – Inside-delta circuit incorrectly realized – Ground fault 2. Error appears while motor is starting: – Kick start voltage too high – Breakaway pulse incorrectly set	1. Check and correct the wiring. 2. Adjust parameters or extend pause time.
Current measuring range exceeded	• For sensors: The measured value exceeds the measuring range. • For actuators: The output value exceeds a high limit value.	• Check the interaction between the module and the sensor or actuator.
Invalid / inconsistent firmware present	The firmware is incomplete and / or the firmware expansions are incomplete or incompatible.	• Run a complete firmware update. • Check any occurring error messages. • Check to see whether or not the firmware update was aborted.
Monitoring of switching frequency time error	The maximum number of starting operations in the monitoring period has been exceeded.	The next starting operation should take place only after the interlock time has expired.
Error rotating field	The direction of rotation field is not correct.	-
Above threshold P	The active power of the motor has exceeded a limit.	Check the application driven by the motor.
Below threshold P	The active power of the motor has fallen below a limit.	
Active power error limit trip	Additional tripping in the event of an active power fault limit overshoot or undershoot.	-

Faults	Cause	Remedy
Active power error limit exceeded	The active power of the motor has exceeded a limit.	Check the application driven by the motor.
Active power error limit undershot	The active power of the motor has fallen below a limit.	-
Supply voltage not permitted for test	Current is flowing in the motor feeder even though it is in test mode or in the test position. Possible causes: • The main circuit is not interrupted in test mode.	-
Operating temperature too high	The temperature in the components has exceeded the maximum limit.	Check the ambient temperature or the control cabinet cooling.
Actuator disconnection	The module has disconnected the actuator. An additional diagnostic message will be displayed to provide you with more detailed information about the cause.	
CPU/Master STOP	CPU/Master in stop	Switch controller back to Run mode
No external start parameters received	This is issued when no new start parameters have been received by the device under the current configuration.	Please check if the parameter set of which start parameters are downloaded is enabled and active at the device.
Parameter fault	The module is not or is incorrectly parameterized or parameterization changes are denied in current operating mode.	• Correct and execute parameterization. • Switch the operating mode and repeat parameterization.
Preset unequal actual configuration	A preset unequal actual configuration is present if there is a faulty configuration or if there are differences between the real and configured slots of the module. The parameter has no effect if a higher-level controller transfers a parameter assignment.	In the case of a preset unequal actual configuration, an internal trip command is generated. This internal trip command must be acknowledged with the "Reset" function.
Module slot wrong or configuration	Real and configured slot of module is different.	Ensure consistency between plugged and configured module.

5.1.2 Wanings and remedial measures of the 3RW55 Soft Starter

Warning	Cause	Remedy
Generator operation	The motor is in ramp-down mode. The motor connection cables may be energized.	Parameterize the ramp-down mode to minimize or avoid the generator operation.
Connection break in manual mode	Connection to operator device (e.g. 3RW5 HMI) is interrupted.	• Check the communication between the 3RW5 HMI and the device. • Check the connection between PC and the local device interface.
Temperature sensor overload	The temperature of the motor is too high.	• Check the motor and the application that is driven by the motor. • After triggering, the motor can only be switched on again if the temperature has reached the release position of the temperature sensor.
Temperature sensor wire break	A wire break has occurred in the sensor line of the temperature sensor.	Check the sensor line and the temperature sensor.
Temperature sensor short-circuit	A short-circuit has occurred in the sensor line of the temperature sensor.	
Module slot wrong or configuration faulty	Real and configured slot of module is different.	Ensure consistency between plugged and configured module position or possibly the referenced module has a wiring fault.
Switching element for start too hot	Switching element (switch contact, power semiconductors) too hot.	• Check the ambient conditions associated with cooling. You may want to consider lowering the operating characteristics. • Check the number of switching operations.
Time reserve before tripping underrun	The time to overload trip of the thermal motor model is shorter than the configured time for the tripping reserve.	• Let the motor cool down. • For heavy starting and settings for tripping CLASS 20, deactivate this monitoring.

Warning	Cause	Remedy
Motor heating warning limit exceeded	• The motor feeder is overloaded. • The motor temperature has exceeded a limit.	• Check the motor and the applications driven by the motor. • You can switch on the motor again after the cooling-off period has expired or after deleting the thermal motor model.
Current limit maintenance demanded exceeded	The current has exceeded a limit.	Check the application driven by the motor.
Current limit maintenance request undershot	The current has undershot a limit.	
Asymmetry warning limit exceeded	A limit for asymmetry has been exceeded. Asymmetry can cause an overload. Possible causes: • Phase failure • Fault in the motor windings	Check the motor feeder and the motor.
Ground fault warning limit exceeded	The ground-fault monitoring has responded. An impermissibly high residual current is flowing.	Check the connecting cable of the motor for damage.
Monitoring of switching frequency time error warning	The maximum number of starting operations in the monitoring period has been exceeded.	The next starting operation should take place only after the interlock time has expired.
Error rotating field	The direction of rotation field is not correct.	-
Check fan	• Fan is dirty (not rotating freely) • Fan defective	Check the function of the fan: • Clean the fan • Check the wiring • Replace the fan
Overvoltage	The supply voltage is above the tolerance limit.	Change the power supply.
Active power limit maintenance demanded exceeded	The active power of the motor has exceeded a limit.	Check the application driven by the motor.
Active power limit maintenance demanded undershoot	The active power of the motor has fallen below a limit.	-
Ramp up time exceeded	The configured maximum starting time is shorter than the required motor starting time.	Prolong the "max. starting time" parameter, increase the current limiting value or check the load coupled with the motor for a mechanical defect.
Ramp up time underrun	The configured minimum starting time is longer than the required motor starting time.	Shorten the "min. starting time" parameter, lower the current limiting value or check the load coupled with the motor for a mechanical defect.

Warning	Cause	Remedy
New Ex parameter values detected	Parameters for Ex motor protection received.	Confirm the correctness directly at the protection device or for the protection device.
Remaining time for tripping warning limit undershot	The Soft Starter has tripped the motor due to motor overload tripping within the set time.	-
Main power rotation faulty	The Soft Starter has detected a wrong main power rotation.	-
Starting time limit maintenance demanded exceeded	Set time starting time limit warning has been exceeded	-
Starting time limit maintenance demanded undershot		-
CPU/Master STOP	CPU/Master in stop	Switch controller back to Run mode.
Preset unequal actual configuration	A preset unequal actual configuration is present if there is a faulty configuration or if there are differences between the real and configured slots of the module. The parameter has no effect if a higher-level controller transfers a parameter assignment. In the case of a preset unequal actual configuration, no internal trip command is generated.	-
Missing startup parameters	Necessary startup data for the device are missing.	Check parameterization or startup data records.

5.2 Measured values

Description

Select **Device > Measured values** in order to open the "Measured values" window. This is where various measured values can be displayed as percentages or absolute values.

Measured values

Measured value	Display	Description
Phase currents [%]	• I L1 • I L2 • I L3 • Average	The phase currents are displayed as a percentage. You can monitor each phase (L1/L2/L3) individually, or the average of all 3 phases.
Phase currents (rms)[A]	• I L1 • I L2 • I L3 • Average • max.	The phase currents are displayed in amperes. You can monitor each phase (L1/L2/L3) individually, the average of all 3 phases, or the maximum value of each phase.
Line-to-line voltages (rms) [V]	• U L1-L2 • U L2-L3 • U L3-L1 • Average	The motor voltage is shown in volts. You can monitor the respective motor voltage of each phase as well as the average of the motor voltage.
Control function Soft Starter		
Active power [kW]		Indicates the current active power.
Power factor L1..3		Indicates the current power factor.
Output frequency [Hz]		This value is displayed only if the starting and stopping output frequencies differ from the line frequency.
Asymmetry		
Asymmetry [%]		The maximum deviation of one phase current relative to the average value of all 3 phase currents.
Main frequency monitoring		
Line frequency [Hz]		Measured frequency of three phase supply in hertz.
Thermal motor model		
Motor temperature rise [%]		Current value of motor temperature rises in %. This value is recorded by means of sensors and shows the relative temperature rise of the motor.
Remaining time for motor overload protection [s]		This parameter provides a dynamic prediction of the time remaining until the tripping of the motor overload protection, depending on the momentary motor current.
Remaining motor cooling time [s]		The remaining recovery time after protective tripping of the motor until the Soft Starter is ready to operate again.
Thermal switching element model		
Remaining switching element cooling time [s]		This parameter is dependent on the thermal capacity of the power unit and the ambient conditions (temperature, air circulation, installation location etc.)

Measured value	Display	Description
Switching element heating [%]		The currently calculated switching element heating is continuously compared with the previously saved switching element heating.
Switching frequency monitoring		
Remaining switching frequency monitoring time [s]		If motors are started frequently, this can cause the motor to overheat. The Soft Starter monitors the switching frequency in order to adhere to the wait and cooling down times.

5.3 Statistic data

Description

Select **Device** > **Statistic data** in order to open the "Statistic data" window.

This is where various Statistical values can be displayed as percentages or absolute values.

Statistic data

Parameters	Meaning
Power	
Active energy import (total) [Wh]	Via the "Measured value" parameter, select the measured value Active energy drawn (total) that is transferred from the analog output.
Active energy export (total) [Wh]	Via the "Measured value" parameters, select the measured value Active energy supply (total) that is transferred from the analog output.
Operating hours	
Operating hours - device [hhhh:mm:ss]	Specifies how long the supply voltage of the Soft Starter was switched on
Operating hours - motor [hhhh:mm:ss]	Specifies how long the motor was switched on
Operating hours motor	
Operating hours if motor current= 18 ... 49.9(% x $I_e$max) [hhhh:mm:ss]	Specifies for how long the motor was switched on at specific motor currents
Operating hours if motor current= 50 ... 89.9(% x $I_e$max) [hhhh:mm:ss]	
Operating hours if motor current= 90 ... 119.9(% x $I_e$max) [hhhh:mm:ss]	
Operating hours if motor current= 120 ... 1000(% x $I_e$max) [hhhh:mm:ss]	
Motor overload protection	
Number of motor overload trips	The value is incremented by 1 with each overload trip.
Number of switching element overload trips	The value is incremented by 1 with each contact block overload trip.

Parameters	Meaning
Number of bypass overload trips	The count of this statistic value is increased by 1 for each bypass overload trip.
Operating cycles	
Number of starts motor CW	The Soft Starter counts the number of starts. For example: The value is incremented by 1 when the current is flowing in the main circuit after the "Motor ON" command has been issued.
Number of starts motor CCW	
Number of starts output 1	The value is incremented by 1 each time the output is set.
Number of starts output 2	
Number of starts output 3	
Number of starts output 4	
Number of braking stops	The value is incremented by 1 when an electrical braking function has been selected as the stopping mode.
Current monitoring	
Phase current max (%)	The Soft Starter measures the current in all 3 phases and displays the current of the phase with the highest value (in percent of the set current I_e).
Phase current max (rms)[A]	The Soft Starter measures the current in all 3 phases and displays the current of the phase with the highest value (in amperes [A]).
Last tripping current IA (%)	The Soft Starter measures the current in all 3 phases and displays the current that is flowing in the phase under the highest value when the trip occurs (as a percentage of the set current I_e).
Last tripping current IA (rms)[A]	The Soft Starter measures the current in all 3 phases and displays the current that is flowing in the phase under the highest value when the trip occurs (in amperes [A]).
Last real starting time [s]	Displays the actual starting time after the end of a start-up phase.

5.4 Maximum pointer

Description

Select **Device** > **Maximum Pointer** in order to open the "Maximum Pointer" window.

Maximum pointers are stored extreme values of measured values from the past and are used for preventive diagnostics. Maximum pointers are stored in the device and can be deleted at any time.

- The higher-level PLC can retrieve the measured value at any time
- The higher-level PLC can delete the measured value at any time

Maximum pointer

Display	Description
Operating hours	
Operating hours - device [hhhh:mm:ss]	Specifies how long the supply voltage of the device was switched on.
Operating hours - motor	
Operating hours if motor current= 18 ... 49.9(% x I_e)[hhhh:mm:ss]	Specifies for how long the motor was switched on at specific motor currents.
Operating hours if motor current= 50 ... 89.9(% x I_e)[hhhh:mm:ss]	
Operating hours if motor current= 90 ... 119.9(% x I_e)[hhhh:mm:ss]	
Operating hours if motor current= 120 ... 1000(% I_e)[hhhh:mm:ss]	
Motor overload protection	
Number of motor overload trips	The value is incremented by 1 with each overload trip.
Number of start with ext. bypass	The value of this maximum pointer increased by 1 for each switch-on operation of the ext. by pass.
Main frequency monitoring	
Minimum line frequency [Hz]	Minimum line frequency measured in Hertz.
Maximum line frequency [Hz]	Maximum line frequency measured in Hertz.
Thermal switching element model	
Maximum switching element heating [%]	Maximum calculated temperature of the switching elements in [%] (for 100% trip).
Phase current (%)	
Phase current IL1min (%)	Minimum phase current of phase 1 as a % of the setting current I_e.
Phase current IL2min (%)	Minimum phase current of phase 2 as a % of the setting current I_e.
Phase current IL3min (%)	Minimum phase current of phase 3 as a % of the setting current I_e.
Phase current IL1max (%)	Maximum phase current of phase 1 as a % of the setting current I_e.
Phase current IL2max (%)	Maximum phase current of phase 2 as a % of the setting current I_e.
Phase current IL3max (%)	Maximum phase current of phase 3 as a % of the setting current I_e.
Maximum trigger current [%]	Maximum current in the event of an overload trip in percentage.
Phase current (rms)	
Phase current IL1min (rms)[A]	Minimum phase current of phase 1 in amperes.
Phase current IL2min (rms)[A]	Minimum phase current of phase 2 in amperes.
Phase current IL3min (rms)[A]	Minimum phase current of phase 3 in amperes.
Phase current IL1max (rms)[A]	Maximum phase current of phase 1 in amperes.
Phase current IL2max (rms)[A]	Maximum phase current of phase 2 in amperes.
Phase current IL3max (rms)[A]	Maximum phase current of phase 3 in amperes.
Maximum trigger current [A]	Maximum current in the event of an overload trip in ampere.
Starting current I max (rms)[A]	Displays the maximum flowing current during the startup.
Starting current I L1 max (rms)[A]	Displays the maximum flowing current of the phase during the startup.
Starting current I L2 max (rms)[A]	
Starting current I L3 max (rms)[A]	
Line-to-line voltages (rms)	

Display	Description
Line-to-line voltage U L1-L2 min [V]	Voltages between the phases in volts.
Line-to-line voltage U L2-L3 min [V]	
Line-to-line voltage U L3-L1 min [V]	
Line-to-line voltage U L1-L2 max [V]	
Line-to-line voltage U L2-L3 max [V]	
Line-to-line voltage U L3-L1 max [V]	
Delete maximum pointer	Button for deleting the maximum pointer.

5.5 Control station

Select **Device** > **Control station** in order to open the "Control station" window.

The window contains the following functions:

Parameter	Meaning
Process Image of inputs (PII)	
Ready (automatic)	The device can be operated via the bus, e.g. PLC.
Motor on	The Motor on is activated for as long as the control command "Motor CW" or "Motor CCW" is present.
Group error	You can disable or enable the transmission of group errors via the bus connection.
Group warning	You can disable or enable the transmission of general warnings via the bus connection.
Input 1	Parameterizable digital inputs/output is activated by "Digital input".
Input 2	
Input 3	
Input 4	
Diagnostics flag	
Motor CW	The direction of the motor is the same as that of the mains.
Motor CCW	The direction of the motor is the opposite to that of the mains.
Test mode active	Test with small load/Simulation is active.
Stopping mode active	The motor is stopped in the selected stopping mode.
Operation/bypass active	The startup is completed but the run-down has not yet begun.
Starting mode active	The motor is started in the selected starting mode.
Cooling time active	After an overload trip of the thermal motor model, starting of the motor is not possible for a certain period of time (parameter: recovery time) to ensure that the motor has cooled down. The remaining cooling time is shown in the "Measured values" dialog.
Automatic parameterization active	When 'automatic parameterization' is activated, the Soft Starter optimizes the starting parameters each time the motor is started. The 'automatic parameterization' can be set for each of the parameter sets.
Process information	

Parameter	Meaning
Ramp operation	This is to indicate whether the Soft Starter is currently in ramp operation.
Manual operation local	You can only control the Soft Starter locally via the local interface, the 3RW5 HMI High Feature or via the digital inputs.
Control	
Switching element for start too hot	Switching element can only be started after cool down is complete.
Temperature sensor overload	The motor can only be switched on again if the temperature has reached the release position of the temperature sensor.
Thermal motor model overload	The motor can be switched again after the cooling-off period has expired or after deleting the thermal motor model.
Device error	
Device error	Unrecoverable error detected after internal diagnostics
Ex application active	
New Ex parameter values detected	The "Ex application" function supports you with parameterization of the Soft Starter if you are operating a motor in a hazardous area.
Motor current	
Motor current (A)	Motor current in Ampere.
Motor current (%)	Motor current in percentage.
Refresh	This button refreshes the motor current in percentage(%) and ampere(A)
Process Image of Outputs (PIO)	
Motor CW	This motor is running in clockwise rotation.
Motor CCW	This motor is running in counter clockwise rotation.
Creep speed	The motor is running at creep speed in clockwise or counter clockwise direction.
Manual operation local - input controlled	You can only control the Soft Starter on-site via the digital inputs.
Outputs	
Output 1	The "output n" is parameterized on "control source PIQ-DQ x.y Output n".
Output 2	
Output 3	
Emergency start	With the emergency start function the system can continue to be operated in the case of system faults.
Disable quick stop	Motor does not stop despite pending ON command from Quick-stop.
Use alternative stopping mode	Activate alternative stopping in order to set up an additional stop in parameter set 1.
Pump cleaning start[1]	The pump cleaning function is started with the aid of a control command by means of an input action or in the process image outputs. The pump cleaning process can be repeated or initiated as many times as required.
Motor standstill	The 3RW55 Soft Starter evaluates the signal from an external motor standstill detection at the input.
Operating mode control	

Parameter	Meaning
Automatic mode	In automatic mode, the motor starter is controlled exclusively via the fieldbus.
Manual operation bus - PC controlled	You can only control the Soft Starter on-site (Fieldbus) via either SIMATIC PDM or SIRIUS Soft Starter ES Premium.
Manual operation local - Input controlled	You can only control the soft starter on-site via the digital inputs.
Manual operation local - HMI controlled	You can only control the soft starter on-site via 3RW5 HMI High Feature.
Manual operation local - PC controlled	You can only control the soft starter on-site (Local interface) via either SIMATIC PDM or SIRIUS Soft Starter ES Premium.
Manual operation local - web server controlled*	You can control the soft starter via web server.
Connection abort in manual mode	If the connection to the control source is aborted, the control priority automatically switches back to the lowest priority of the current mode.
Operating mode manual	You can control the Soft Starter via PLC.
Automatic Operation - Input controlled	In this mode,the PLC can regain master control if the previous control was through digital inputs under 'Manual Operation local- Input controlled' mode.
Operating mode manual - local	The Soft Starter can only be controlled via the local interface, 3RW5 High - Feature, or via the input actions 8 and 9.the control function is deactivated via fieldbus.
Master control	
Get control	User assumes control.
Release control	User releases control.
Reset	You can acknowledge the fault after it has been remedied. The "Reset" input is edge-controlled.
Self-test	Perform the self-test (user-test) as specified, the Soft Starter responds with an overload trip after approx. 5 seconds.
Motor	
Motor CCW	This is where you activate/deactivate the counter-clockwise rotation of the motor. Soft starter: The direction of the motor is the opposite to that of the mains.
Creep speed CCW	This is where you activate the motor in counter-clockwise with active creep speed
Creep speed CW	This is where you activate the Motor in clockwise with active creep speed
Motor CW	This is where you activate/deactivate the clockwise rotation of the motor. Soft starter: The direction of the motor is the same as that of the mains.
Stop	Activates stop command for motor
Active parameter set	
Parameter set 1	Select one of the three parameter sets. One parameter set is deactivated when another is activated. One parameter set must be active at all times.
Parameter set 2	
Parameter set 3	

*The SoftStarter cannot be controlled via the web-server with SIRIUS 3RW55 Soft Starter with PROFINET- FDI Package V1.0.

[1] For initiating consecutive pump cleaning processes without stopping the motor, user has to uncheck and check the checkbox of 'Pump cleaning start' Process Image Outputs in Control Station Online menu, after a pump cleaning process is complete.

Completion of pump cleaning process can be verified from the status of the 'Pump cleaning active' parameter in Soft Starter Diagnosis Online menu.

5.6 Functions

Functions

Select **Device > Functions** in order to open the "Functions" window. The window contains the following functions:

Commands		
Get control		User assumes control
Release control		User releases control
Mode		
Manual operation bus - PC controlled		Soft Starter can be controlled only via either SIMATIC PDM or SIRIUS Soft Starter ES Premium.
Manual operation local - HMI controlled		You can only control the Soft Starter on-site via 3RW5 HMI High Feature.
Manual operation bus - PC controlled		You can only control the Soft Starter on-site (Fieldbus) via either SIMATIC PDM or SIRIUS Soft Starter ES Premium.
Manual operation local - Input controlled		You can only control the Soft Starter on-site via the digital inputs.
Manual operation local - PC controlled		You can only control the Soft Starter on-site (Fieldbus) via either SIMATIC PDM or SIRIUS Soft Starter ES Premium.
Ready (automatic)		The device can be operated via the bus, e.g. PLC.
Automatic mode		In automatic mode, the motor starter is controlled exclusively via the fieldbus
Automatic Operation - Input controlled		In this mode, the PLC can regain master control if the previous control was through digital inputs under 'Manual Operation local- Input controlled ' mode.
Connection abort in manual mode		If the connection to the control source is aborted, the control priority automatically switches back to the lowest priority of the current mode.
Emergency run		
Enable Emergency run		Enable/Disable Emergency run and check the status of Emergency run
Disable Emergency run		
Emergency run enabled		
Emergency run active		
Restart		
Restart		Soft starter performs a restart. Only possible in manual mode.
Factory settings		
Factory settings restored	Soft Starter	Activates "Restore factory settings". All of the parameters are reset to their default values. Only possible in manual mode. The parameters are not automatically updated in the RAM.
	Communication module	
	HMI	
	All devices	

Test mode		
Test mode	Normal operation active	Test mode is not active.
	Test mode active	Test mode is active.
	Simulation active	The system is checked for correct functioning and wiring. Motor operation is performed virtually (starting, running, stopping) • Activate - Simulation mode activated. • Deactivate - Mode will be switched to normal mode.
	Test with small load active	The auxiliary and main circuit wiring is tested using a small load. A direction of rotation test can be performed by visually monitoring the motor shaft or the load connected to it. • Activate - Test mode activated. • Deactivate - Mode will be switched to normal mode.
Time		
Time set		PC Time is set to the Soft Starter
Time shift		The shift in hours from the Network time to be set in the Soft Starter.
Update Interval*		Time interval at which synchronization of the time of the day with the NTP Server is performed
Server IP Address*		IP Address of the NTP Server

*NTP Settings like Update Interval and Server IP Address are supported for 3RW55 PROFINET High Feature Communication Module and 3RW55 Soft Starter from Firmware Version V2.0

5.7 HMI Diagnosis

HMI diagnosis parameters

General information

Display	Meaning
Operating state	
Run	3RW55 Soft Starter is ready for operation.
Set actual comparison device bus interface	
Device assigned	3RW55 Soft Starter is assigned to one of the IO controllers.
HMI Not Configured	HMI for 3RW55 Soft Starter is not configured.
Micro SD card	
Micro SD card active	Micro SD Card is in use.
Micro SD card plugged	Micro SD card inserted.
Micro SD card access error	Micro SD card not accessible.
Micro SD card write - protected	Micro SD card read only, can't be written.
Local interface	
Local interface active	3RW55 Soft Starter device is controlled through HMI.
Local interface data invalid	

Display	Meaning
Loadable Language*	
Loading Language rejected	The additional language Package into 3RW55 HMI Module has been rejected.
Loading Language active	The additional language Package into 3RW55 HMI Module is active.
Loading Language Successful	The additional Package into 3RW55 HMI Module is successfully loaded.
Loading Language unsuccessful	Additional language Package into 3RW55 HMI Module is unsuccessful.
Invalid signature 'Load additional Language'	Additional language package in 3RW5 HMI Module has invalid signature.
Self test	
Self test active	Performs Test LEDs, buttons and display
Operating system functions	
Factory settings restored	Indicates that the factory settings have been restored. All parameters have been reset to their factory settings.
FW Update	
FW update active	The firmware update is in progress.
FW update rejected	The firmware is incomplete and/or the firmware expansions are incomplete or incompatible. Remedy: Run a complete firmware update.
FW update successful	The firmware update was successful
Parameterization	
Invalid parameter	The module is not or is incorrectly parameterized or parameterization changes are denied in current operating mode
First access denied	User logon denied
Address filter configured	
Useful data protected	3RW55 Soft Starter is now accessible only through PIN protected user accounts.
Security	
User account setup	Status of local access protection.
Secure channel opened	
Timeout secured connection	
Secured connection ended	
Configuration access changed	
Unauthorized access denied	
Encryption not correct	

* Additional Language packages can be used as of firmware version V3.0 of the 3RW55 High Feature HMI Module.

Note

Additional Language packages

Additional Language packages can be used as of firmware version V3.0 of the 3RW55 High Feature HMI Module. For more information , please refer to the section-> 'Reloading a language for the High Feature 3RW5 HMI' in the 3RW55 Soft Starter Equipment Manual

5.7.1 Faults and remedial actions on the 3RW5 HMI High Feature

Faults	Cause	Remedy
HMI Fault	Unrecoverable error detected after internal diagnostics (self-test, etc.).	Replace the device.
No device answer	The connection to the connected basic unit has been interrupted.	Check the connection between the HMI and the device.
FW Update Unsuccessful FW Update Invalid Signature	The firmware is incomplete and/or the firmware expansions are incomplete or incompatible.	• Run a complete firmware update. • Check any occurring error messages. • Check to see whether or not the firmware update was aborted.
Error during self-test Local interface defective	Unrecoverable error detected after internal diagnostics (self-test, etc.).	Replace the device.
Local interface disabled due to flooding	Too many requests to the local device interface	The interface remains disabled until it is no longer flooded with requests.
Write Error	File cannot be written to the micro SD card.	• Check whether the micro SD card is inserted. • Check whether the micro SD card is write-protected.
Read Error	File cannot be read from the micro SD card.	• Check whether the micro SD card is inserted. • Create and copy a new file onto the micro SD card.
File system error	Micro SD card cannot be read.	Format the micro SD card using FAT32 file format.