Safety Instructions
Proline Prowirl 200

Cl. I, II, III Div. 1, Zone 0 for IS
(Ex i Intrinsically safe version)

Document: XA01154D
Safety instructions for electrical apparatus for explosion-hazardous areas classified according to the National Electrical Code (NEC) and Canadian Electrical Code (CEC) → 3

Endress+Hauser
People for Process Automation

Proline Prowirl 200

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Associated documentation

All documentation is available:
- On the CD-ROM supplied (not included in the delivery for all device versions).
- Available for all device versions via:
  - Internet: www.endress.com/deviceviewer
  - Smart phone/tablet: *Endress+Hauser Operations App*
- In the Download Area of the Endress+Hauser web site: www.endress.com → Download

This document is an integral part of the following Operating Instructions:

Measuring device	Documentation code		
	HART	FOUNDATION Fieldbus	PROFIBUS PA
Prowirl C 200	BA01152D	BA01215D	BA01220D
Prowirl D 200	BA01153D	BA01216D	BA01221D
Prowirl F 200	BA01154D	BA01217D	BA01222D
Prowirl O 200	BA01155D	BA01218D	BA01223D
Prowirl R 200	BA01156D	BA01219D	BA01224D

Additional documentation:

Document type	Contents	Documentation code
Special documentation	Remote display FHX50	SD01007F
Special documentation	Overvoltage Protection (OVP)	SD01090F
Installation Drawing		As wanted on the nameplate.

Please note the documentation associated with the device.

Manufacturer's certificates

Certificate number

160686-2541184

Notified body

CSA: Canadian Standards Association

Extended order code

The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

Structure of the extended order code

******	–	**********	+	A*B*C*D*E*F*G*...
Device type		Basic specifications		Optional specifications

* = Spaceholder: At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

- Device type
  The device and the device design is defined in the "Device type" section (Product root).
- Basic specifications
  The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available. The selected option of a feature can consist of several positions.
- Optional specifications
  The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = test, certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

Device type

Position	Order code	Selected option	Description
1	Instrument family	7	Vortex flowmeter
2	Sensor	C, D, F, O, R	Sensor type
3	Transmitter	2	Transmitter type: 2-wire, compact version, remote version
4	Generation index	B	Platform generation
5, 6	Nominal diameter	C: DN 50 to 150 D: DN 15 to 150 F: DN 15 to 300 O: DN 15 to 150 R: "R-type" DN 25 to 200, "S-type" DN 40 to 250	Nominal diameter of sensor

Basic specifications

Position	Order code	Selected option	Description
1, 2	Approval	C2	$_{C}CSA_{US}$
			Class I, II, III Division 1, Groups A-G
			Ex ia IIC and AEx ia IIC
			Class I, II, III, Class I Zone 0
3	Output	A	4-20mA HART
		B	4-20mA HART, Pulse/frequency/switch output
		C	4-20mA HART + 4-20mA analog
		D	4-20mA HART, Pulse/frequency/switch output, 4-20mA input
		E	FOUNDATION Fieldbus, Pulse/frequency/ switch output
		G	PROFIBUS PA, Pulse/frequency/switch output
4	Display, Operation	A	W/o; via communication
		C	SD02 4-line; push buttons + data backup function
		E	SD03 4-line, illum.; touch control + data backup function
		L	Prepared for display FHX50 + M12 connection [1]
		M	Prepared for display FHX50 + M12 custom connection [1]

1) FHX50 is approved separately.

Optional specifications

ID	Order code	Selected option	Description
Jx	Test, Certificate	JN	Ambient temperature transmitter −50 °C
Nx	Accessory Mounted	NA	Overvoltage protection (OVP)

Safety instructions: General

- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
  - Be suitably qualified for their role and the tasks they perform.
  - Be trained in explosion protection.
  - Be familiar with national regulations (e.g. CEC or NEC).
- Install the device according to the manufacturer's instructions and national regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- Only use the device in media to which the wetted materials have sufficient durability.
- Refer to the temperature tables for the relationship between the permitted ambient temperature for the sensor and/or transmitter, depending on the range of application, and the temperature classes.
- Modifications to the device can affect the explosion protection and must be carried out by staff authorized to perform such work by Endress+Hauser.
- Observe all the technical data of the device (see nameplate).
- When using in hybrid mixtures (gas and dust occurring simultaneously), additional measures should be taken. Please see approval body.
- Class II Group G: The surface temperature of the apparatus cannot exceed +165 °C.
- Classification of Zones: When installed in Zone 1 the interior of the measuring tube is permissible for use in Zone 0.

⚠ WARNING

Substitution of components is not permitted.

▶ Substitution of components may impair intrinsic safety.

Safety instructions: Installation

- Continuous service temperature of the connecting cable: −40 to +80 °C (−50 to +80 °C for optional specifications, ID Jx (Test, Certificate) = JN); in accordance with the range of service temperature taking into account additional influences of the process conditions ($T_{a,min}$ and $T_{a,max}$ + 20 K).
- Only use certified cable entries suitable for the application. Observe selection criteria as per CEC or NEC.
- When the measuring device is connected, attention must be paid to explosion protection at the transmitter

- Control room equipment shall not use or generate more than 250 V_{rms}.
- Install the transmitter circuit wiring according to Canadian Electrical Code (CEC) respective National Electrical Code (NEC) using threaded conduit or other wiring methods in accordance with articles 500 to 510.
- Install all Intrinsically Safe Circuits:
  - Per Canadian Electrical Code (CEC) Part I Section 18 and Appendix F
  - Per National Electrical Code (NEC) ANSI/NFPA 70 and ISA RP 12.6

Intrinsic safety

- The device can be connected to the Endress+Hauser FXA291 service tool: refer to the Operating Instructions.
- The intrinsically safe input power circuit of the device is isolated from ground. If the device is only equipped with one input, the dielectric strength of the input is at least 500 V_{rms}. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least 500 V_{rms}, and the dielectric strength of the inputs vis-à-vis one another is also at least 500 V_{rms}.
- The device can be connected to the remote display FHX50 which has Ex ia explosion protection: refer to the Special documentation and Ex documentation.

Potential equalization

- Integrate the device into the local potential equalization (→ 16).
- If the ground connection has been established via the pipe as specified, it is also possible to integrate the sensor into the potential equalization system via the pipe.

Overvoltage protection

Optional specification, ID Nx (Accessory Mounted) = NA

- Minimum ambient temperature when using Overvoltage Protection (OVP): −40 °C
- When using the internal overvoltage protection: Reduce the admissible ambient temperature at the housing by 2 K.
- For installations which require overvoltage protection to comply with national regulations or standards.
  Install the device using overvoltage protection (e.g. HAW56x from Endress+Hauser).

- Observe the safety instructions of the overvoltage protection.
- If an overvoltage protection against atmospheric over voltages is required: no other circuits may leave the housing during normal operation without additional measures.
- The intrinsically safe input power circuit of the device is isolated from ground. If the device is only equipped with one input, the dielectric strength of the input is at least 290 V_{rms}. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least 290 V_{rms}, and the dielectric strength of the inputs vis-à-vis one another is also at least 290 V_{rms}.

Safety instructions: Class II, Class III

- To ensure dust-tightness, securely seal the transmitter housing, cable entries and sealing plugs.
- Only open the transmitter housing briefly, ensuring that no dust or moisture enters the housing.
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection. The plastic transport sealing plug does not meet this requirement and must therefore be replaced during installation.
- Only use certified cable entries and sealing plugs. The cable entries and metal sealing plugs supplied meet this requirement.
- The remote display FHX50 is not suitable for installation in Class II, Class III.

Temperature tables

Ambient temperature

Minimum ambient temperature:

- *Basic specification, position 3 (Output; Input) = A, B, D* in conjunction with *Optional specification, ID Jx (Test, Certificate) = JN*
  T_a = −50 °C
  (Not permitted in conjunction with *Optional specification, ID Nx (Accessory Mounted) = NA*(→ 8))
- *Basic specification, position 3 (Output; Input) = A, B, C, D, E, G*
  T_a = −40 °C

Maximum ambient temperature:
T_a = +85 °C depending on the medium temperature and temperature class

Medium temperature

The following relationship of ambient temperature to medium temperature applies when T_m < −50 °C:

T_m [°C]	-50	-100	-150	-200
T_a [°C]	-50	-47	-44	-39

Compact version

Basic specification, position 3 (Output; Input) = A

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

► $T_a = T_a - 2$ K

Version with max. T_m = 280 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	195	280	–
60	–	95	130	195	280	–
65	–	–	130	195	280	–
70	–	–	130	–	–	–

Basic specification, position 3 (Output; Input) = B

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

► $T_a = T_a - 2$ K

Version with max. T_m = 280 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35 [1)]	80	95	130	195	280	–
50 [2)]	–	95	130	195	280	–
60	–	–	130	195	280	–
65	–	–	130	195	280 [3)]	–
70	–	–	130	195 [4)]	280 [4)]	–

1) T_a = 40 °C for pulse/frequency/switch output P_i = 0.85 W
2) T_a = 55 °C for pulse/frequency/switch output P_i = 0.85 W
3) T_a = 65 °C for pulse/frequency/switch output P_i = 0.7 W
4) T_a = 70 °C for pulse/frequency/switch output P_i = 0.7 W

Basic specification, position 3 (Output; Input) = C

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

▶ $T_a = T_a - 2$ K

Version with max. T_m = 280 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	195	280	–
55	–	95	130	195	280	–
60	–	–	130	195	280	–
65	–	–	130	195	280 [1)]	–
70	–	–	130	–	–	–

1) T_a = 65 °C for pulse/frequency/switch output P_i = 0 W

Basic specification, position 3 (Output; Input) = D

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

▶ $T_a = T_a - 2$ K

Version with max. T_m = 280 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35	80	95	130	195	280	–
50	–	95	130	195	280	–
55	–	–	–	195	280	–
60	–	–	–	195	–	–

Basic specification, position 3 (Output; Input) = E, G

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

► $T_a = T_a - 2$ K

Version with max. T_m = 280 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	195	280	–
50 [1]	–	95	130	195	280	–
60	–	–	130	195	280	–
65	–	–	130	195	280 [2]	–
70	–	–	130	195 [3]	280 [3]	–

1) T_a = 60 °C for pulse/frequency/switch output P_i = 0 W
2) T_a = 65 °C for pulse/frequency/switch output P_i = 0 W
3) T_a = 70 °C for pulse/frequency/switch output P_i = 0 W

High-temperature version

Basic specification, position 3 (Output; Input) = A

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

► $T_a = T_a - 2$ K

Version with max. T_m = 440 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	195	290	440
60	–	95	130	195	290	440
70	–	–	130	195	290	440

Basic specification, position 3 (Output; Input) = B

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

▶ $T_a = T_a - 2$ K

Version with max. T_m = 440 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35 [1]	80	95	130	195	290	440
50 [2]	–	95	130	195	290	440
65	–	–	130	195	290	440
70	–	–	130	195 [3]	290	440 [3]

1) T_a = 40 °C for pulse/frequency/switch output P_i = 0.85 W
2) T_a = 55 °C for pulse/frequency/switch output P_i = 0.85 W
3) T_a = 70 °C for pulse/frequency/switch output P_i = 0.85 W

Basic specification, position 3 (Output; Input) = C

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

▶ $T_a = T_a - 2$ K

Version with max. T_m = 440 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	195	290	440
55	–	95	130	195	290	440
65	–	–	130	195	290	440
70	–	–	130	195 [1]	290 [1]	440 [1]

1) T_a = 70 °C for pulse/frequency/switch output P_i = 0 W

Basic specification, position 3 (Output; Input) = D

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

► $T_a = T_a - 2$ K

Version with max. T_m = 440 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35	80	95	130	195	290	440
50	–	95	130	195	290	440
55	–	–	–	195	290	440
60	–	–	–	195	290	440
65	–	–	–	–	290	–

Basic specification, position 3 (Output; Input) = E, G

NOTICE

The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6.

The following applies for basic specification, position 1, 2 (Approval) = C2:

► $T_a = T_a - 2$ K

Version with max. T_m = 440 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	195	290	440
50 [1)]	–	95	130	195	290	440
65	–	–	130	195	290	440
70	–	–	130	195 [2)]	290 [2)]	440 [2)]

1) T_a = 60 °C for pulse/frequency/switch output P_i = 0 W
2) T_a = 70 °C for pulse/frequency/switch output P_i = 0 W

Remote version

Transmitter

Basic specification, position 3 Output; Input	Basic specification, position 1, 2 Approval	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]
A	All	40	60	75
B	All	35 [1]	50 [2]	70 [3]
C	All	40	55	70 [4]
D	All	35 [5]	50 [5]	65
E G	All	40	55	70 [4]

1) T_a = 40 °C for pulse/frequency/switch output P_i = 0.85 W
2) T_a = 60 °C for pulse/frequency/switch output P_i = 0.85 W
3) T_a = 75 °C for pulse/frequency/switch output P_i = 0.85 W
4) T_a = 75 °C for pulse/frequency/switch output P_i = 0 W
5) The following applies for installations with overvoltage protection in conjunction with temperature class T5, T6 and basic specification, position 1, 2 (Approval) = C2: $T_a = T_a - 2$ K

Sensor

Version with max. T_m = 280 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
55	80	95	130	195	280	–
70	–	95	130	195	280	–
85	–	–	130	195	280	–

High-temperature version

Version with max. T_m = 440 °C						
T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
55	80	95	130	195	290	440
70	–	95	130	195	290	440
85	–	–	130	195	290	440

Connection values: Signal circuits

The following tables contain specifications which are dependent on the transmitter type and its input and output assignment. Compare the following specifications with those on the nameplate of the transmitter.

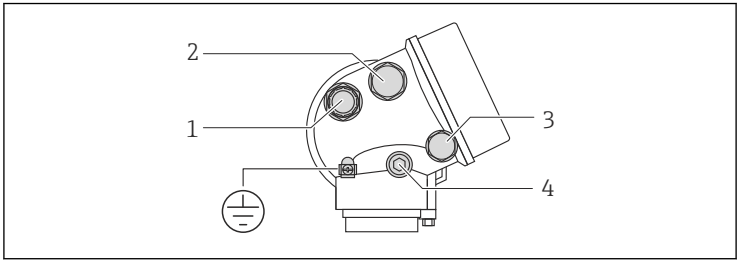
Cable specification: Connecting cable for remote version

The sensor cable connection between the sensor and the transmitter has Ex ia type of protection.

Cable parameter: L/R ≤ 38.2 µH/Ω

The cable supplied by Endress+Hauser complies with this value.

Connecting the transmitter



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Position		Basic specification, position 1, 2 Approval	Type of protection used for cable entry	Description
1	Cable entry for output 1	C2	IS/Ex ia/DIP IS/AEx ia/DIP	In the case of device versions with a plastic transport sealing plug, this plug does not meet the explosion protection requirements and must be replaced during installation by a suitable entry that meets the approval specifications. In the case of device versions with a cable entry, this entry has a separate component approval and meets the requirements of the explosion protection indicated on the nameplate
2	Cable entry for output 2	C2	IS/Ex ia/DIP IS/AEx ia/DIP	In the case of device versions with a metal sealing plug, this plug is part of the device approval and meets the requirements of the explosion protection indicated on the nameplate. In the case of device versions with a cable entry, this entry has a separate component approval and meets the requirements of the explosion protection indicated on the nameplate.
3	Cable entry of the remote display and operating module FHX50	C2	IS/Ex ia/DIP IS/AEx ia/DIP	In the case of device versions with a metal sealing plug, this plug is part of the device approval and meets the requirements of the explosion protection indicated on the nameplate. In the case of device versions with a cable entry, this entry has a separate component approval and meets the requirements of the explosion protection indicated on the nameplate.

Position		Description
4	Pressure compensation plug	**WARNING** **Housing degree of protection voided due to insufficient sealing of the housing.** ► Do not open - not a cable entry.
⏚	Potential equalization	**NOTICE** **Terminal for connection to potential equalization.** ► Pay attention to the grounding concept of the facility.

Terminal assignment

Transmitter

The order code is part of the extended order code. For detailed information on the features of the device and the structure of the extended order code (→ 🖹 5).

Connection versions

Order code for "Output"	Terminal numbers					
	Output 1		Output 2		Input	
	1 (+)	2 (-)	3 (+)	4 (-)	5 (+)	6 (-)
Option **A**	4-20 mA HART (passive)		-		-	
Option **B** [1]	4-20 mA HART (passive)		Pulse/frequency/ switch output (passive)		-	
Option **C** [1]	4-20 mA HART (passive)		4-20 mA analog (passive)		-	
Option **D** [1] [2]	4-20 mA HART (passive)		Pulse/frequency/ switch output (passive)		4-20 mA current input (passive)	
Option **E** [1] [3]	FOUNDATION Fieldbus		Pulse/frequency/ switch output (passive)		-	
Option **G** [1] [4]	PROFIBUS PA		Pulse/frequency/ switch output (passive)		-	

1) Output 1 must always be used; output 2 is optional.
2) The integrated overvoltage protection is not used with option D: Terminals 5 and 6 (current input) are not protected against overvoltage.
3) FOUNDATION Fieldbus with integrated reverse polarity protection.
4) PROFIBUS PA with integrated reverse polarity protection.

Intrinsically safe values

The order code is part of the extended order code. For detailed information on the features of the device and the structure of the extended order code (→ 🖹 5).

IS type of protection

Order code for "Output"	Output type	Intrinsically safe values	
Option **A**	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
Option **B**	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
	Pulse/frequency/switch output	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF	
Option **C**	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 30 nF	
	4-20mA analog		
Option **D**	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
	Pulse/frequency/switch output	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF	
	4 to 20 mA current input	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
Option **E**	FOUNDATION Fieldbus	STANDARD U_i = 30 V I_i = 300 mA P_i = 1.2 W L_i = 10 µH C_i = 5 nF	FISCO U_i = 17.5 V I_i = 550 mA P_i = 5.5 W L_i = 10 µH C_i = 5 nF
	Pulse/frequency/switch output	U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF	

Order code for "Output"	Output type	Intrinsically safe values	
Option **G**	PROFIBUS PA	STANDARD U_i = 30 V I_i = 300 mA P_i = 1.2 W L_i = 10 µH C_i = 5 nF	FISCO U_i = 17.5 V I_i = 550 mA P_i = 5.5 W L_i = 10 µH C_i = 5 nF
	Pulse/frequency/switch output	U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF	

Remote display FHX50

Basic specification, position 1, 2 Approval	Cable specification	Basic specification, position 4 Display, Operation Option L, M
Option **C2**	Max. cable length: 60 m (196.85 ft)	U_o = 7,3 V
		I_o = 327 mA
		P_o = 362 mW
		L_o = 149 µH
		C_o = 388 nF
		$C_c \leq$ 125 nF
		$L_c \leq$ 149 µH

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