SINAMICS G120P
Fire Operation

Use of the Essential Service Mode (ESM)

Application Description • June 2012

Applications & Tools

Answers for industry.

SIEMENS

Siemens Industry Online Support

This article comes from the Siemens Industry Online Support. You can go directly to the download page of this document using the following link:

http://support.automation.siemens.com/WW/view/de/<Beitrags-Nr>

Caution:
The functions and solutions described in this document predominantly address the implementation of the automation task. Please note, that when networking your plant with other plant parts, the company network or the Internet, the appropriate protective measures must be taken regarding industrial security. You can find additional information under entry ID 50203404.

http://support.automation.siemens.com/WW/view/de/50203404

Please also actively use our technical forum in the Siemens Industry Online Support on this topic. Send in your questions, suggestions or problems, and discuss these with our strong forum community:

http://www.siemens.de/forum-applikationen

Copyright © Siemens AG 2012 All rights reserved

SIEMENS

SINAMICS G120P Application Manual Fire Operation

Use of the Essential Service Mode (ESM)

Task 1

Solution 2

Application examples 3

Commissioning 4

References 5

Contact person 6

History 7

Copyright © Siemens AG 2012 All rights reserved

Warranty and liability

Note

The application examples are not binding and do not claim to be complete regarding the configuration and equipping as well as possible eventualities. The application examples do not represent customer-specific solutions. They are only intended to provide support for typical applications. You are responsible in ensuring that the described products are correctly used. These application examples do not relieve you of the responsibility of safely and professionally using, installing, operating and servicing equipment. When using these application examples, you recognize that we cannot be made liable for any damage/claims beyond the liability clause described. We reserve the right to make changes to these application examples at any time without prior notice. If there are any deviations between the recommendations provided in this application example and other Siemens publications - e.g. Catalogs, then the contents of the other documents have priority.

We do not accept any liability for the information contained in this document.

Claims against us – irrespective of the legal grounds – resulting from the use of the examples described in this application example, information, programs, engineering and performance data etc. are excluded. Such an exclusion shall not apply where liability is mandatory, e.g. under the German Product Liability Act involving intent, gross negligence, or injury of life, body or health, guarantee for the quality of a product, fraudulent concealment of a deficiency or non-performance. Claims of the purchaser for compensation relating to non-performance of essential contract obligations shall be limited to foreseeable damages typically covered by a contract unless intent, willful misconduct or gross negligence is involved or injury of life, body or health. The above stipulations shall not change the burden of proof to your detriment.

It is not permissible to transfer or copy these application examples or excerpts of them without first having prior authorization from Siemens Industry Sector in writing.

Copyright © Siemens AG 2012 All rights reserved

Table of contents

Warranty and liability **4**

1 Task **6**

1.1 Smoke and heat extraction (SHE) in buildings 6
1.2 Scenario 7

2 Solution **9**

2.1 Overview 9
2.2 Application example for the ESM function 11
2.3 Hardware and software components used 12

3 Application examples **13**

3.1 Application example 1 13
3.2 Application example 2 15
3.3 Application example 3 17
3.4 Application example 4 19
3.5 Application example 5 21
3.6 Application example 6 23

4 Commissioning **25**

4.1 Essential Service Mode (general information) 25
4.2 Assigning the ESM function to a DI (Digital Input) 26
4.2.1 Starter 27
4.2.2 IOP 27
4.3 Selecting the setpoint source 28
4.3.1 Starter 28
4.3.2 IOP 29
4.4 Direction of rotation reversal in the ESM/fire mode 30
4.4.1 Starter 30
4.4.2 IOP 30
4.5 PID control in the ESM/fire mode 31
4.5.1 PID controller in the standard and ESM modes 31
4.5.2 PID controller in the standard mode only. 31
4.5.3 PID controller in the ESM mode only 31
4.6 Displaying the ESM/fire mode 32
4.6.1 IOP display of the ESM/fire mode 32
4.6.2 Relay output display of the ESM/fire mode 32
4.7 Fault handling in the ESM/fire mode 32
4.8 Automatic restart in the ESM/fire mode 33
4.9 Acknowledging an existing fault in the ESM/fire mode 33
4.10 G120P starting in the ESM/fire mode 34
4.11 Stopping the G120P in the ESM/fire mode 34

5 References **35**

5.1 Internet links - data 35

6 Contact person **35**

7 History **35**

Copyright © Siemens AG 2012 All rights reserved

1 Task

1.1 Smoke and heat extraction (SHE) in buildings

Introduction

»Wherever there is smoke there is also fire« – this saying is still applicable today. However, the two sources of risk – smoke and fire – are mentioned in the correct sequence. Most recently, it has been shown in cases of fire that smoke has put more people at risk than the fire itself. This fact should indicate that smoke should take higher precedence regarding the risk that people are exposed to when a building catches fire.

On one hand, a lot of smoke reduces the visibility and releases toxic gases into the air that is breathed, so that escape and evacuation routes, for example, cannot be used without the appropriate protective equipment. On the other hand, when gases and fumes released by fire collect, the thermal load in rooms close to the source of the fire is so high that flashovers can occur to other areas or rooms.

Smoke and heat extraction are necessary, this is an undisputed fact. However, it takes a lot of effort to convince general contractors of the need to plan and invest in this area. This is because the application cannot be located in the comfort zone of an HVAC system, but is only considered as a preventive measure.

The valid domestic fire protection regulations, which even differ regionally, only partly defined the requirements placed on SHEs in buildings. Applications that have been tested in the field predominantly come from Australia and the US. For Europe, EN 12101 defines the requirements on SHE components as well as methods for differential pressure systems (pressurizing systems) in buildings.

Copyright © Siemens AG 2012 All rights reserved

Directives and standards

Table 1-1

Country	Standard
USA	NFPA 92A, NFPA 92B, ASHARE Guideline 5 *Design of Smoke Management System*
Europe	EN 12101 Part1-6 *Smoke and heat control systems*
Germany	VDMA 24200-1 *Automatisierte Brandschutz- und Entrauchungssysteme ABE (automated fire protection and smoke extraction systems)*
Australia, New Zealand	AS/NZS 1668.1:1998 *The use of ventilation and airconditioning in buildings - Fire and smoke control in multi-compartment buildings*
Switzerland	prSWKI BT101 Part 1-6 *Rauch- und Wärmefreihaltung (smoke and heat extraction)*

1.2 Scenario

The following diagram shows a possible fire scenario as well as the interaction between the ventilation system and SHE. According to this scenario, in the middle floor of the building, a fire has started. The switchover from ventilation (comfort operation) to fire operation (smoke extraction operation) can be automatically realized from the central fire alarm system or using a key-operated switch at the fire fighting control panel.

In both of these cases, the ventilation system in Section 2 is first switched-off. Fire protection and smoke extraction flaps are closed or opened according to the diagram. The smoke extraction fan is then started in section 3. The hot and generally toxic fumes are then discharged to the outside. The duct where air can enter as well as the open flap ensure that the air in the room is adequately circulated.

The fire protection flaps in the building level involved, prevent smoke from entering into the other building levels through the air intake and air discharge ducts. However, open doors, passageways and other openings between the levels of the building and the stairwell or elevator shaft allow the smoke to be distributed. In these zones, the ventilation system is deliberately operated with an overpressure condition in order to keep escape and evacuation routes as well as other levels of the building smoke-free for as long as possible.

Using a differential pressure sensor and variable-speed fan (with PID controller), an overpressure condition of 50…100 Pa is maintained in zone 1. This overpressure condition prevents smoke from entering into the stairwell. The closed-loop control compensates pressure changes when the doors are opened and closed. Further, this closed-loop control also prevents doors from no longer being able to be opened as a result of the high pressure difference.

The intake air fan in zone 2 is also activated, which creates an overpressure condition in the stairwell. It goes without saying that a closed-loop differential pressure control is also conceivable. However, in most cases, the fan is operated with a fixed speed.

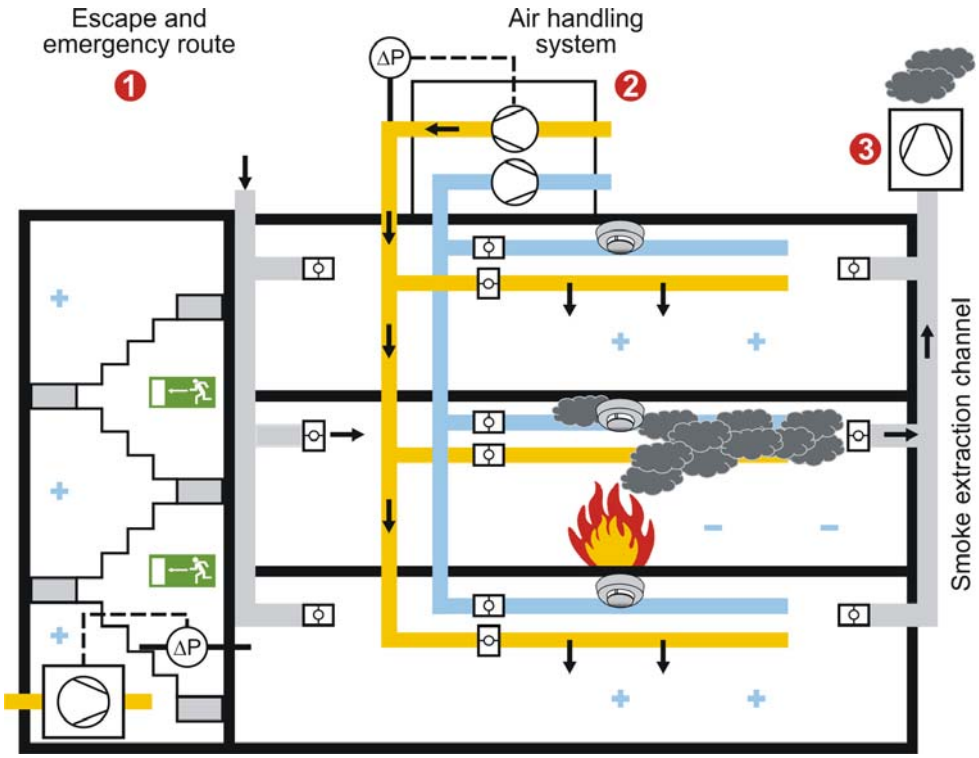
The interaction between the SHE and the ventilation system has the following objective:

Smoke and fumes caused from the fire are extracted to the outside as quickly as possible in order to minimize the amount of smoke and heat.

The ventilation system is operated in an overpressure mode, in order to keep evacuation routes and adjacent rooms smoke-free for as long as possible – or at least keep them in a low-smoke condition.

Copyright © Siemens AG 2012 All rights reserved

Fig. 1-1 - Principle of operation of SHE and the ventilation system in the case of fire:



Copyright © Siemens AG 2012 All rights reserved

2 Solution

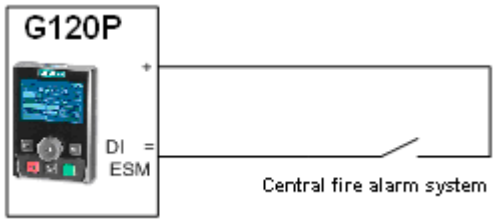
2.1 Overview

From FW 4.3 onwards, SINAMICS G120P has functions for operation when there is a fire. The focus is on the overpressure systems mentioned above, which can be simply implemented using variable-speed fans. The changeover from the comfort to the fire mode is realized using the essential service mode (ESM).

Activating the ESM function

ESM can be activated using digital inputs DI0…5 or additional logical parameter combinations.

This signal typically comes from the central fire alarm system. The symbol of a burning house is displayed on the IOP (if one is being used) at the upper edge of the screen.



If the command for ESM is deactivated again, then the G120P continues to operate in the normal mode.

Copyright © Siemens AG 2012 All rights reserved

Difference between ESM and the normal mode

ESM involves maintaining fan operation "under all circumstances". As soon as ESM is activated, G120P starts operation, independent of which operating state is specified by the building automation system. **As a consequence, ESM has priority over normal operation.** In addition, in ESM the protective converter functions (non-critical faults and alarms) – for instance overtemperature or communication error – are suppressed and critical fault/errors such as overvoltage and overcurrent are continuously acknowledged, and the drive restarted. It is not permissible that the critical faults/errors are suppressed or ignored!

Possible operating modes

The following operating modes are possible in order to address various applications:

- Last known setpoint
- Approaching a defined fixed speed
- Operating with an analog setpoint
- Operating with a setpoint received via a bus
- PID control (e.g. pressure control)

For non fail-safe operating modes, an alternative fail-safe setpoint can be saved for the case that the setpoint is no longer available.

In addition, for every operating mode, direction of rotation reversal can be selected.

Feedback signal to the building automation

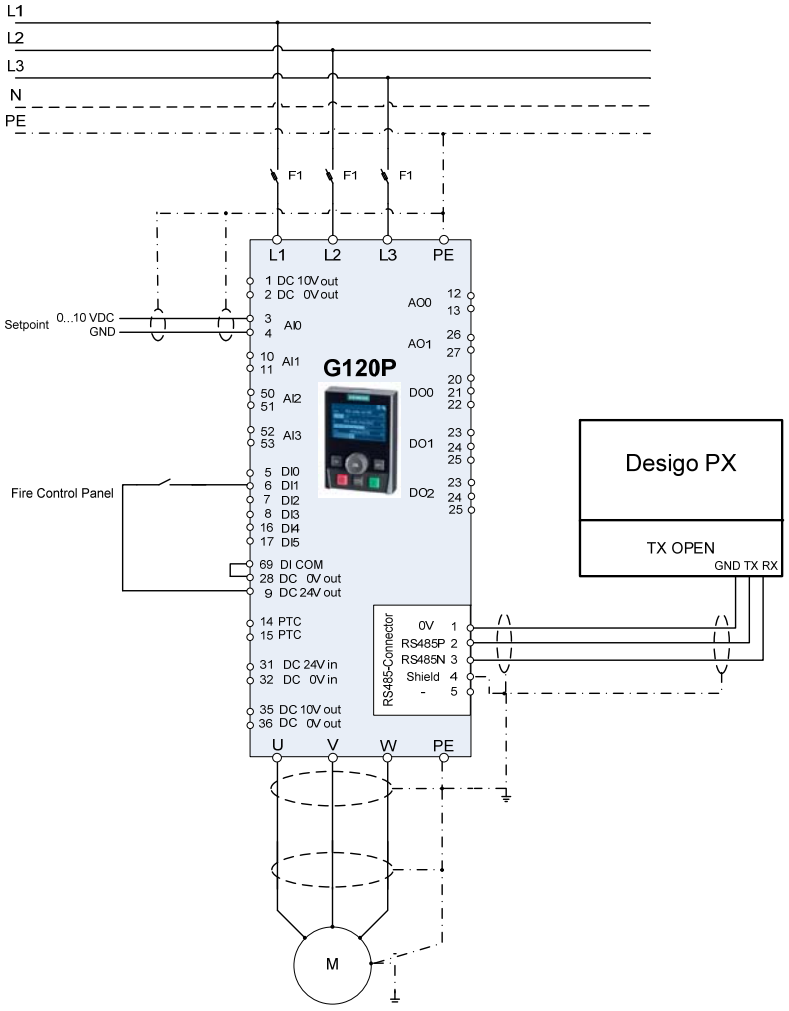
The "ESM active" signal is available in the G120P, and can also be output via a digital output.

Copyright © Siemens AG 2012 All rights reserved

2.2 Application example for the ESM function

The EMS function is available as standard in the G120P, and can be activated at any time. We will consider the various typical applications for the ESM function. The following example shows a typical G120P application with ESM in a shopping center.

Fig. 2-1



- Several air-conditioning systems with some G120P for the air intake and air discharge fans are installed in a shopping center
- In normal operation, the SINAMICS G120P receives its switch-on command as well as the setpoint via the bus from DESIGO
- If the ESM is activated from the central fire alarm system, the G120P ramps up to the maximum speed at 50 Hz, and suppresses the protective functions and fault messages as described above
- The system switches over to overpressure operation, in order to keep the rooms free of smoke

Copyright © Siemens AG 2012 All rights reserved

2.3 Hardware and software components used

The application was created using the following components:

Hardware components

Table 2-1

Component	Qty.	MLFB/Order No.	Note
Control Unit CU230P-2 BT	1	6SL3243-0BB30-1HA2	As an alternative, other versions of the CU230P-2 can be used. Possible restrictions for control via a bus
PM230 power unit	1	6S7L3223…	Alternatively, every power unit that is compatible with CU230P-2 can be used
Motor	1		Induction motor that matches the power unit
IOP	1	6SL3255-0AA00-4JA0	Alternative parameter assignment via BOP-2 or Starter

Standard software components

Table 2-2

Component	Qty.	MLFB/Order No.	Note
Starter	1	6SL3072-0AA00-0AG0	Alternative parameter assignment via IOP or BOP-2

Copyright © Siemens AG 2012 All rights reserved

3 Application examples

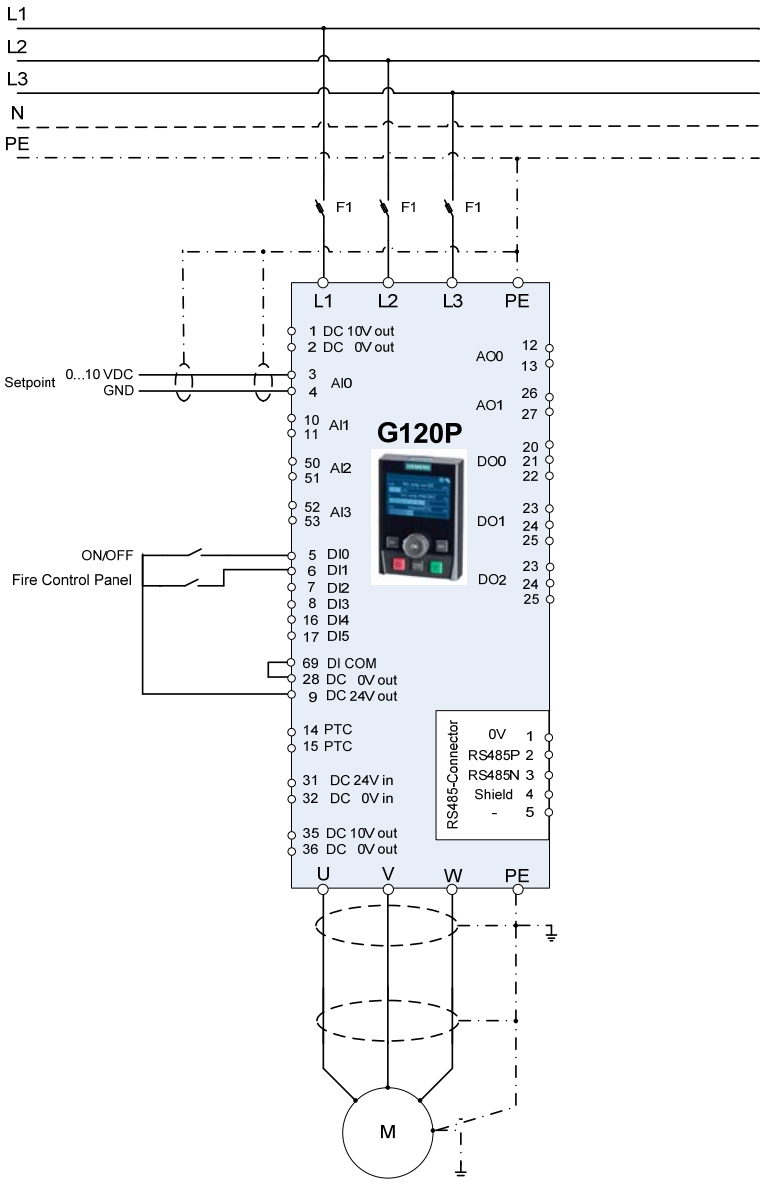
3.1 Application example 1

Description

- In normal operation, the G120P receives the setpoint via analog input 0 (for example, from a building automation system such as DESIGO PX)
- In the case of fire, this is signaled from the central fire alarm system to the G120P. The G120P goes into the ESM mode and the setpoint is still received via the analog input

Connection circuit diagram

Fig. 3-1



Copyright © Siemens AG 2012 All rights reserved

Parameter settings

Commission the system using the wizards.

Select as macro "12:) standard I/O with analog setpoint"

Table 3-1

Par. No.	Value	Parameter function	Description
p1113[0]	0	Setpoint inversion	Delete the interconnection of the setpoint inversion at DI1, set using the macro
p3880	r722.1	ESM activation	Interconnection of the ESM activation at DI1
p3881	2	ESM setpoint source	Setpoint source for ESM = [2] analog setpoint AI0 (r0755[0])

Comments

- The manual mode is automatically inhibited if ESM is active
- The “Fault present”, "Alarm present" and "Operation Enabled" signals are always available at the two relay outputs.
  If required, the "ESM active" signal can be configured at a relay output.
- If the ESM setpoint is no longer available, then the system uses the last active setpoint

Copyright © Siemens AG 2012 All rights reserved

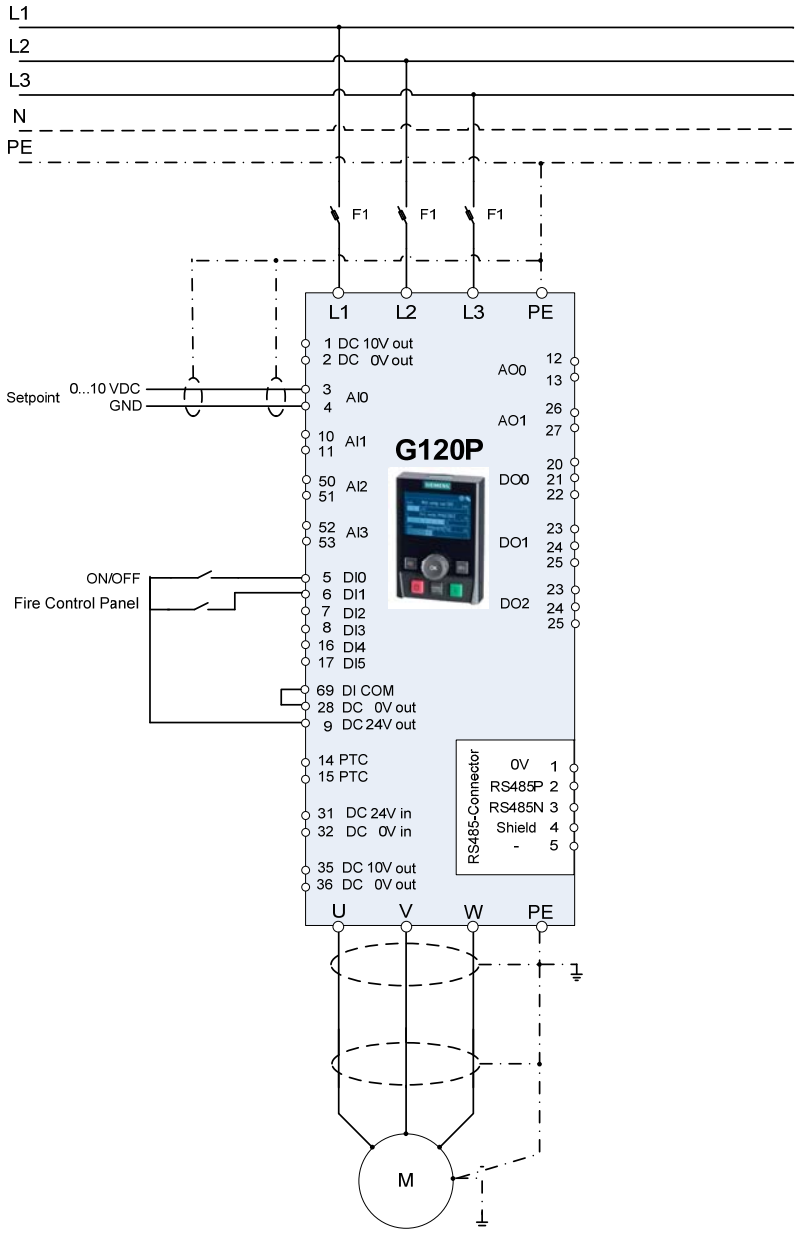
3.2 Application example 2

Description

- In normal operation, the SINAMICS G120P receives the setpoint via analog input 0 (for example, from a building automation system such as DESIGO PX)
- In the case of a fire, this is signaled from the central fire alarm system to the G120P, which then, at a fixed speed of e.g. 1200 rpm, transitions into the ESM mode

Connection circuit diagram

Fig. 3-2



Copyright © Siemens AG 2012 All rights reserved

Parameter settings

Commission the system using the wizards.

Select as macro "12-) standard I/O with analog setpoint"

Table 3-2

Par. No.	Value	Parameter function	Description
p1113[0]	0	Setpoint inversion	Delete the interconnection of the setpoint inversion at DI1, set using the macro
p3880	r722.1	ESM activation	Interconnection of the ESM activation at DI1
p3881	1	ESM setpoint source	Setpoint source for ESM = [1] fixed speed setpoint 15 (p1015)
p1015	1200	Fixed speed setpoint 15	Sets the fixed speed setpoint to 1200 rpm

Comments

- The manual mode is automatically inhibited if ESM is active
- The "Fault present", "Alarm present" and "Operation Enabled" signals are always available at the two relay outputs.
- If required, the “ESM active” signal can be configured at a relay output

Copyright © Siemens AG 2012 All rights reserved

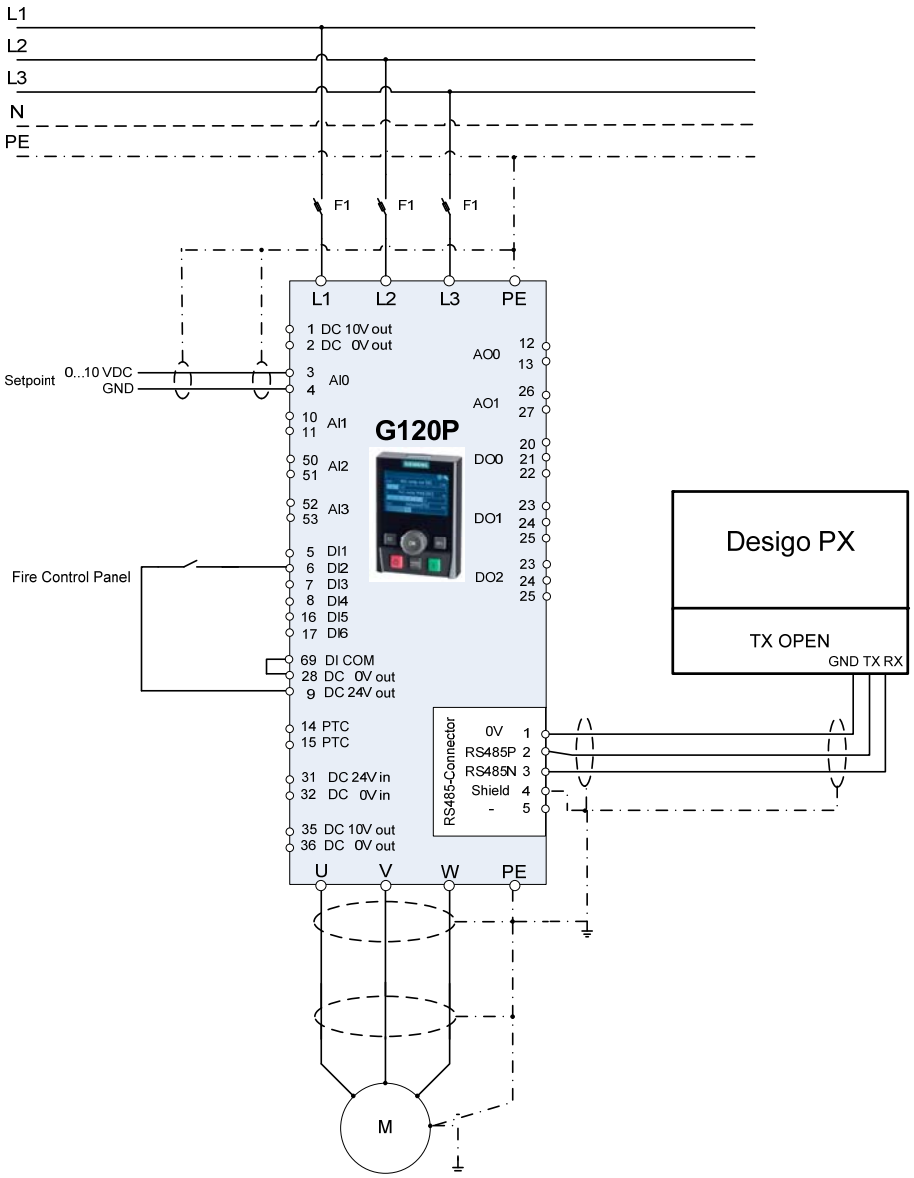
3.3 Application example 3

Description

- In normal operation, the SINAMICS G120P is controlled from DESIGO PX via the bus using the TX OPEN module
- In the case of fire, this is signaled from the central fire alarm system to the G120P; this then transitions into the ESM mode. The setpoint is still always received from DESIGO via the bus

Connection circuit diagram

Fig. 3-3



Copyright © Siemens AG 2012 All rights reserved

Parameter settings

Commission the system using the wizards.

Select as macro "21-) USS fieldbus". Observe the engineering instructions, TX G120P (CM110576)

Table 3-3

Par. No.	Value	Parameter function	Description
p2020	6	USS baud rate	[6] 9600 baud
p2021	1(example)	USS address	Address range 1-31
p2023	4	USS PKW	PKW length 4
p2040	65000	Fieldbus monitoring	65'000 ms
p3880	r722.1	ESM activation	Interconnection of the ESM activation at DI1
p3881	3	ESM setpoint source	Setpoint source for ESM = [3] setpoint from the fieldbus

Comments

- The manual mode is automatically inhibited if ESM is active
- The "Inverter fault", "Inverter alarm" and "inverter operational" signals are always available at the two relay outputs.
- If required, the “ESM active” signal can be configured at a relay output
- If ESM is active, fault F0072 (bus communication fault) is ignored
- In this particular example, DESIGO PX is used as communication master. However, another communication type (BACnet/MSTP, Modbus RTU or P1) can be just as effectively used
- If the ESM setpoint is no longer available, then the system uses the last active setpoint

Copyright © Siemens AG 2012 All rights reserved

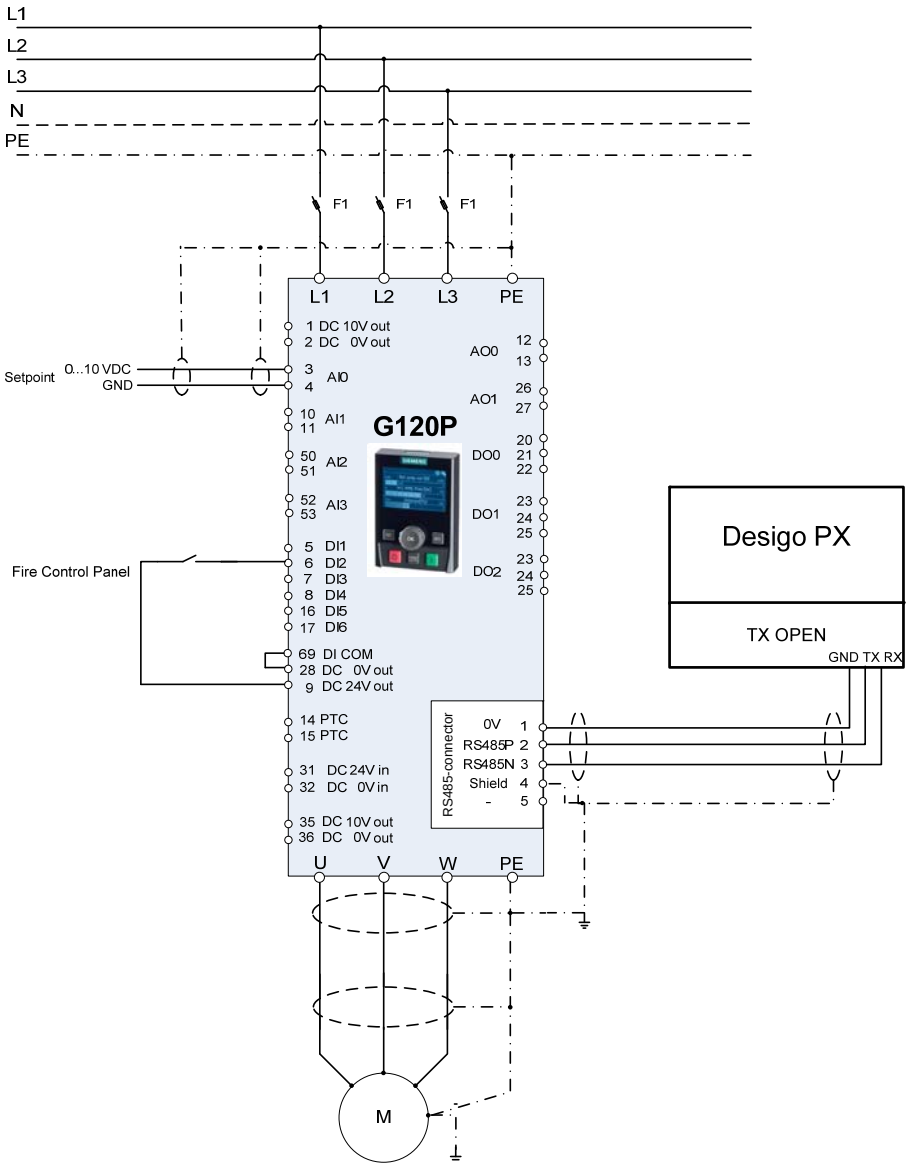
3.4 Application example 4

Description

- In normal operation, the SINAMICS G120P is controlled from DESIGO PX via the bus using the TX OPEN
- In the case of a fire, this is signaled from the central fire alarm system to the G120P, which then, at a fixed speed of e.g. 1200 rpm, transitions into the ESM mode

Connection circuit diagram

Fig. 3-4



Copyright © Siemens AG 2012 All rights reserved

Parameter settings

Commission the system using the wizards.

Select as macro "21-) USS fieldbus". Observe the engineering instructions, TX G120P (CM110576)

Table 3-4

Par. No.	Value	Parameter function	Description
p2020	6	USS baud rate	[6] 9600 baud
p2021	1(example)	USS address	Address range 1-31
p2023	4	USS PKW	PKW length 4
p2040	65000	Fieldbus monitoring	65'000 ms
p3880	r722.1	ESM activation	Interconnection of the ESM activation at DI1
p3881	1	ESM setpoint source	Setpoint source for ESM = [1] fixed speed setpoint 15 (p1015)
p1015	1200	Fixed speed setpoint 15	Sets the fixed speed setpoint to 1200 rpm

Comments

- The manual mode is automatically inhibited if ESM is active
- The "Inverter fault", "Inverter alarm" and "inverter operational" signals are always available at the two relay outputs. If required, the “ESM active” signal can be configured at a relay output
- If ESM is active, fault F0072 (bus communication fault) is ignored
- In this particular example, DESIGO PX is used as communication master. However, another communication type (BACnet/MSTP, Modbus RTU or P1) can be just as effectively used

Copyright © Siemens AG 2012 All rights reserved

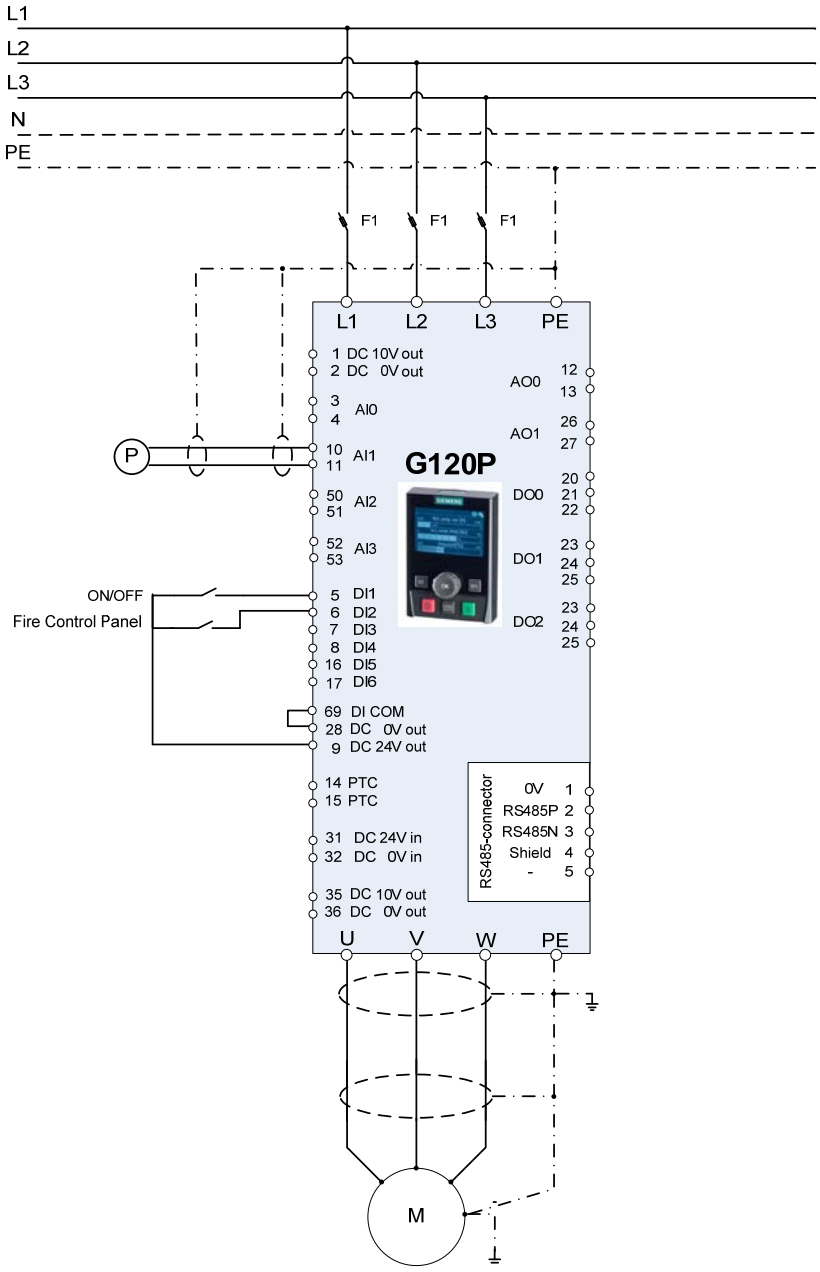
3.5 Application example 5

Description

- In normal operation, the internal PID control loop of the SINAMICS G120P controls the pressure in a stairwell, for example.
- In the case of fire, this is signaled from the central fire alarm system to the G120P; this then transitions into the ESM mode. The internal PID control loop continues to operate

Connection circuit diagram

Fig. 3-5



Copyright © Siemens AG 2012 All rights reserved

Parameter settings

Commission the system using the wizards.

Select as macro "12-) standard I/O with analog setpoint"

Table 3-5

Par. No.	Value	Parameter function	Description
p1113[0]	0	Setpoint inversion	Delete the interconnection of the setpoint inversion at DI1, set using the macro
p756[1]	0	Analog input1, type	[0] voltage input (0-10V)
p2200	1	Technology controller enable	1 = enabled
P2201	50	Fixed setpoint	For example 50%
p2253	p2201	Technology controller setpoint	Fixed setpoint
p2264	r755.1	Technology controller actual value	Analog input 1
p2280	1.2 (example)	PID proportional gain	
p2285	30s (example)	PID integral time	
p3880	r722.1	ESM activation	Interconnection of the ESM activation at DI1
p3881	4	ESM setpoint source	Setpoint source for ESM = [4] setpoint from the technology controller

Comments

- The manual mode is automatically inhibited if ESM is active
- The “Inverter fault”, "Inverter alarm" and "Inverter operational" signals are always available at the two relay outputs.
  If required, the "ESM active" signal can be configured at a relay output.
- If the ESM setpoint is no longer available, then the system uses the last active setpoint

Copyright © Siemens AG 2012 All rights reserved

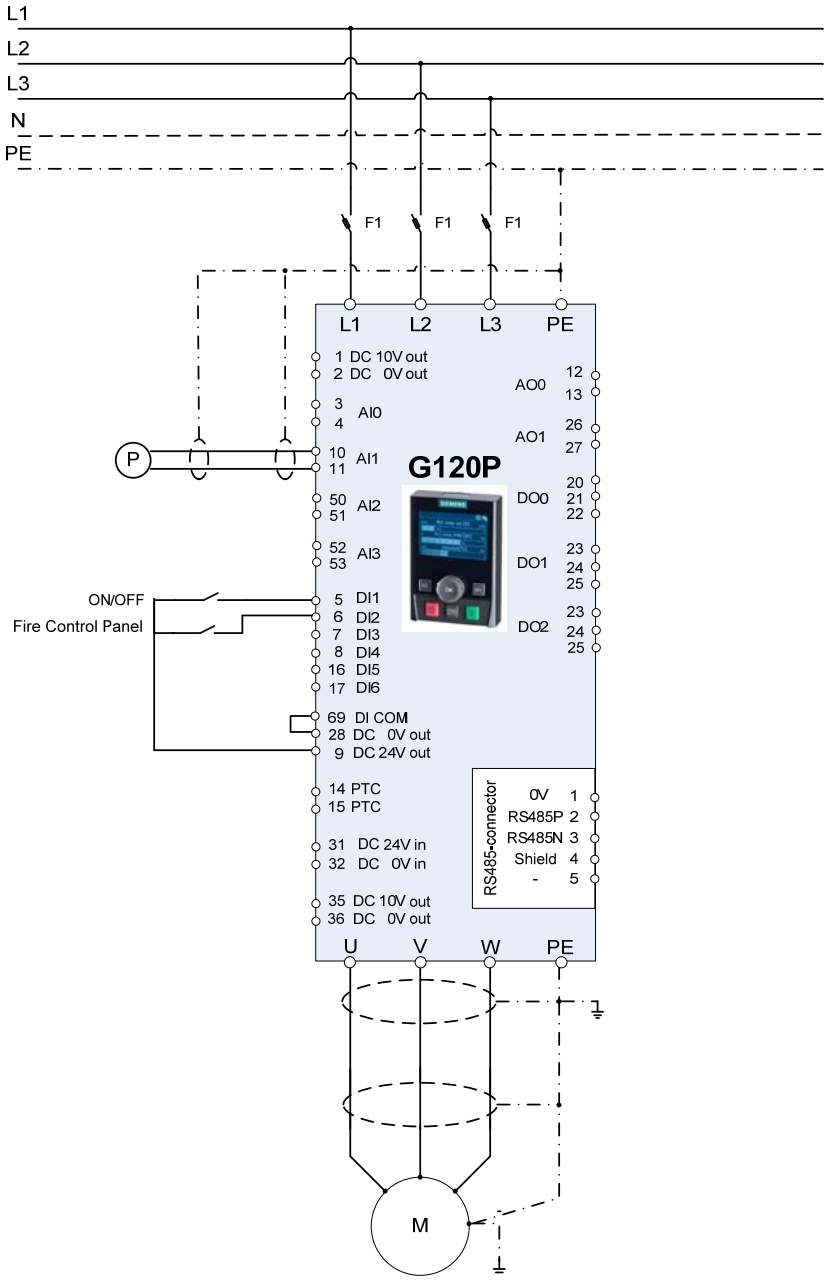
3.6 Application example 6

Description

- In normal operation, the internal PID control loop of the SINAMICS G120P controls the pressure in a stairwell, for example.
- In the case of a fire, this is signaled from the central fire alarm system to the G120P, which then, at a fixed frequency of e.g. 40 Hz, transitions into the ESM mode

Connection circuit diagram

Fig. 3-6



Copyright © Siemens AG 2012 All rights reserved

Parameter settings

Commission the system using the wizards.

Select as macro "12-) standard I/O with analog setpoint"

Table 3-6

Par. No.	Value	Parameter function	Description
p1113[0]	0	Setpoint inversion	Delete the interconnection of the setpoint inversion at DI1, set using the macro
p756[1]	0	Analog input1, type	[0] voltage input (0-10V)
p2200	1	Technology controller enable	1 = enabled
P2201	50	Fixed setpoint	For example 50%
p2253	p2201	Technology controller setpoint	Fixed setpoint
p2264	r755.1	Technology controller actual value	Analog input 1
p2280	1.2 (example)	PID proportional gain	
p2285	30s (example)	PID integral time	
p3880	r722.1	ESM activation	Interconnection of the ESM activation at DI1
p3881	1	ESM setpoint source	Setpoint source for ESM = [1] fixed speed setpoint 15 (p1015)

Comments

- The manual mode is automatically inhibited if ESM is active
- The "Inverter fault", "Inverter alarm" and "Inverter operational" signals are always available at the two relay outputs.
- If required, the “ESM active” signal can be configured at a relay output

Copyright © Siemens AG 2012 All rights reserved

4 Commissioning

4.1 Essential Service Mode (general information)

- If the G120P is in the ESM mode, then all of the active faults are ignored; the only exception are faults that could cause the power unit to be destroyed.

- In the ESM mode, automatic restart (P1210) is automatically set to 6, independent of the setting used in normal operation. This means that critical faults – refer to the list above – are continuously acknowledged and the G120P is continuously restarted.

- If the ESM setpoint fails, three alternative setpoints are available. The system continues to operate with the last setpoint, fixed setpoint or maximum speed.

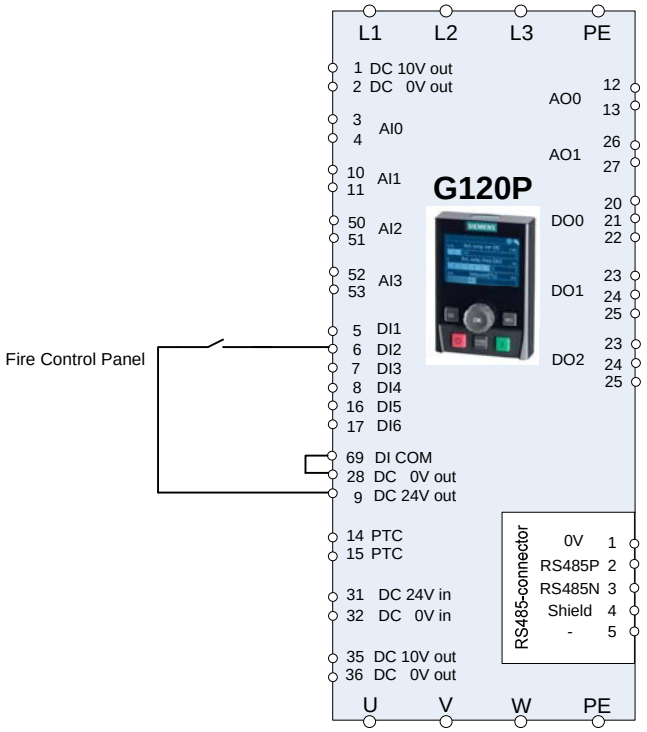
Copyright © Siemens AG 2012 All rights reserved

4.2 Assigning the ESM function to a DI (Digital Input)

According to the standards, all ESM functions can be assigned to the **same** digital input; this means that no additional inputs are required.

We recommend that DI1 is used for ESM. However, in this case, any DI can be used (DI0…DI5) – or another interconnection (e.g. fieldbus).

Fig. 4-1

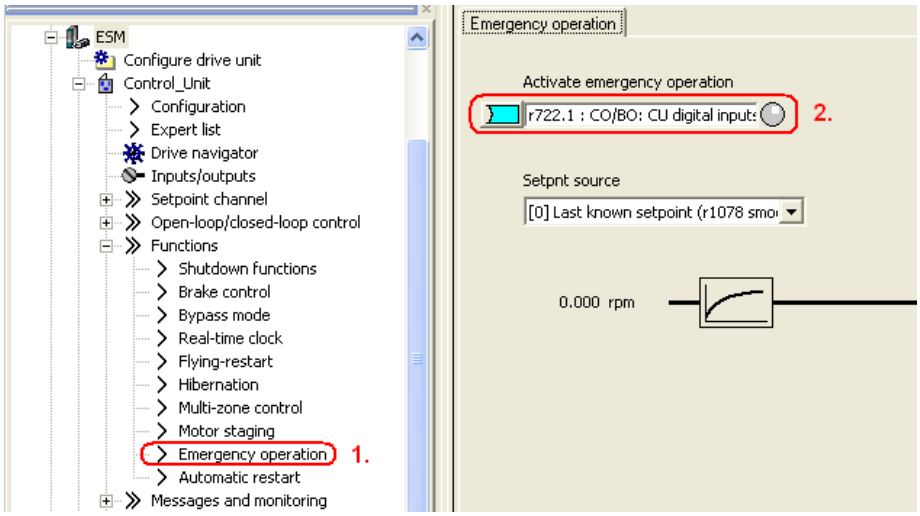


Copyright © Siemens AG 2012 All rights reserved

4.2.1 Starter

Under Functions, open the screen form for emergency service operation **(1.)**

Fig. 4-2



As emergency service operation, activate DI1 (r722.1) **(2.)**

4.2.2 IOP

Table 4-1

Par. No.	Value	Parameter function	Description
p3880	r722.1	ESM activation	Interconnection of the ESM activation at DI1

Copyright © Siemens AG 2012 All rights reserved

4.3 Selecting the setpoint source

5 selection options are available as speed setpoint.

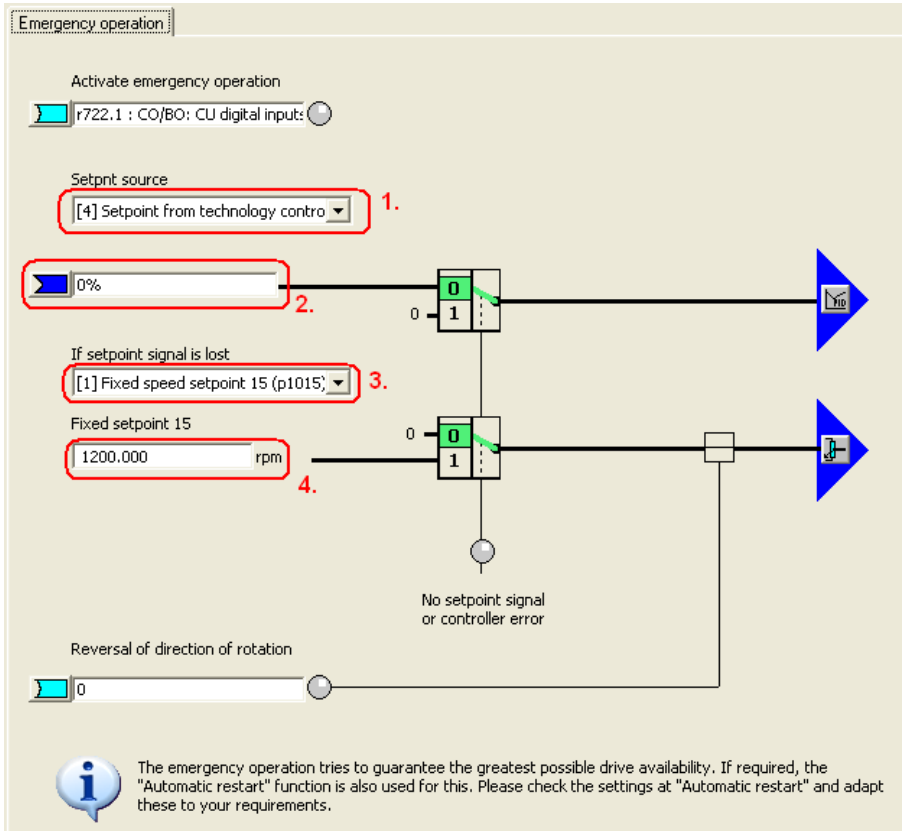
0: Last known setpoint (r1078 smoothed)
1: Fixed speed setpoint 15 (p1015)
2: Analog setpoint AI0 (r0755[0])
3: Setpoint from the fieldbus
4: Setpoint from the technology controller

For a selection 2 - 4, three alternative setpoints are available for the case that the original setpoint fails.

4.3.1 Starter

First select the ESM setpoint source **(1.)** and, depending on the setpoint source (fixed speed setpoint or technology controller) add the setpoint **(2.)**.

Fig. 4-3



If you select the analog input, fieldbus or technology controller as ESM setpoint. You can specify an alternative setpoint, which then becomes effective if the original setpoint fails **(3.)** – and in the case of a fixed speed setpoint, you can also specify a fixed setpoint **(4.)**.

Copyright © Siemens AG 2012 All rights reserved

4.3.2 IOP

Table 4-2

Par. No.	Value	Parameter function	Description
p3881	0 - 4	ESM setpoint source	0: Last known setpoint (r1078 smoothed) (default) 1: Fixed speed setpoint 15 (p1015) 2: Analog setpoint AI0 (r0755[0]) 3: Setpoint from the fieldbus 4: Setpoint from the technology controller
p3882 For p3881=2/3/4	0 - 2	ESM alternative setpoint source	0: Last known setpoint (r1078 smoothed) (default) 1: Fixed speed setpoint 15 (p1015) 2: Maximum speed (p1082)
p3884 For p3881 = 4	x	ESM setpoint for technology controller	
p1015 For p3881 = 1 Or p3882 = 1	x	Fixed speed 15	Fixed speed for the fixed speed setpoint of the ESM.

Copyright © Siemens AG 2012 All rights reserved

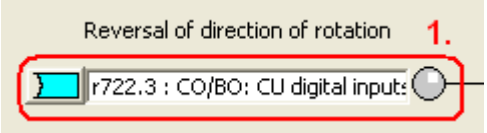
4.4 Direction of rotation reversal in the ESM/fire mode

If no changes are made, then the direction of rotation in the ESM mode is positive (with the exception of a negative setpoint). There is a separate direction of rotation reversal for the ESM mode, which is independent of normal operation. If the drive should always rotate in the negative direction of rotation, then the switchover can be permanently set to 1.

4.4.1 Starter

Interconnect the direction of rotation reversal **(1.)** to the digital input or the interconnection with which you want to reverse the direction of rotation.

Fig. 4-4



4.4.2 IOP

Table 4-3

Par. No.	Value	Parameter function	Description
p3883	r722.3 (example)	ESM direction reversal activation	Interconnection for the ESM direction of rotation reversal.

Copyright © Siemens AG 2012 All rights reserved

4.5 PID control in the ESM/fire mode

Several combinations are possible between the technology controller and the ESM mode. It should be noted that the technology controller also requires an enable signal if it is to be used in the ESM mode. It is not absolutely necessary that it is deactivated if it is not used in the ESM mode.

To set the PID controller as ESM setpoint, refer to Chapter 4.3

4.5.1 PID controller in the standard and ESM modes

With this combination, the technology controller can be activated for both. When switching over into the ESM mode, the setpoint of the PID controller can be automatically switched over.

4.5.2 PID controller in the standard mode only.

With this combination, the technology controller can also be activated for both. The ESM setpoint overwrites the output value of the technology controller. However, when the PID controller is active, note that the ramp-function generator is deactivated, and therefore the G120P quickly changes the speed.

4.5.3 PID controller in the ESM mode only

With this combination, the technology controller may only be active in the ESM mode. For example, this can be implemented by setting the technology controller enable p2200 = r3889.0 (ESM mode active)

Copyright © Siemens AG 2012 All rights reserved

4.6 Displaying the ESM/fire mode

4.6.1 IOP display of the ESM/fire mode

If the ESM mode is activated, the message "Drive is in Essential Service Mode (ESM)" is displayed; when OK is pressed, this message is cleared and the normal display options of the IOP are available.

Further, a symbol of a burning house is displayed at the upper right of the screen



4.6.2 Relay output display of the ESM/fire mode

If a relay is required to display the state of the ESM, then a digital output can be interconnected to the ESM mode signal.

Example: If the ESM mode is to be output via digital output 1, then parameter p731 must be interconnected with r3889.0 (ESM mode active).

This functions in the same way with DO 0 - p730 and DO 2 - p732.

Copyright © Siemens AG 2012 All rights reserved

4.7 Fault handling in the ESM/fire mode

The G120P is designed, so that when ESM is activated, all faults and alarms are ignored – with the exception of the critical faults. Critical faults are faults that can lead to the G120P being damaged.

Critical faults include the following:

F01000 Internal software error
F01001 Floating Point exception
F01002 Internal software error
F01003 Acknowledgment delay when accessing the memory
F01015 Internal software error
F01040 Save parameter settings and carry out a POWER ON
F01044 Descriptive data error
F01205 Time slice overflow
F01512 BICO: No scaling available
F01662 Error internal communications
F07901 Drive: Motor overspeed
F30001 Power unit: Overcurrent
F30002 Power unit: DC link voltage ,overvoltage
F30003 Power unit: DC link voltage, undervoltage
F30004 Power unit: Overtemperature heat sink AC inverter
F30005 Power unit: Overload I2t

F30017 Power unit: Hardware current limit has responded too often
F30021 Power unit: Ground fault
F30024 Power unit: Overtemperature thermal model
F30025 Power unit: Chip overtemperature
F30027 Power unit: Precharging DC link time monitoring
F30036 Power unit: Internal overtemperature
F30071 No new actual values received from the Power Module
F30072 Setpoints can no longer be transferred to the Power Module
F30105 PU: Actual value sensing fault
F30662 Error in internal communications
F30664 Error while booting
F30802 Power unit: Time slice overflow
F30805 Power unit: EPROM checksum error
F30809 Power unit: Switching information not valid

If one of these faults occurs, then the G120P shuts down with an OFF2 stop (coasts down to a stop); it then attempts a fault acknowledgment as well as an automatic restart.

This process permanently continues, or stops if the G120P has been destroyed.

Copyright © Siemens AG 2012 All rights reserved

4.8 Automatic restart in the ESM/fire mode

When ESM is activated and enabled (the DI that is assigned to the ESM is energized), then the setting internally changes to 6 within P1210 (automatic restart).

Setting 6 permits an automatic restart after a line brownout, line blackout or a fault. The number of restarts is unlimited.

The following parameters must be taken into consideration for the ESM – even if P1210 deviates from the setting 6 in normal operation:

P1212 (time up to the first restart) = 1 s (default)
P1213 (restart interval) = 60 s (default)

Note

If P1210 has a setting other than 6, if ESM is not activated (normal operation), then when ESM is activated, setting 6 is not visible, as this takes place internally.

4.9 Acknowledging an existing fault in the ESM/fire mode

If a fault occurs, before the ESM/fire mode is enabled, then the G120P ignores all uncritical faults and attempts to acknowledge all critical faults and start the motor. If a critical fault is still present, then the G120P switches off and attempts to restart for an unlimited number of times or until it (G120P) is destroyed.

4.10 G120P starting in the ESM/fire mode

When ESM is enabled, the G120P **always** starts – even, if no switch-on command is activated in the standard settings.

Example: In a building, the air handling units can be shut down overnight or at weekends. If a fire is signaled, when required, the central fire alarm system overrides the standard control of the building automation system. However, the activation of the ESM/fire mode in the G120P by the central fire alarm system ensures that the smoke extraction fans are switched-on.

4.11 Stopping the G120P in the ESM/fire mode

After the ESM has been activated, the only possibility of stopping the G120P is to open the ESM circuit (deactivate the DI, which is assigned to ESM) or to interrupt the power supply to the G120P.

The manual operation at the IOP or the OFF1, OFF2 or OFF3 command sources used in normal operation have no effect and cannot be used to stop the drive.

Example

From AS/NZS 1668.1: 1998: "Operator and maintenance personnel should not be able to deactivate, reprogram or bring the converter into a non-functional state accidentally, which would prevent correct operation in the case of a fire."

NOTICE The personnel in the plant or system must clearly understand that after activating the ESM/fire mode, the G120P **it is not stopped** until the DI assigned to the ESM mode is opened.

Copyright © Siemens AG 2012 All rights reserved

5 References

5.1 Internet links - data

This list in no way complete and only reflects a selection of suitable information.

Table 5-1

	Subject area	Title
\1\	Reference to the article	http://support.automation.siemens.com/WW/view/de/BeitragsID
\2\	Siemens Industry Online Support	http://support.automation.siemens.com
\3\	G120P data sheet CM2N5111de	https://www.hqs.sbt.siemens.com/gip/general/dlc/data/assets/hq/Frequenzumrichter-fuer-Pumpen-und-Luefter-SINAMICS-G120P_A6V10370249_hq-en.pdf
\4\	Getting Started	http://support.automation.siemens.com/WW/view/de/51421059
\5\	Application examples	http://support.automation.siemens.com/WW/view/en/20208582/136000
\6\	General product information	http://www.siemens.com/g120p
\7\	Control Unit operating instructions	http://support.automation.siemens.com/WW/view/de/44386550
\8\	List Manual, Control Unit	http://support.automation.siemens.com/WW/view/de/49946106
\9\	Desingo CM110576	

Copyright © Siemens AG 2012 All rights reserved

6 Contact person

Siemens AG

Industry Sector
I DT MC PMA APC
Frauenauracher Strasse 80
D - 91056 Erlangen
mailto: tech.team.motioncontrol@siemens.com

7 History

Table 7-1

Version	Date	Change
V1.0	06/2012	First Edition