SINEAX TV 809, 1 channel
Programmable isolating amplifier

For electrically insulating, amplifying and converting DC signals

CE 0102 Ex II (1) GD



Fig. 1. Isolating amplifier SINEAX TV 809 in housing **P12/17***, terminals not pluggable.*

Application

The purpose of the isolating amplifier **SINEAX TV 809** (Fig. 1) is to electrically insulate input and output signals, respectively to amplify and/or change the signal level or type (current or voltage) of the input signals.

Measured variables and measuring ranges are programmed with the aid of a PC, a programming cable and the programming software. Specific measured variable data such as analogue output signal, transmission characteristics and various functions in combination with the alarm function can also be programmed.

The isolating amplifier fulfils all the important requirements and regulations concerning electromagnetic compatibility **EMC** and **Safety** (IEC 1010 resp. EN 61 010). It was developed and is manufactured and tested in strict accordance with the **quality assurance standard** ISO 9001/EN 29001.

An explosion-proof "intrinsically safe" [EEx ia] IIC version rounds off this series of SINEAX TV 809.

Features / Benefits

- **Measuring input** (current, voltage, measuring range), **measuring output** (current, voltage, output range) and **relay functions programmed using PC / Simplifies project planning and engineering, short delivery times, low stocking levels**
- **Input voltage up to ± 1000 V**
- **Short setting time**
- **Programmable input filter**
- **Any conversion factor, also with signal inversion**
- **Possibility to linearize the input signal**
- **Online measurement interrogation and control of the outputs via PC**
- **Built-in alarm relay (optionally)**
- **Wide DC, AC power pack tolerance / Universal**
- **Available in type of protection "Intrinsic safety" [EEx ia] IIC** (see "Table 6: Data on explosion protection")

Standard versions

The following versions are available as standard versions already programmed for the **basic** configuration. It is only necessary to quote the **Order No.:**

Table 1: Instruments in standard or Ex version (without alarm relay)

Version	Meas. input*	Meas. output*	Power supply	Screw terminals	**Order No.**
Standard	programmable within ± 1000 V (Ex max. 30 V) resp. ± 100 mA or ± 1.5 mA Basic configuration **4…20 mA**		24… 60 V DC, AC	not pluggable	147 258
			85…230 V DC, AC		147 266
			24… 60 V DC, AC	pluggable	147 274
			85…230 V DC, AC		147 282
[EEx ia] IIC Measuring input intrinsic safety			24… 60 V DC, AC	not pluggable	147 646
			85…110 V DC, 85…230 V AC		147 654
			24… 60 V DC, AC	pluggable	147 662
			85…110 V DC, 85…230 V AC		147 670

** The type of output variable (current or voltage) is configurable with software.*

Please complete the Order Code 809-.... .... according to "Table 7: Ordering information" for versions with user-specific input and/or output ranges.

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Programming

A PC, the programming cable PRKAB 600 plus ancillary cable and the configuration software TV 800 *plus* are required to program the isolating amplifier.

The connection between
"PC ↔ PRKAB 600 ↔ SINEAX TV 809" can be seen from Fig. 2. The power supply must be connected in order to configure the SINEAX TV 809.

The software TV 800 *plus* is supplied on a CD and runs under Windows 95, 98, NT and 2000.

The programming cable PRKAB 600 adapts the signal level and provides galvanic isolation between the PC and the SINEAX TV 809 isolating amplifier.

The programming cable PRKAB 600 is used for programming both standard and Ex versions.

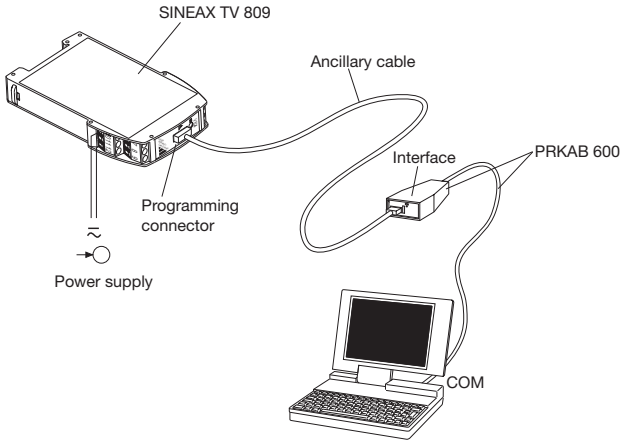


Fig. 2. Programming a SINEAX TV 809.

Technical data

Measuring input

DC current:
Type 809 – xx**1**
Start value/final value between – 100 and 100 mA, R_i = 15.4 Ω
any point may be zero

Type 809 – xx**2**
Start value/final value between – 1.5 and 1.5 mA, R_i = 1 kΩ
any point may be zero

DC voltage:
EEx version max. 30 V
≤ ± 1.7 V, R_i = 1 MΩ
> ± 1.7 to ≤ ± 100 V, R_i = 540 kΩ
> ± 100 to ± 1000 V, R_i = 5.5 MΩ
Reduced safety see Table 5

Restriction:
Min. span ≥ 0.1 · Highest input value quantity

Example:
Start value = – 5 V
Final value = + 3 V
Highest input value quantity = 5 V

Measuring output

DC current, DC voltage and range programmable

DC current:
Reference range – 20 … 20 mA

Start and final values anywhere within the reference range, also with reversed direction, e.g. 20 … 4 mA;

For reduced start or final value, additional error (lower resolution)

Burden voltage: 12 V

Current limit under overload: Approx. ± 22 mA

Open-circuit voltage: < 16 V

External resistance: R_{ext} max. [kΩ] = $\frac{12\ V}{I_{AN}\ [mA]}$

I_{AN} = Output voltage end value

Residual ripple: < 0.5% p.p.

DC voltage:
Reference range – 10 … 10 V

Start and final values anywhere within the reference range, also with reversed direction,
e.g. + 10 … – 5 V;

For reduced start or final value, additional error (lower resolution)

Voltage limit under overload: Approx. ± 11 V

Short-circuit current: ≤ 60 mA

External resistance: R_{ext} min. [kΩ] ≥ $\frac{U_{AN}\ [V]}{10\ mA}$

U_{AN} = Output voltage end value

Residual ripple: < 0.5% p.p.

Table 2: Rise time / Setting time

Rise time (63%) [s]		Setting time (99%) [s]	
50 Hz	60 Hz	50 Hz	60 Hz
0.04	0.03	0.08	0.07
0.06	0.05	0.17	0.14
0.10	0.08	0.36	0.30
0.18	0.15	0.72	0.60
0.34	0.28	1.5	1.2
0.66	0.55	3.0	2.5
1.3	1.1	6.0	5.0
2.6	2.2	12	10
5.1	4.3	24	20
10.3	8.6	48	40
20.5	17	94	80
41	34	190	160
82	68	380	315
160	140	750	630
330	270	1500	1260

Programming connector

Interface: Serial interface

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Accuracy data (acc. to EN/IEC 60 770-1)

The reference value is the output reference range.
For a reduced output range, the relative error increases in proportion to the reduction.

Basic accuracy:	Error limits ≤ ± 0.2% incl. linearity and reproducibility errors
Reference conditions	
Ambient temperature	23 °C, ± 2 K
Power supply	24 V DC ± 10% and 230 V AC ± 10%
Output burden	Current: 300 Ω, voltage: 2 kΩ
Influencing factors	
Temperature	< ± 0.1% per 10 K
Burden influence	< ± 0.1%
Longtime drift	≤ ± 0.3% / 12 months
Switch-on drift	< ± 0.2%
Common and transverse mode influence	≤ ± 0.1% For voltage input, the transversal error voltage corresponds to the final value selected
Output + or – connected to ground	< ± 0.1%

Power supply

DC, AC power pack (DC or 45...400 Hz)

Table 3: Nominal voltages and tolerances

Nominal voltage U_N	Tolerance	Instrument versions
24... 60 V DC, AC	DC –15...+ 33% AC ± 15%	Standard (Non-Ex)
85...230 V DC, AC		
24... 60 V DC, AC	DC – 15...+ 33% AC ± 15%	Type of protection "Intrinsic safety" [EEx ia] IIC
85...230 V AC	± 10%	
85...110 V DC	–15...+ 10%	

Power input: ≤ 1.2 W resp. ≤ 2.5 VA

Supervising a limit GW (⎍)

This section is only valid for isolating amplifiers that are ordered and fitted with a relay for limit value indication.

Output contact K: Relay
1 galvanically isolated switching contact

Trip point type: Programmable
- Inaktive
- Low trip point of measured variable (see Fig. 3, left)
- High trip point of measured variable (see Fig. 3, right)

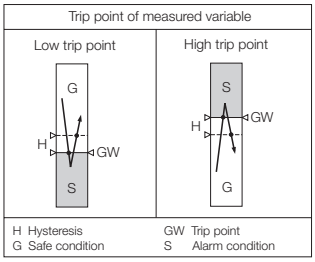


Fig. 3. Switching function, according to trip point type.

Trip point adjustment
with PC for trip point: Programmable
– between –10 and 110%[1]

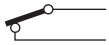
Hysteresis: Programmable
– between > 0 and 100%[1]

Energizing and de-energizing delays: Programmable
– between 0 to 1080 s

Relay contact position: Programmable
– see Table 7 Feature 14

Frontplate signals: The green LED "ON" flashes when the limit value is exceeded

Table 4: Contact arrangement and data

Symbole	Material	Contact rating
	Gold flashed silver alloy	AC: ≤ 2 A / 250 V (500 VA) DC: ≤ 2 A / 125 V (60 W)

Relay approved by UL, CSA, SEV

Installation data

Housing:	Housing **P12/17** and **P12/17 St** Refer to Section "Dimensional drawings" for dimensions
Material of housing:	Lexan 940 (polycarbonate) Flammability Class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen
Mounting:	For snapping onto top-hat rail (35 × 15 mm or 35 × 7.5 mm) acc. to EN 50 022
Position of use:	Any
Electrical terminals:	PHOENIX screw terminals with wire guards, for 0.14 mm² to 2.5 mm²
Weight:	Approx. 0.1 kg
Electrical insulation:	All circuits (measuring input/ measuring output/power supply) are electrically insulated

Regulations

Electromagnetic compatibility:	The standards EN 50 081-2 and EN 50 082-2 are observed
Intrinsically safe:	Acc. to EN 50 020
Protection (acc. to IEC 529 resp. EN 60 529):	Housing IP 40 Terminals IP 20
Electrical standards:	Acc. to IEC 1010-1 (1990) resp. EN 61 010-1 (1993)

[1] In relation to the analog input value range.

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SINEAX TV 809, 1 channel
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Permissible operating voltage acc. to EN 61 010-1, 1st edition
(R.M.S. value, increased isolation, contamination level 2, overvoltage category II, up to 2000 m)

Table 5:

	Input	Output	Relay
Supply	1000 V	600 V	300 V
Input		600 V (1000 V)*	600 V (1000 V)*
Output			300 V

* Values in brackets are valid for the overvoltage category I

Test voltage AC / 50 Hz / 1 minute

	Input	Output	Relay
Supply	3700 V	3700 V	2300 V
Input		3700 V	3700 V
Output			2300 V

Ambient tests

EN 60 068-2-6:	Vibration
Acceleration:	± 2 g
Frequency range:	10 … 150 … 10 Hz, rate of frequency sweep: 1 octave/minute
Number of cycles:	10, in each of the three axes
EN 60 068-2-27:	Shock
Acceleration:	3 x 50 g 3 shocks each in 6 directions
EN 60 068-2-1/-2/-3:	Cold, dry heat, damp heat

Environmental conditions

Commissioning temperature:	– 10 to + 55 °C
Operating temperature:	– 25 to + 55 °C
Storage temperature:	– 40 to + 70 °C
Annual mean relative humidity:	≤ 75%

Table 6: Data on explosion protection ⟨Ex⟩ II (1) GD

Order Code	Type of protection «Intrinsic safety» Marking		Type Examination Certificate	Mounting location of the instrument
	Instrument	Measuring input		
809-33/34/93/94	**[EEx ia] IIC**	**EEx ia IIC**	**Type Examination Certificate ZELM 01 ATEX 0051**	**Outside** the hazardous area

Table 7: Ordering information (see also Table 1: Standard versions)

Order Code **809 -**			
Features, Selection	*SCODE	no-go	
1. Mechanical design			
3) Housing P12/17 for rail mounting, connecting screw terminals not pluggable			3 . . . . .
9) Housing P12/17 St for rail mounting, connecting screw terminals pluggable			9 . . . . .
2. Version / Power supply			
1) Standard / 24 … 60 V DC/AC			. 1 . . . . .
2) Standard / 85 … 230 V DC/AC			. 2 . . . . .
3) [EEx ia] IIC / 24 … 60 V DC/AC input intrinsically safe			. 3 . . . . .
4) [EEx ia] IIC / 85 … 110 V DC / 230 V AC input intrinsically safe			. 4 . . . . .
3. Current input rating			
1) Input current, max. final value 100 mA (standard version)	D		. . 1 . . . .
2) Input current, max. final value 1.5 mA	E		. . 2 . . . .
For hardware layout of current input. Must be specified, even if used (programmed) for voltage input only!			

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Order Code **809 -**			
Features, Selection	*SCODE	no-go	
4. Alarm function			
0) Without alarm function	F		0 . . . . .
1) With built-in alarm relay			1 . . . . .
5. Test records			
0) Without test records			. 0 . . . . .
D) Test records in German			. D . . . . .
E) Test records in English			. E . . . . .
6. Configuration			
0) **Basic** configuration programmed	G		. . 0 . . . .
1) Programmed to order			. . 1 . . . .
Line 0: Specification complete! Basic configuration corresponds with input current max. final value 100 mA, Line 0 in feature 7 to 11 as well as line 0 in feature 12 to 14, without alarm function or line 1 in feature 12 to 14, with alarm function. With input current max. final value 1.5 mA, line 1 in feature 7 corresponds with the basic configuration. Line 1: The following features 7 to 11 resp. 7 to 14 (with alarm contact) must be fully specified.			
7. Input signal			
0) Input 4 … 20 mA		E	. . . 0 . . .
1) Input 0 … 1 mA		D	. . . 1 . . .
9) Input [V]		G	. . . 9 . . .
Z) Input [mA]		G	. . . Z . . .
Zeile 9: Input [V] initial/final value between – 1000 and 1000 at standard version, EEx version max. 30 V! zero position anywhere, minimal span 0.05 V *) Line Z: Input [mA] at nominal value 100 mA (line 1 in feature 3) initial/final value between – 100 and 100, zero position anywhere, minimal span 3 mA *) Input [mA] at nominal value 1.5 mA (line 2 in feature 3) initial/final value between – 1.5 and 1.5, zero position anywhere, minimal span 0.09 mA *) *) Minimal span ≥ 0.1 × highest input value quantity			
8. Output signal			
0) Output 4 … 20 mA			. . . . 0 . . .
9) Output (reference range – 10…10 V) [V]		G	. . . . 9 . . .
Z) Output (reference range – 20…20 mA) [mA]		G	. . . . Z . . .
Lines 9 and Z: Any initial and final value within reference range, also with inversed characteristic, e.g. 20…4 mA, + 10…– 5 V. **Attention!** Additional error (lower resolution) for reduced start or final value!			

Table 7 continued on next page!

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Order Code **809 -**

Features, Selection	*SCODE	no-go	
9. Output characteristic			
0) Linear			0 . . . . .
9) Special characteristic		G	9 . . . . .
Line 9: For individual characteristic, on inquiry!			
10. Output time response			
0) Setting time standard, approx. 80 ms			. 0 . . . . .
9) Setting time [s]		G	. 9 . . . . .
Line 9: Values from 0.14 to 1500 s in 14 steps, depending on the selected frequency in feature 11; values for 50 and 60 Hz according to table 2 “Rise time/Setting time”			
11. Mains ripple suppression			
0) For frequency 50 Hz			. . 0 . . . .
1) For frequency 60 Hz		G	. . 1 . . . .
12. Alarm, type and values			
0) Alarm function inactive	H		. . . 0 . . .
1) High alarm 90%; hysteresis 1% (standard values)	K	F	. . . 1 . . .
2) High alarm, hysteresis [%;%]	K	FG	. . . 2 . . .
3) Low alarm, hysteresis [%;%]	K	FG	. . . 3 . . .
Line 2 and 3: Specify values in % of the input span, Setpoint: Any value between –10% and 110%, with initial value of measuring range always corresponding to 0%; hysteresis > 0 to 100%. Examples for setpoint (extreme values): Input range: / Input at – 10%: / Input at 110%: 4 … 20 mA / 2.4 mA / 21.6 mA – 10 … 10 mA / – 12 mA / 12 mA – 5 … 10 V / – 6.5 V / 11.5 V			
13. Alarm, switching delay			
0) Alarm function inactive		K	. . . . 0 . .
1) Delay energizing/deenergizing 0.2 s (Standard)		H	. . . . 1 . .
2) Delay energizing/deenergizing [s:s]		GH	. . . . 2 . .
Line 2: Energizing and deenergizing delay [s] 0 to 1080			
14. Alarm, mode of action			
0) Alarm function inactive		K	. . . . . 0 .
1) Contact closed in alarm condition and at power loss		H	. . . . . 1 .
2) Contact open in alarm condition and at power loss		GH	. . . . . 2 .
3) Contact closed in alarm condition, open at power loss		GH	. . . . . 3 .
4) Contact open in alarm condition, closed at power loss		GH	. . . . . 4 .

**Lines with letter(s) under “no-go” cannot be combined with preceding lines having the same letter under “SCODE”.*

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Electrical connections

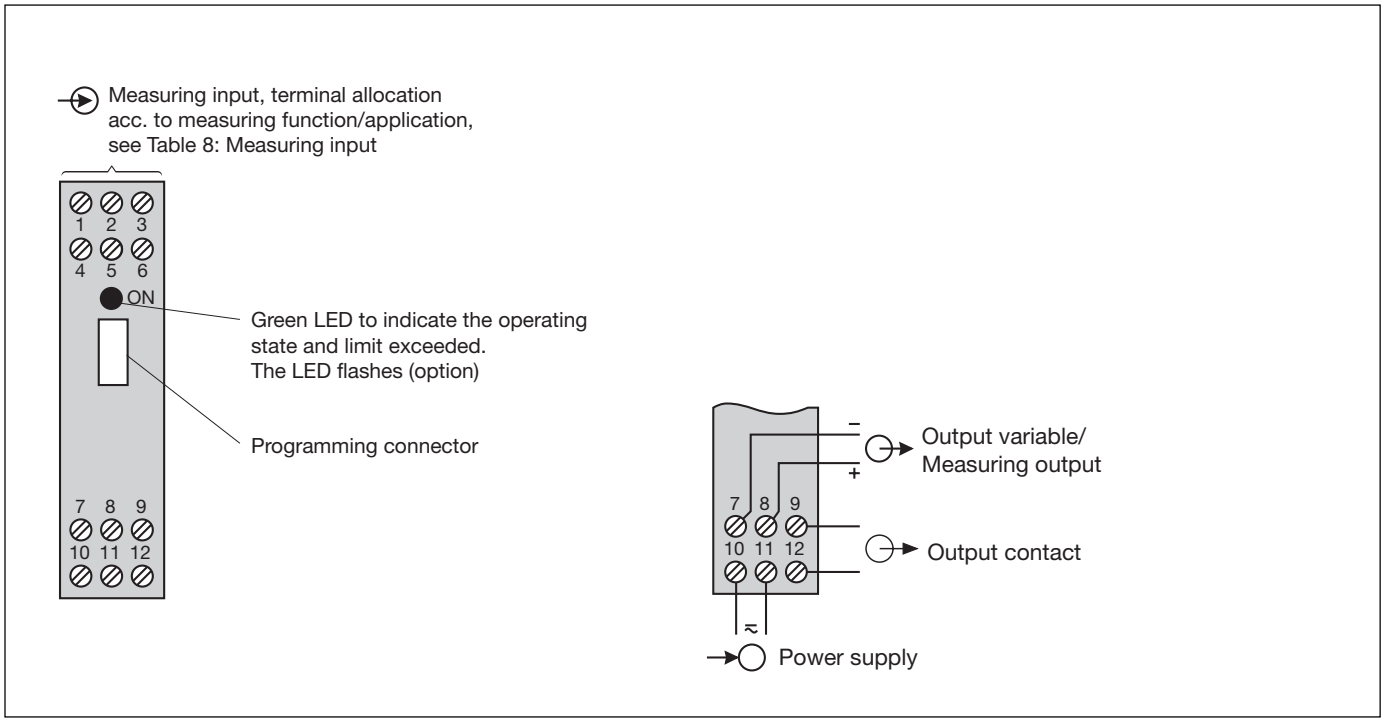
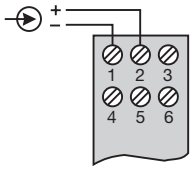
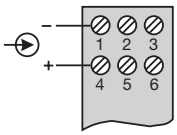
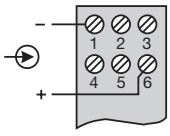
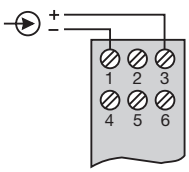
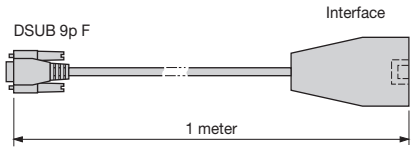
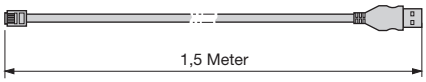


Table 8: Measuring input

Measuring function / Application	Measuring range limits	Terminal allocation
DC voltage	≤ ± 1.7 V	
	> ± 1.7 to ≤ ± 100 V	
	> ± 100 to ± 1000 V	
DC current	≤ ± 100 mA	
	≤ ± 1.5 mA	

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Table 9: Accessories and spare parts

Description	Order No.
Programming cable PRKAB 600 	147 787
Ancillary cable for SINEAX Type TV 809 	143 587
Configuration software TV 800 *plus* on CD **(Download free of charge under http://www.gmc-instruments.com)**	146 557
Operating Instructions TV 809 Bd in German	147 422
Operating Instructions TV 809 Bf in French	147 795
Operating Instructions TV 809 Be in English	147 802

Standard accessories

1 Operating Instructions in German, French and English
1 Type examination certificate (only for “intrinsically safe” explosion-proof devices)

Dimensional drawings

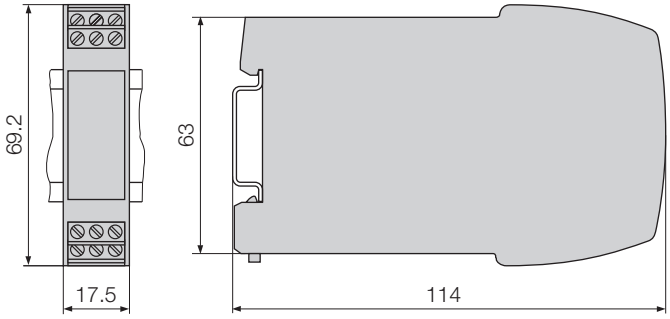


*Fig. 4. SINEAX TV 809 in housing **P12/17** clipped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm, acc. to EN 50 022), connecting screw terminals not pluggable.*

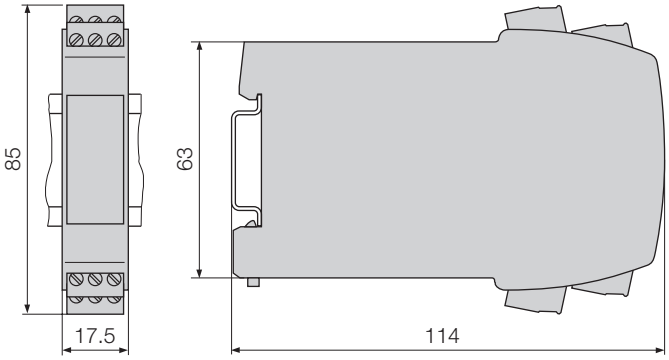


*Fig. 5. SINEAX TV 809 in housing **P12/17 St** clipped onto a top-hat rail (35 x 15 mm or 35 x 75 mm, acc. to EN 50 022), connecting screw terminals pluggable.*

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