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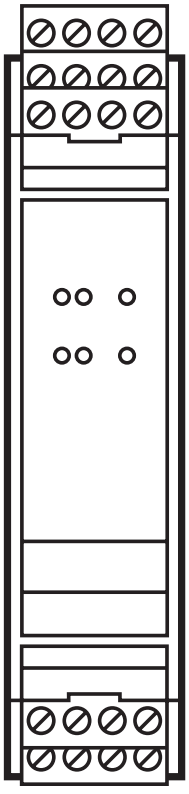
CE

Original Installation Instructions
Safety Standstill Monitor

UK

ecomat200®

DA102S



80001217/00 06/2013 For hardware version 1.0

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This document is the original instructions.

1 Preliminary note

The instructions are part of the unit. They are intended for authorised persons according to the EMC and Low Voltage Directives and safety regulations.
The instructions contain information about the correct handling of the product.
Read the instructions before use to familiarise yourself with operating conditions, installation and operation.
Follow the safety instructions.

1.1 Symbols used

▶ Instructions
> Reaction, result
→ Cross-reference


Important note
Non-compliance can result in malfunction or interference.


Information
Supplementary note.

○ LED off
● LED on
 LED flashes
 LED flashes quickly
 2 LEDs flash alternately

2 Safety instructions

- Follow the operating instructions.
- Improper use may result in malfunctions of the unit. This can lead to personal injury and/or damage to property during operation of the machine. For this reason note all remarks on installation and handling given in this document. Also adhere to the safety instructions for the operation of the whole installation.
- In case of non-observance of notes or standards, especially when tampering with and/or modifying the unit, any liability and warranty is excluded.
- The unit must be installed, connected and put into operation by a qualified electrician trained in safety technology.
- The applicable technical standards for the corresponding application must be complied with.
- For installation the requirements according to EN 60204 must be observed.
- Connect and lay all cables according to EN ISO 13849-2 D.5.2 (Safety of machinery - Safety-related parts of control systems).
- In case of malfunction of the unit please contact the manufacturer. Tampering with the unit is not allowed.
- Disconnect the unit externally before handling it. Also disconnect any independently supplied relay load circuits.
- After installation of the system perform a complete function check.
- Use the unit only in specified environmental conditions (→ 11 Technical data). In case of special operating conditions please contact the manufacturer.
- Use only as described below (→ 4 Functions and features).

3 Items supplied

- 1 safe standstill monitor DA102S including 5 Combicon connectors with screw terminals
- 1 original operating instructions "Safe standstill monitor" reference no. 80001217.

If one of the above-mentioned components is missing or damaged, please contact one of the ifm branch offices.

4 Functions and features

The device is a 2-channel pulse evaluation system for the safe detection of underspeed or standstill of an object.

For evaluation, the device requires 2 pulse pick-ups (pnp-switching sensors with "normally open" function).

The safe state is when the output contacts (13-14 and 23-24) of the device are open.

ifm electronic gmbh does not assume any liability for the function and the interaction of the device with devices from other manufacturers.

Suitability of the device for a certain application cannot be assured and must be ensured by the user.

The device can be used in applications up to

- PL e according to ISO 13849-1
- SIL 3 according to IEC 61508
- SIL_{CL} 3 according to EN 62061

4.1 Requirements for the hardware configuration

The following requirements must be met when using the device:

4.1.1 Product-independent requirements

It must be ensured that the safety requirements of the respective application correspond to the requirements stated in these instructions.

The specified technical data indicated in these instructions must be complied with. The principle of normally closed operation must be applied to all external safety circuits connected to the system.

The following points have to be ensured in the application by taking administrative measures:

- The devices of type "safe standstill monitor", DA102S, in operation must be subjected to a self-test (switching on) within a period of maximum 6 months (intermittent operation).
  The self-test starts when the supply voltage is applied.
  (→ 7.2 Supply voltage)
- The safety-relevant relay contacts have to be protected by respective fuses of 3.6 A as short-circuit/overload protection.
  (→ 7.6 Switching outputs 14-23 and 24-24)

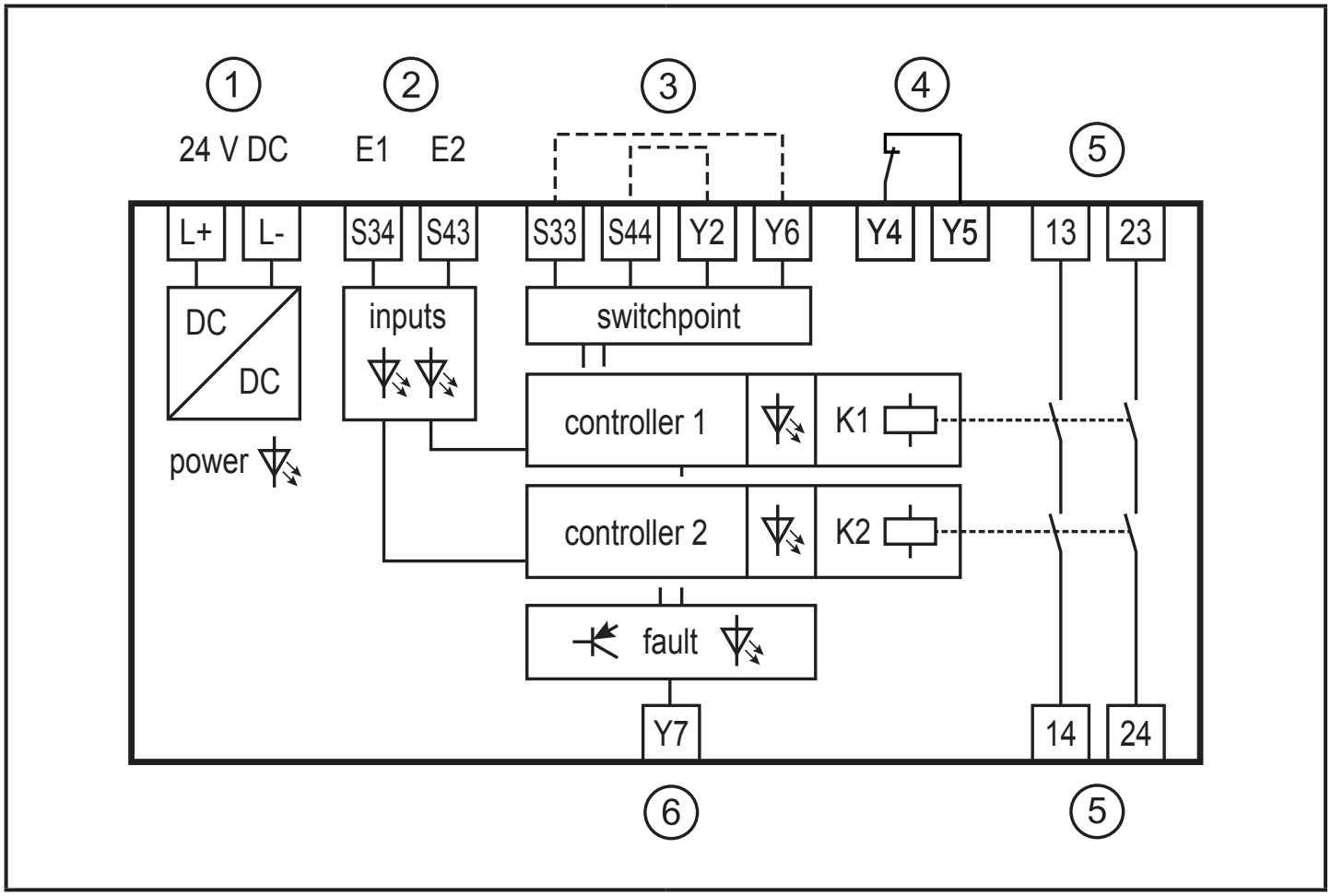
4.1.2 Product-dependent requirements

In case of faults within the device which result in the defined safe state, the device must be replaced.

Any faulty unit should be returned to the manufacturer.

5 Function

5.1 Block diagram



1: Supply voltage
2: Inputs
3: Switch point setting (bridging)
4: Feedback contact
5: "Standstill" switching outputs
6: "Fault" transistor output

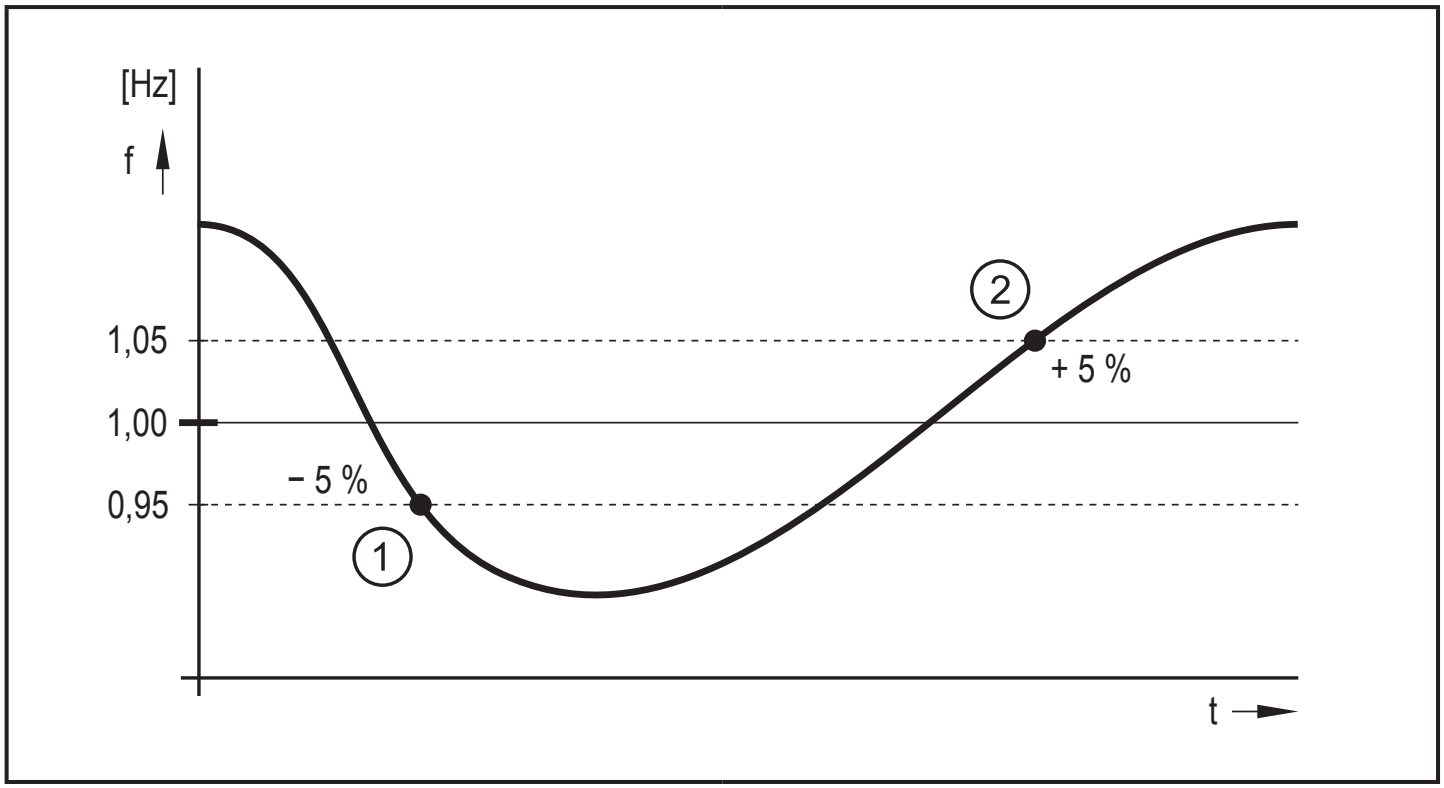
5.2 Operating principle

The device is a 2-channel pulse evaluation system for the safe detection of underspeed or standstill. In this respect the device picks up the pulse sequences of 2 connected pulse pick-ups.

The microprocessors calculate the resulting frequency. The device detects underspeed as compared to the set switch point by constantly comparing the frequency of the actual and the preset values.

5.3 Switching function

In accordance with a "safe standstill message", the output relays are energised when the switch point is not reached or with standstill.
The output relays K1/K2 switch (are energised) when the set switch point is 5% below the set level. They switch back (are de-energised) when the set switch point is exceeded by 5%.



Switching function
e.g. switch point setting 1 Hz

1: Switching outputs close "Standstill" message
2: Switching outputs open "No standstill" message

5.4 Switch point setting

Via an external circuit the switch point can be selected from 4 preset values (0.2 / 0.5 / 1 / 2 Hz).
(→ 7.3 Switch point setting)

5.5 Switching outputs 14-23 and 24-24

Each input channel has an effect on the output relay.
The NO contacts of the output relays K1/K2 are connected in series. The switching outputs are closed when both output relays have switched.

By means of the switching outputs a door guard locking system can, for example, be controlled.

5.6 Y7 transistor output

The Y7 transistor output provides a non-safety related signal for communication to a PLC.

Status	Y7 transistor output
Normal operation (no error)	HIGH (ON)
Error	LOW (OFF)

The output data is compatible with the input data of the current-sinking inputs of type 1, 2, 3 to EN 61131-2.

5.7 Pulse pick-ups (sensors)

2 pnp-switching sensors with the "normally open" output function are connected to the device as pulse pick-ups.

The position of the sensors and the mechanical design of the cams are not arbitrary since one sensor must always be damped.
(→ 6.3 Arrangement of the damping cams)

5.8 Sensor monitoring

In order to prevent faulty standstill signalling, the sensors are permanently monitored during operation of the installation.

5.8.1 Pulse comparison input 1 and 2

By permanently comparing the pulses it is evaluated whether the pulse sequences of both sensors differ from each other.
If during operation a mechanical or electrical error causes one sensor to fail, there will be an interruption of the otherwise identical pulse sequence ($f1 \neq f2$).

In accordance with "safe" standstill monitoring this is not considered as underspeed.

The output relays K1/K2 do not switch, there is an error message.

5.8.2 Mechanical requirements on damping cams and gaps

The arrangement of the mark-to-space ratio of the damping cams and gaps ensure that at least one sensor is damped all the time.

Therefore the gap between the damping cams must not be of a size that both sensors face a gap at the same time and are not damped.

The device monitors continuously if this condition is met.
If this regulation is violated, there is an error and the device goes into the safe state.

(→ 6.3 Arrangement of the damping cams)

5.9 Error message

If the device detects an error, the switching outputs are kept in the safe state.
The "Fault" LED is lit and the transistor output Y7 opens ("LOW" status).

Definition "safe state":

- Output relays K1/K2 are de-energised
- Switching outputs 13-14 and 23-24 open
- No standstill message

The error message is reset by interrupting the voltage supply.

5.10 Feedback contact

The device monitors the position of the guard locking by means of a feedback contact.

- When a movement starts, the output relays K1/K2 are de-energised.
  The switching outputs open.
  The output LEDs K1/K2 flash when the feedback contact is open.
- If the input frequency is greater than the switch point and the feedback contact is open, the output LEDs K1/K2 flash.
  With resulting standstill and continually open feedback circuit the output relays K1/K2 are not energised.
  The switching outputs remain open.

There is no error message.
Transistor output Y7 remains closed ("HIGH" state).

(→ 7.5 Feedback contact)

6 Installation

6.1 Installation of the device

▶ Mount the device on a DIN rail in a housing protected against dust and humidity (min. IP54 - degree of soiling 2).

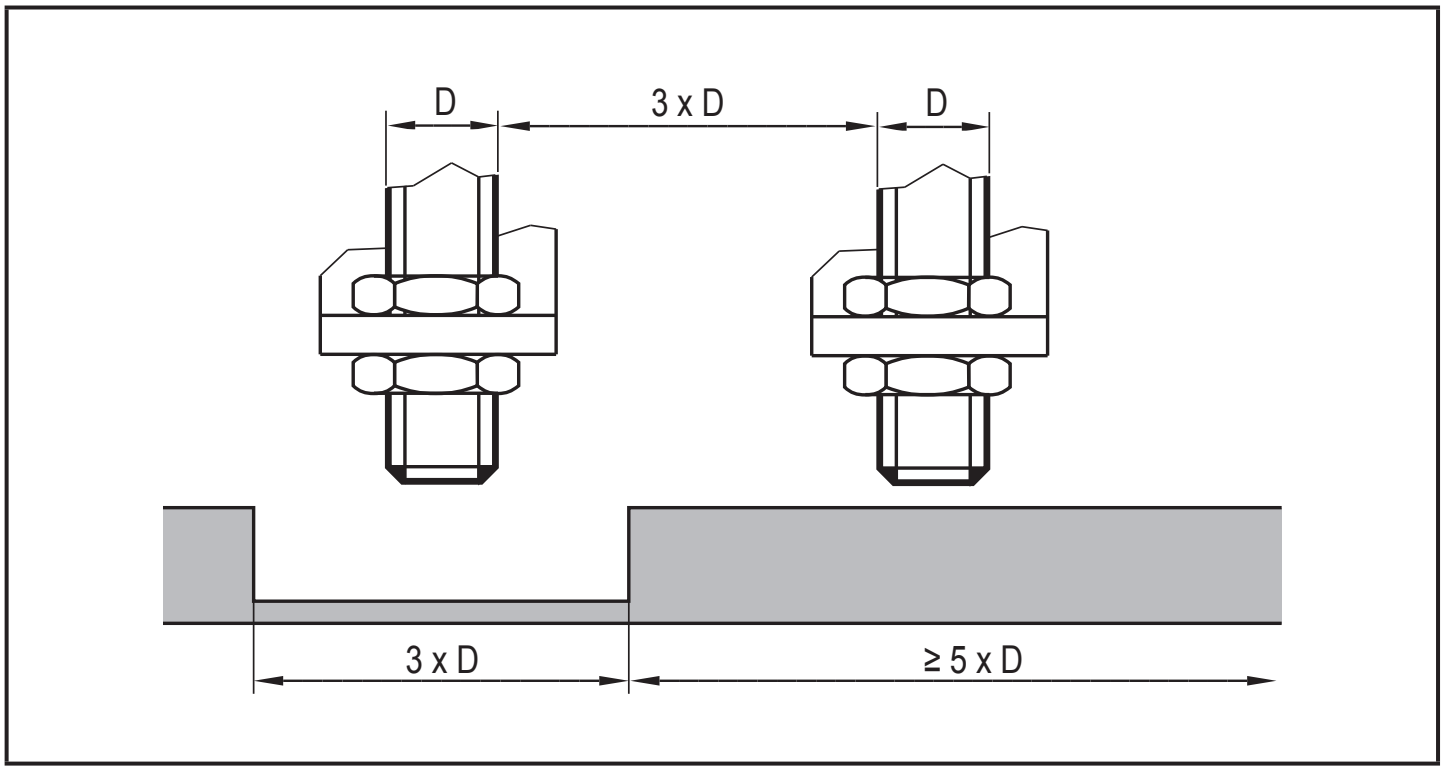
6.2 Installation of the pulse pick-ups (sensors)

▶ Mount the pulse pick-ups mechanically separated from each other. (Not together on a mounting bracket.)
▶ Lay the cables to the pulse pick-ups separately and protect them against damage.

6.3 Arrangement of the damping cams

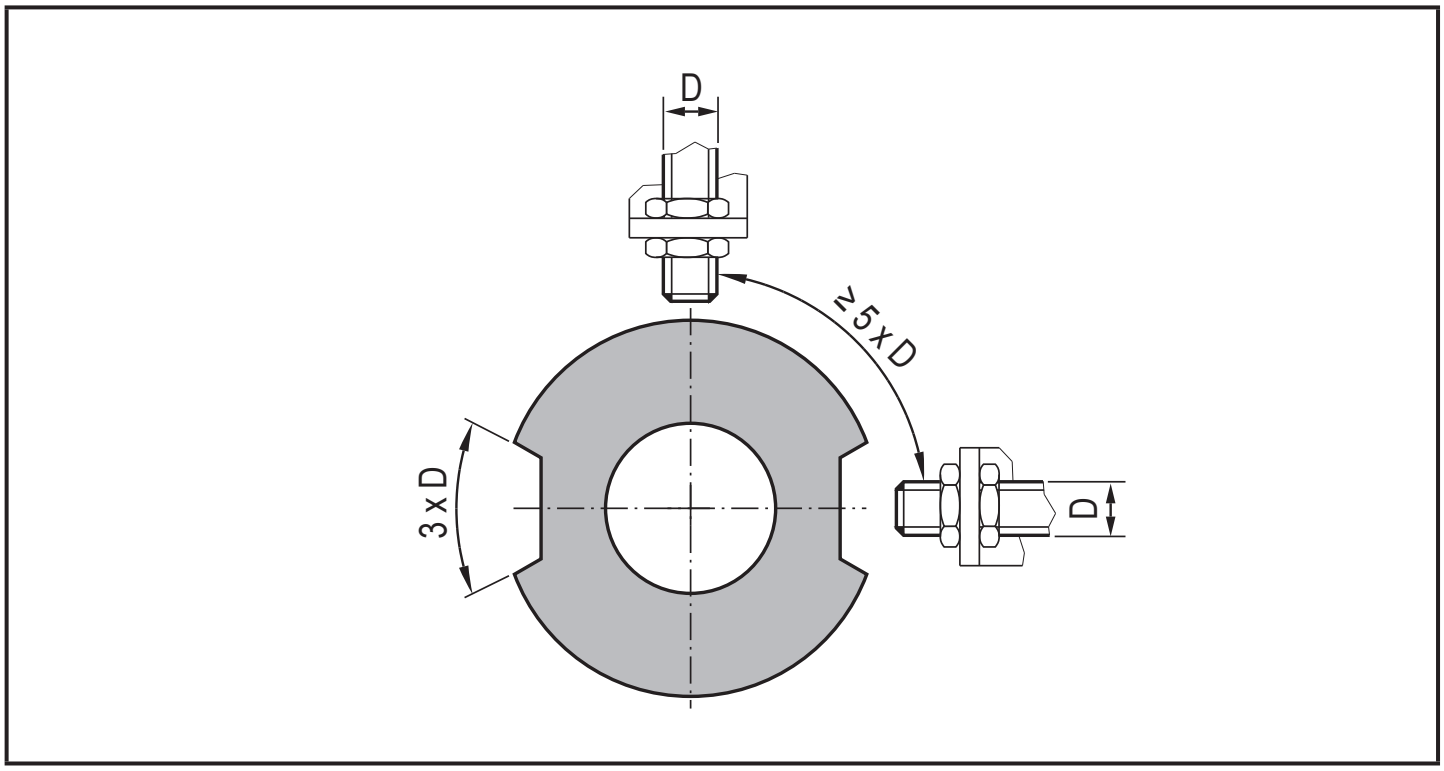
The arrangement of the damping cams and the gaps must ensure that at least one sensor is always damped (→ 5.8 Sensor monitoring).

6.3.1 Example rack



Mechanical requirements

6.3.2 Example cam disc



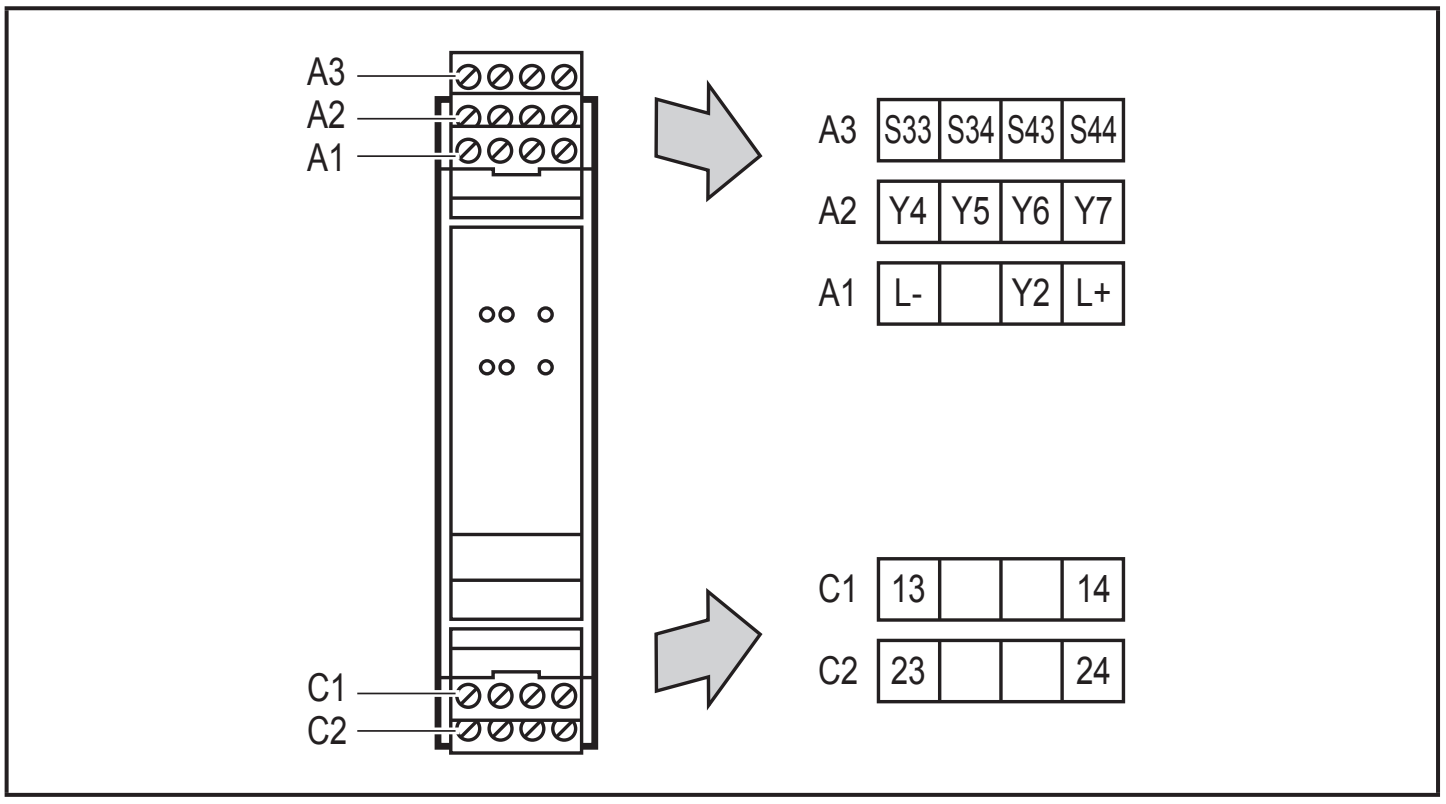
Mechanical requirements

7 Electrical connection

▶ Use 60/75°C copper conductors only.

Do not use unconnected terminals as support point terminal.

7.1 Connections (overview)



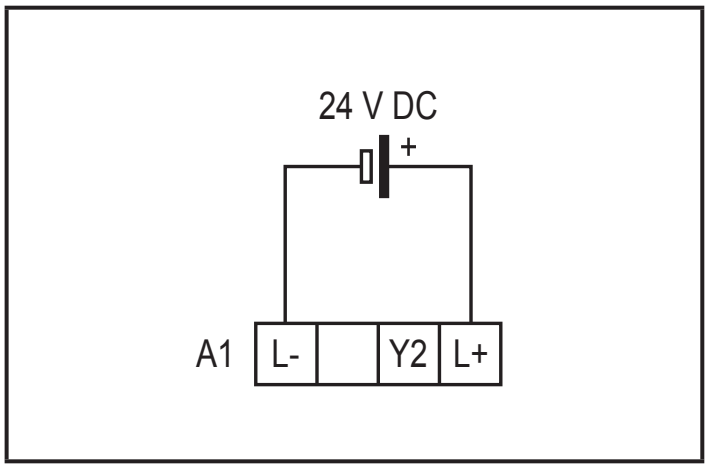
Combicon connector

Connector	Terminal	Connection	
A1	L-, L+	Supply voltage	(→ 7.2)
	Y2	Switch point setting (bridging)	(→ 7.3)
A2	Y4, Y5	Feedback contact	(→ 7.5)
	Y6	Switch point setting (bridging)	(→ 7.3)
	Y7	Transistor output	(→ 7.7)
A3	S34, S43	Pulse inputs	(→ 7.4)
	S33, S44	Switch point setting (bridging) Supply voltage sensors	(→ 7.3) (→ 7.4)
C1	13, 14	Switching output 1	(→ 7.6)
C2	23, 24	Switching output 2	

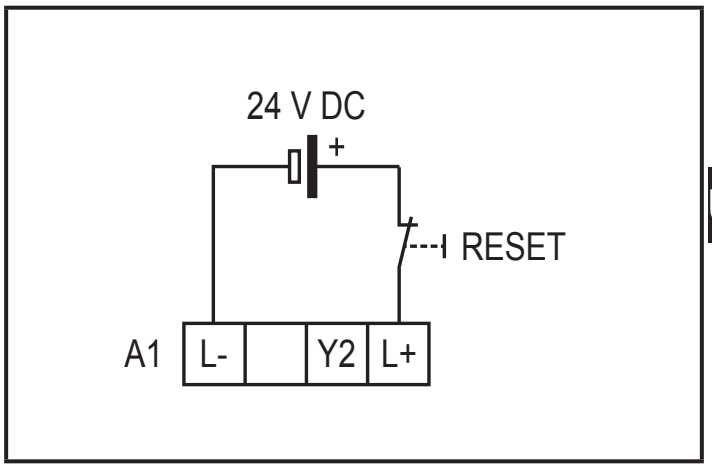
7.2 Supply voltage

▶ Connect the supply voltage of the device to terminals L+ and L-.

For safety reasons the unit can only be restarted by separation from the voltage supply in case of a fault.
It is thus recommended to install a RESET button in series with the L+ circuit.



Supply voltage



RESET button

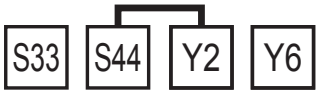
The external supply unit must have a safe separation. In case of a fault the supply voltage can exceed the value of 60 V DC for a maximum of 200 ms, but must not exceed the value of 120 V DC.

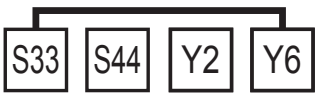
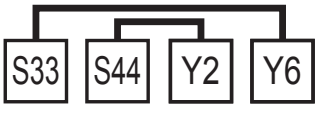
After power on or a RESET the device carries out self diagnostic functions. This self diagnosis lasts approx. 6 seconds. The unit is then ready for operation.

7.3 Switch point setting

▶ Set the requested switch point via a hard-wired bridge on the terminals S33, S44, Y2 or Y6.

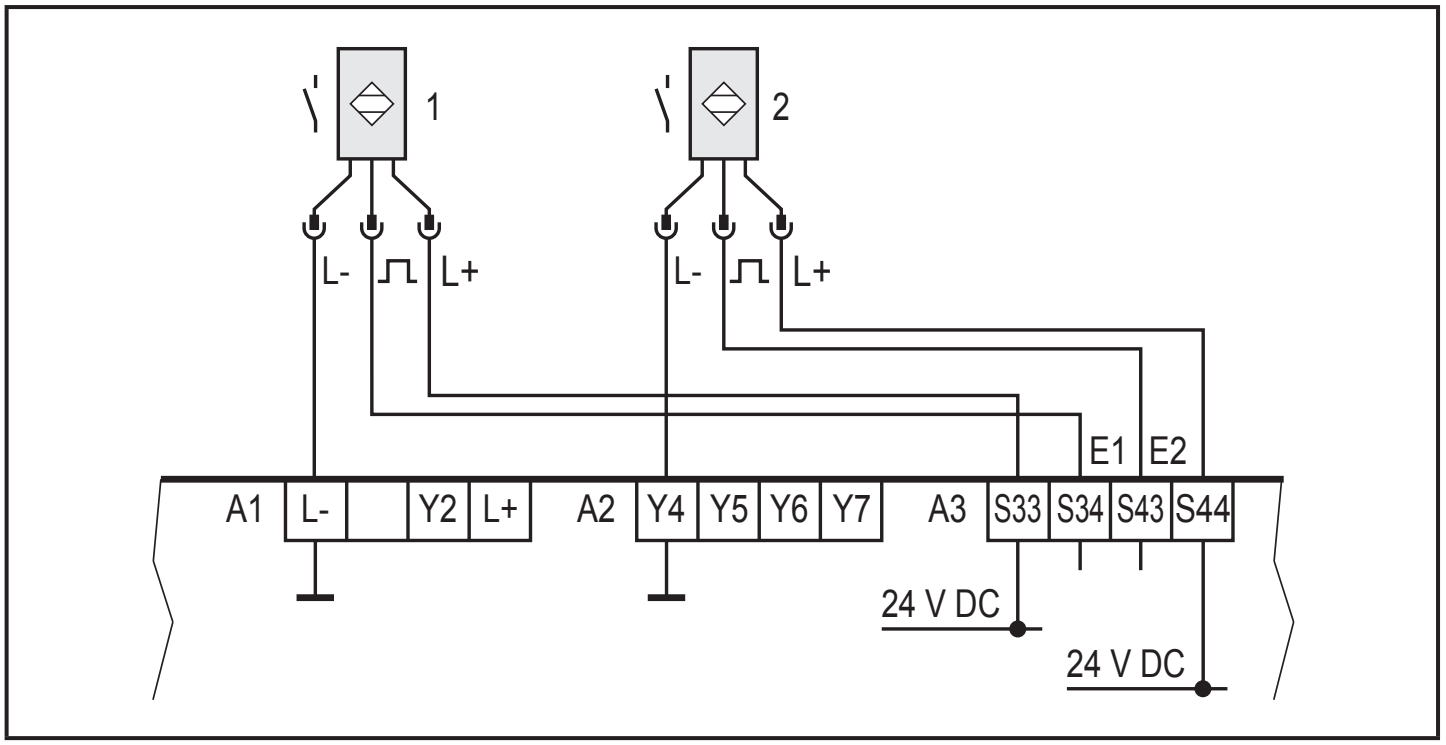
Only change the switch point when disconnected from power.
When switched on, a change of the circuitry will produce an error message of the device.

Wiring	
0.2 Hz	
0.5 Hz	

Wiring	
1.0 Hz	
2.0 Hz	

7.4 Pulse pick-ups (sensors)

- ▶ Use pnp-switching sensors with the "normally open" function.
- ▶ Connect the supply voltage of the sensors to the terminals S33 and S44.
- ▶ Connect the mass of the sensors to the terminals L- and Y4.



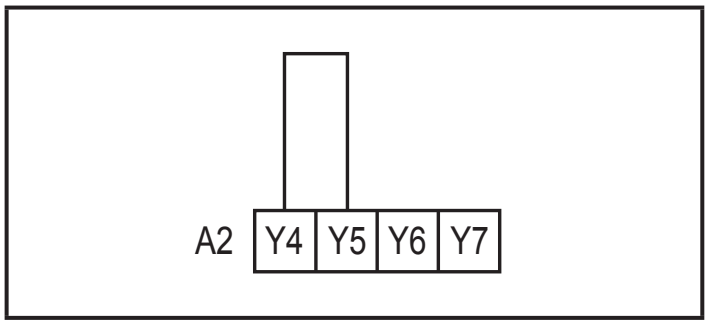
Pulse pick-ups (sensors)

Observe the current consumption of the sensors.
Supply the sensors externally if the current consumption exceeds the current rating of the terminals S33 and S44 (→ 11 Technical data).

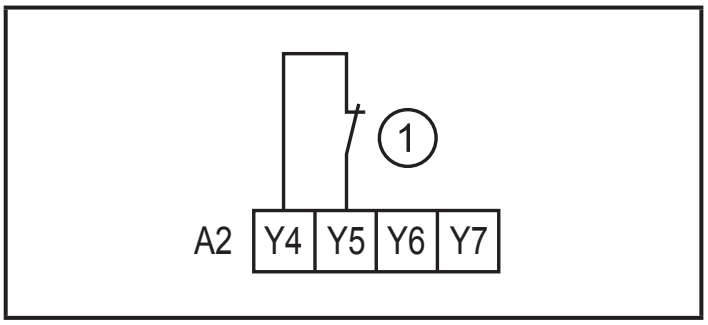
7.5 Feedback contact

- ▶ Connect the feedback contact to input A2 (Y4-Y5).
- ▶ Observe the characteristic data of the input (→ 11 Technical data).

If the monitoring function is not required, the terminals Y4-Y5 can be permanently bridged.



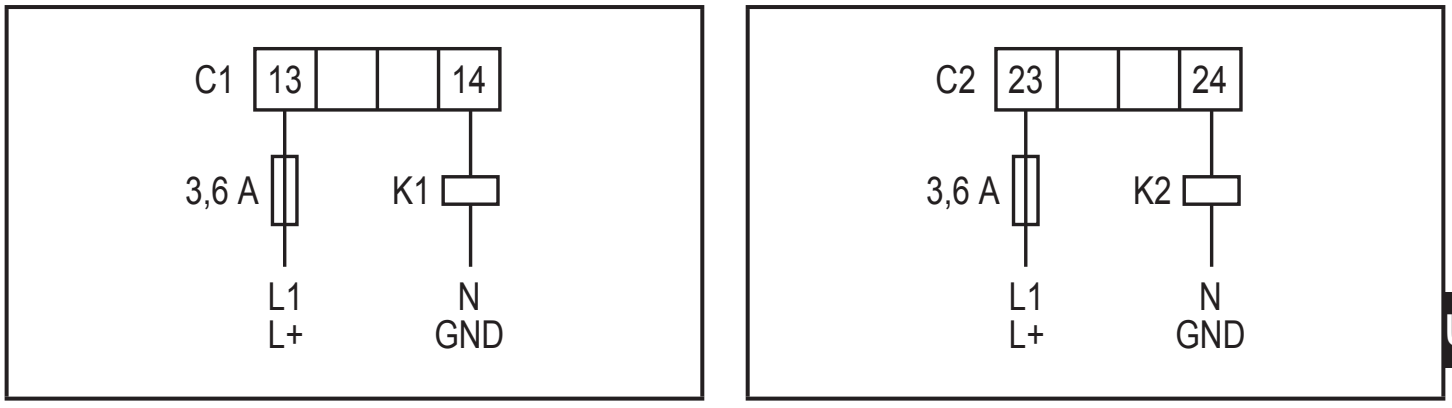
Without monitoring with bridge



1: Feedback contact (normally closed)

7.6 Switching outputs 14-23 and 24-24

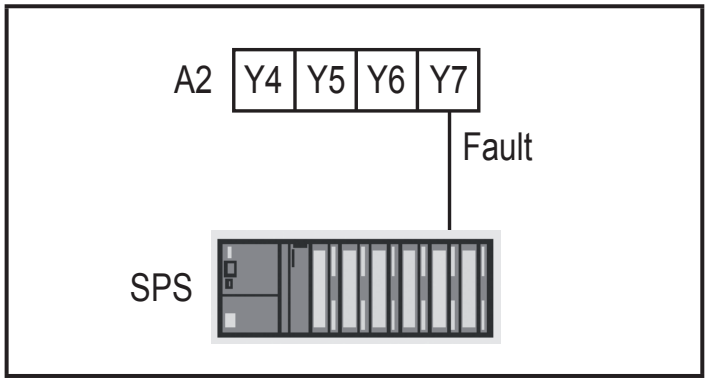
- ▶ Connect to load to be controlled to the outputs C1 (13-14) and/or C2 (23-24).
- ▶ Observe the maximum and minimum load conditions (→ 11 Technical data).



Switching outputs

7.7 Y7 transistor output

- ▶ Connect transistor output Y7 to the signal input of the PLC.
- ▶ Observe the characteristic data of the output (→ 11 Technical data).



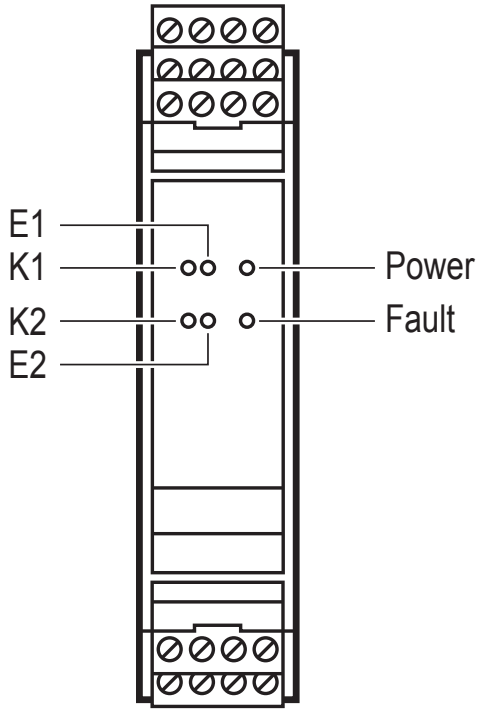
Transistor output

8 Set-up

The device is ready for operation after application of the supply voltage and the self-diagnosis.

▶ After installation and electrical connection, check whether the device operates safely.

9 Display elements



Display elements

LED	Colour	Meaning (normal operation)
E 1	Yellow	Input signal channel 1
K 1		Output relay channel 1
E 2	Yellow	Input signal channel 2
K 2		Output relay channel 2
Power	Green	Supply voltage
Fault	Red	Error

Detailed status description and error description (→ 9.1 LED indications and switching characteristics)

9.1 LED indications and switching characteristics

9.1.1 General

Status	Power	Fault	K1, K2	E1, E2	Outputs 13-14, 23-24	Transistor Y7
Standstill	●	○	●	*)	ON	HIGH
No standstill	●	○	○	*)	OFF	HIGH
Feedback contact open	●	○	⊗	*)	OFF	HIGH
Overvoltage/ undervoltage	⊗	○	*)	*)	*)	HIGH

Symbols used (→ 1.1)
*) current status

9.1.2 External errors

Status	Power	Fault	K1, K2	E1, E2	Outputs 13-14, 23-24	Transistor Y7
S33 and S44 Short-circuit against mass or U_B	●	●	○⊗	○	OFF	LOW
Inputs 1 and 2 simultaneously "0"	●	●	○	●	OFF	LOW
Relay fault, e.g. contacts welded because of overload or life expectancy reached	●	●	⊗	○	OFF	LOW
Impermissible pulse difference between the inputs (f1 ≠ f2)	●	●	○	⊗	OFF	LOW
Impermissible switch-point change during operation	●	●	○	○⊗	OFF	LOW

Symbols used (→ 1.1)

9.1.3 Internal faults

Status	Power	Fault	K1, K2	E1, E2	Outputs 13-14, 23-24	Transistor Y7
Device-internal error	☀	✱	○	○	OFF	LOW

A flash code is output via the "Power" LED.
This flash code enables the manufacturer to analyse the device-internal error.

▶ If the error message is not reset in spite of the interruption of the supply voltage, exchange the device (→ 4.1.2 Product-dependent requirements).

10 Maintenance, repair and disposal

If used correctly, no maintenance and repair measures are necessary.

▶ Observe the product-dependent requirements (→ 4.1.1).
▶ Check the safe functioning of the unit after a fault.

Only the manufacturer is allowed to repair the unit.

After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

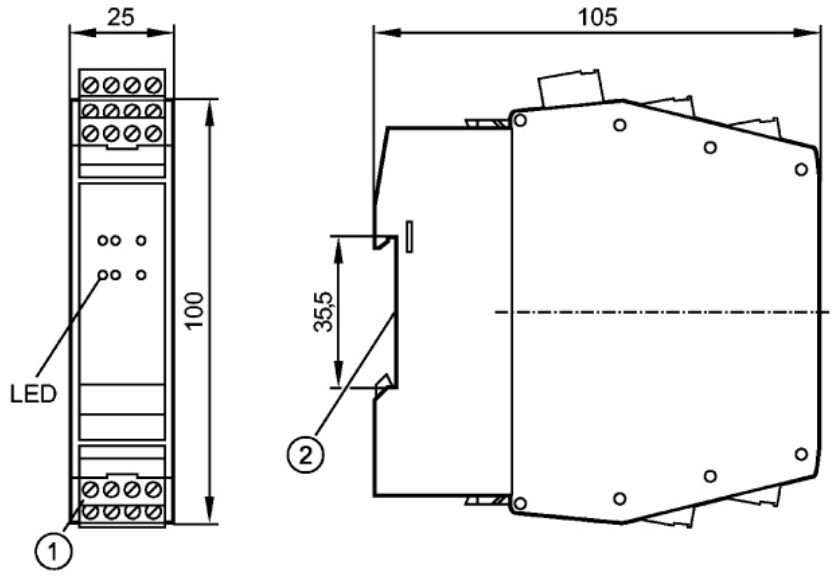
11 Technical data

ecomat200

DA102S

Safety Standstill Monitor

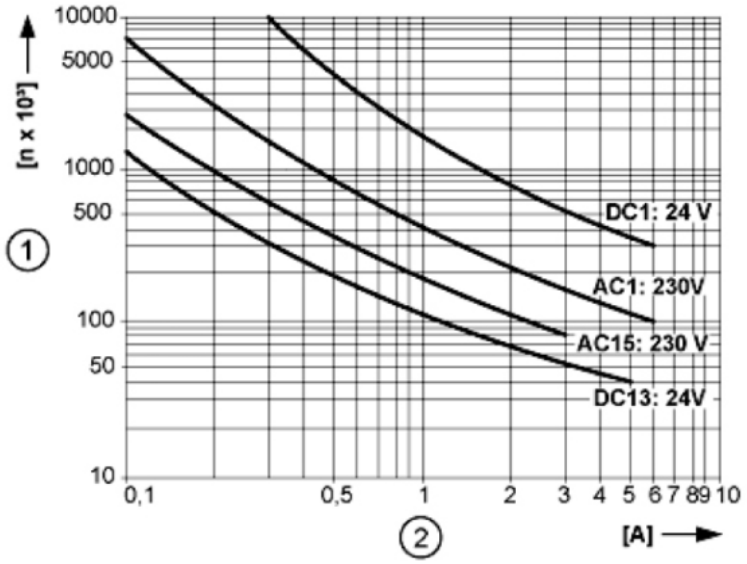
Evaluation systems



1: Combicon connector with screw terminals
2: Mounting on DIN rail

Made in Germany

Product characteristics		
Safety Standstill Monitor		
Evaluation system for safe standstill monitoring		
for 2 pnp switching sensors		
4 switch points selectable		
Error message		
Complies with the requirements: EN ISO 13849-1: category 4 PL e IEC 61508: SIL 3		
Application		
Application		Monitoring rotational or linear movements for minimum switch point not reached (standstill)
Electrical data		
Electrical design		Relay
Operating voltage	[V]	24 DC (19.2...30 DC); incl. 5 % residual ripple
Current consumption	[mA]	≤ 200
Protection class		II
Power-on delay time	[s]	6
Sensor supply		24 V DC / ≤ 50 mA
Inputs		
Input characteristics		Pulse inputs S34, S43: "1": ≥ 11 V, ≤ 10 mA "0": ≤ 5 V, ≤ 2 mA Input voltage: ≤ 36 V
Input frequency [Hz]		≤ 3500
Outputs		
Output function		2 safety-related switching outputs (floating contacts); 1 fault output (positive switching)
Contact rating		6 A, 250 V AC / 24 V DC (≥ 6 mA)
Switching cycles (mechanical)		> 10000 x 10^3

Switching cycles (electrical)	 1: switching cycles; 2: switching current	
Max. switching capacity (DIN EN 60947-5-1 / EN 60947-5-1)	AC1: 250 V / 6 A AC15: 230 V / 3 A DC1: 24 V / 6 A DC13: 24 V / 5 A / 0.1 Hz UL 508: B300 / R300	
Short-circuit protection	The contacts are to be protected by means of fuses with a nominal current of < 3.6 A.	
Switch points	0.2 / 0.5 / 1.0 / 2.0 Hz	
Switching function	Switching outputs 13-14 and 23-24 closed with standstill Y7 transistor output open (LOW) with fault	
Accuracy / deviations		
Hysteresis	[%]	± 5
Environment		
Ambient temperature	[°C]	-25...55
Protection		IP 20
Safety classification		
Mission time TM	[h]	≤ 175200, (20 years)
Test interval T1	[Years]	0.5
Safety-related reliability PFHd	[1/h]	3.38 E-09
Mechanical data		
Housing materials		PA (polyamide)
Displays / operating elements		
Display		Voltage green Fault red Switching status 2x yellow Input pulses 2x yellow
Electrical connection		
Connection		Terminal block Phoenix Contact MSTBO
Accessories		
Accessories (included)		Combicon connector with screw terminals
Remarks		
Pack quantity	[piece]	1

12 Tests / approvals

The device was tested and certified by TÜV-Nord.

The device was developed and tested in accordance with the following directives and standards:

- 2006/42/EC Machinery Directive
- 2004/108/EC EMC Directive
- 73/23/EEC or 93/68 Low voltage directive
- ISO 13849-1: 2008 Safety of machines - safety-related parts of control systems
- IEC 61508: 2011 Functional safety of electrical/electronic/programmable electronic safety-related systems
- EN 60204-1: (1997) (where applicable) Electrical equipment of machines
- UL 508

13 Terms and abbreviations

Cat.	Classification of the safety-related parts of a controller as regards their resistance to failures.	
CCF	Common Cause Failure	
DC	Diagnostic Coverage	
MTTF	Mean Time to Failure	
$MTTF_D$	Mean Time To Dangerous Failure	
PFH (PFH_D)	Probability of (dangerous) Failure per Hour	
PL	Performance Level	PL to ISO 13849-1
SIL	Safety Integrity Level	SIL 1-4 to IEC 61508
PLC	Programmable Logic Controller	

14 EC Declaration of Conformity

EG – Konformitätserklärung

EC Declaration of Conformity

Déclaration de conformité CE

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UK

Die EG-Konformitätserklärung gilt für folgendes Gerät:	The EC declaration of conformity applies to the following unit:	La déclaration de conformité CE s'applique à l appareil suivant:
	Sicherer Stillstandswächter Safety standstill monitor Contrôleur d´arrêt de sécurité	
	DA102S	
Wir bestätigen die Übereinstimmung mit den wesentlichen Anforderungen der europäischen Richtlinie(n):	We confirm the conformity to the essential requirements of the European directive(s):	Nous confirmons la conformité aux exigences essentielles de la (des) directive(s) européenne(s):
2004/108/EG 2006/42/EG 2006/95/EG	**2004/108/EC 2006/42/EC 2006/95/EC**	**2004/108/CE 2006/42/CE 2006/95/CE**
Folgende Norm(en) wurde(n) angewandt:	The following standard(s) was (were) applied:	La (Les) norme(s) suivante(s) a (ont) été appliquée(s):
	EN 61000-6-3 : 2007 EN 61496-1 : 2004 +A1 : 2008 EN 62061 : 2005 EN 61508-1 : 2010 EN ISO 13849-1 : 2008 EN 50178 : 1997	
Nummer der EG-Baumuster-bescheinigung:	Number of the EC type- examination certificate:	Numéro de l´attestation CE de type:
	44 205 11 391435-002	
Da das oben erwähnte Sicherheitsbauteil in Anhang IV der Maschinenrichtlinie erwähnt ist, wurde folgende gemeldete Stelle beigezogen für eine EG-Baumusterprüfung	Since the annex IV of the Machinery Directive mentions the above indicated safety component, the following notified body has been contacted for an EC type examination	Comme le composant de sécurité indiqué ci-dessus figure à l´annexe IV de la directive machines, l´organisme notifié suivant a été contacté pour un examen de type
	TÜV NORD CERT GmbH Am TÜV 1 30519 Hannover (Notified body number: 0044)	
Bevollmächtigte Person zur Zusammenstellung der technischen Unterlagen	Person authorised for the compilation of the technical documents	Personne autorisée de rassembler les documents techniques

Volker Wiesemann, ifm ecomatic gmbh, Im Heidach 18, 88079 Kressbronn

Kressbronn, 06.06.2013
(Ort und Datum der Ausstellung)
(Place and date of issue)
(Lieu et date de l'établissement)

(Unterschrift)
(Signature)
(Signature)

i. V. Wolfgang Striegel,
Entwicklungsleiter

Dokument-Nr.: 8001000

Declaración de conformidad CE

Dichiarazione di conformità CE

EU – tillverkardeklaration

ifm electronic

ifm electronic gmbh
Friedrichstraße 1
45128 Essen
Germany

Telefon: +49 (0)201 / 24 22 - 0
Telefax: +49 (0)201 / 24 22 - 1200
Internet: www.ifm.com

La declaración de conformidad CE se aplica al siguiente producto:	La dichiarazione di conformità CE è valida per il seguente apparecchio:	EU-tillverkardeklarationen gäller för följande apparat:

Controlador de paro de seguridad
Controllore di sicurezza per arresto macchina
Stilleståndsvakter för säkerhetsapplikationer

DA102S

Certificamos la conformidad con los requisitos esenciales de la(s) directiva(s) europea(s):	Confermiamo la conformità con i requisiti essenziali della(e) direttiva(e) europea(e):	Vi intygar att alla väsentliga krav i den (de) europeiska direktivet (direktiven) är uppfyllda:
2004/108/CE **2006/42/CE** **2006/95/CE**	**2004/108/CE** **2006/42/CE** **2006/95/CE**	**2004/108/EG** **2006/42/EG** **2006/95/EG**

Se ha(n) aplicado la(s) siguiente(s) norma(s):	La(e) seguente(i) norma(e) è(sono) stata(e) applicata(e):	Följande standard(er) tillämpas:

EN 61000-6-3 : 2007
EN 61496-1 : 2004 +A1 : 2008
EN 62061 : 2005
EN 61508-1 : 2010
EN ISO 13849-1 : 2008
EN 50178 : 1997

Número del certificado del examen CE de tipo:	Numero dell'attestato di certificazione CE:	EU-typprovningscertifikatets nummer:

44 205 11 391435-002

Dado que el componente de seguridad anteriormente mencionado figura en el anexo IV de la Directiva de Máquinas, el siguiente organismo notificado ha sido contactado para el certificado del examen CE de tipo	Siccome il componente di sicurezza di cui sopra è menzionato nell'Appendice IV della direttiva macchine, per una certificazione CE è stato contattato l'ente di cui sotto	Då annex IV i maskindirektivet berör ovan nämnda säkerhetskomponent, har följande anmälda organ kontaktats för en EU-typprovning

TÜV NORD CERT GmbH
Am TÜV 1
30519 Hannover
(Notified body number: 0044)

Persona autorizada para la composición de documentación técnica.	Persona autorizzata alla compilazione della documentazione tecnica	Auktoriserad person för sammanställning av de tekniska dokumenten

Volker Wiesemann, ifm ecomatic gmbh, Im Heidach 18, 88079 Kressbronn

Kressbronn, 06.06.2013
(Lugar y fecha de expedición)
(Luogo e data del rilascio)
(Ort och datum för utfärdande)

(Firma) i. V. Wolfgang Striegel,
Entwicklungsleiter
(Firma)
(Underskrift)

Nº de documento: 8001000