HEIDENHAIN
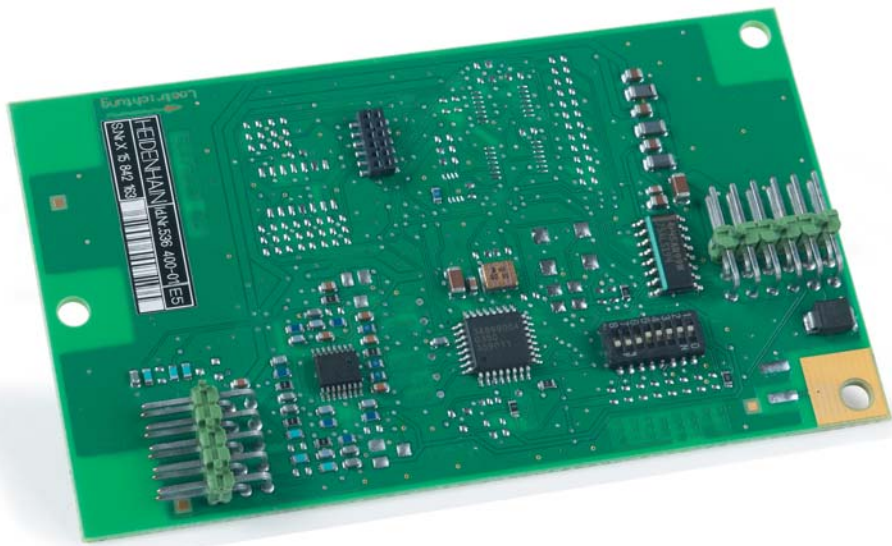
Product Information

IDP 100 Series

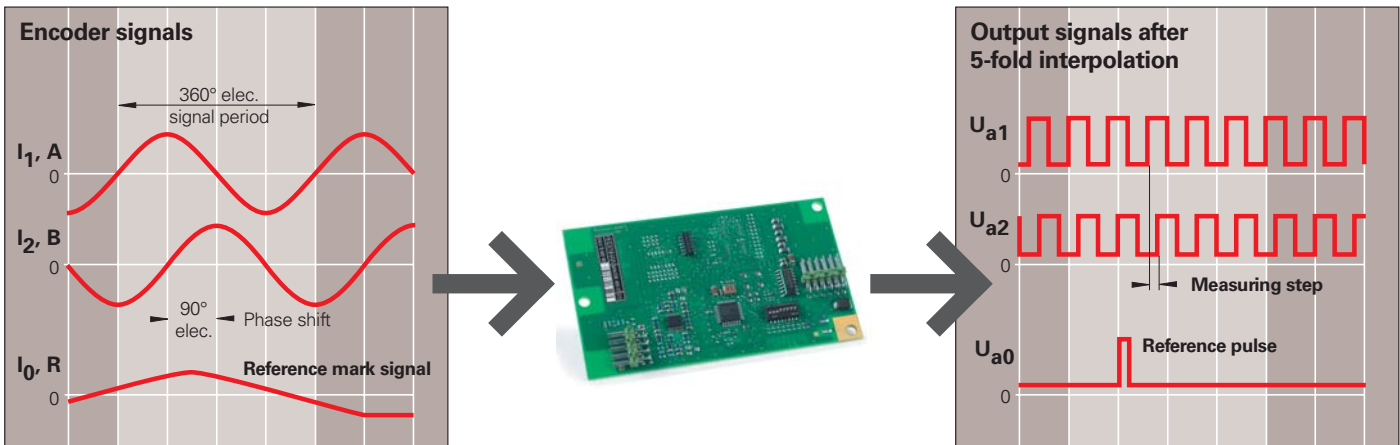Interpolation and
Digitizing Electronics

IDP 101/IDP 181/IDP 182
Interpolation and Digitizing Electronics

HEIDENHAIN linear, rotary and angle encoders operate on the principle of photo-electrically scanning very fine gratings. These encoders normally produce sinusoidal scanning signals with levels of approximately 11 µA$_{PP}$ (current signals) or approx. 1 V$_{PP}$ (voltage signals). The subsequent electronics first interpolate the scanning signals and then convert them into square-wave pulses (digitizing). The interpolation and digitizing circuitry is either integrated in the NC control (e.g. a HEIDENHAIN TNC) or in the numerical display (e.g. ND or POSITIP from HEIDENHAIN), or is available as a separate unit: **IDP 18x** (for voltage signals A, B and R) or **IDP 101** (for current signals I_1, I_2 and I_0).

The IDP provides two square-wave pulse trains (U$_{a1}$ and U$_{a2}$) and a reference pulse U$_{a0}$ as output signals. Within one signal period, each of the four signal edges of U$_{a1}$ and U$_{a2}$ can serve as a counting pulse. The distance between two subsequent edges of U$_{a1}$ and U$_{a2}$ is one measuring step. After 5-fold interpolation, for example, this distance is 1/20th of a grating period.

The adjustment to the subsequent electronics is quite easy. The interpolation, edge separation and reference pulse width are adjusted using PCB switches. Failure indication consists of a separate fault detection signal, or in addition, a switch to high impedance in the outputs U$_{a1}$ and U$_{a2}$.

Encoder signals

360° elec. signal period

I_1, A

I_2, B

90° elec. — Phase shift

I_0, R — Reference mark signal

Output signals after 5-fold interpolation

U$_{a1}$

U$_{a2}$

Measuring step

U$_{a0}$ — Reference pulse

IDP 181/IDP 182 interpolation and digitizing electronics

Input: $\sim$ 1 V$_{PP}$
Output: $\sqcap\sqcup$ TTL

The IDP 18x series features one input for incremental linear or angle encoders with sinusoidal output signals and a signal level of 1 V$_{PP}$. The IDPs provide TTL-compatible square-wave output signals.

The 5 V ± 5 % power supply must be provided by the subsequent electronics.

Interpolation and minimum edge separation a of the output signals or the resulting maximum input frequency are adjustable in the IDP. The hysteresis of the incremental output signals of the IDP 181 is fixed at "no hysteresis;" the IDP 182 is fixed at "with hysteresis."

| | Possible settings | | | | | | Minimum edge separation a |
	IDP 181		IDP 182				
Interpolation	5-fold	**10-fold**	20-fold	25-fold	**50-fold**	100-fold	
Input frequency	200 kHz	**200 kHz**	100 kHz	80 kHz	**40 kHz**	20 kHz	0.100 µs
	200 kHz	100 kHz	50 kHz	40 kHz	20 kHz	10 kHz	0.220 µs
	133 kHz	66 kHz	33 kHz	26 kHz	13 kHz	6.6 kHz	0.345 µs
	100 kHz	50 kHz	25 kHz	20 kHz	10 kHz	5 kHz	0.465 µs
	80 kHz	40 kHz	20 kHz	16 kHz	8 kHz	4 kHz	0.585 µs
	50 kHz	25 kHz	12.5 kHz	10 kHz	5 kHz	2.5 kHz	0.950 µs
	25 kHz	12.5 kHz	6.25 kHz	5 kHz	2.5 kHz	1.25 kHz	1.925 µs
Reference pulse width	**90° elec.** or 270° elec.						
Fault indication	Via **fault detection signal U$_{aS}$,** or additionally U$_{a1}$/U$_{a2}$ at high-impedance						

Default values are printed bold.

IDP 101 interpolation and digitizing electronics

Input: $\sim$ 11 µA$_{PP}$
Output: $\sqcap\sqcup$ TTL

The IDP 101 series features one input for incremental linear or angle encoders with sinusoidal output signals and a signal level of 11 µA$_{PP}$. This IDP provides TTL-compatible square-wave output signals.

The 5 V ± 5 % power supply must be provided by the subsequent electronics.

Interpolation and minimum edge separation a of the output signals or the resulting maximum input frequency are adjustable in the IDP. The hysteresis of the incremental output signals of the IDP 101 is fixed at "no hysteresis."

| | Possible settings | | Minimum edge separation a |
	IDP 101		
Interpolation	5-fold	**10-fold**	
Input frequency	50 kHz	**25 kHz**	0.950 µs
	25 kHz	12.5 kHz	1.925 µs
Reference pulse width	**90° elec.** or 270° elec.		
Fault indication	Via **fault detection signal U$_{aS}$,** or additionally U$_{a1}$/U$_{a2}$ at high-impedance		

Default values are printed bold.

Specifications and Dimensions

General specifications	IDP 101	IDP 181	IDP 182
Power supply	5 V ± 5%		
Current consumption[1]	≤ 100 mA	≤ 120 mA	≤ 130 mA
Cable length Input	≤ 30 m at $I_{Encoder}$ ≤ 120 mA	≤ 30 m at $I_{Encoder}$ ≤ 120 mA ≤ 60 m at U_P > 4.9 V	
Output	≤ 50 m with HEIDENHAIN cable and differential line receiver at the subsequent electronics input		
Vibration 55 to 2000 Hz Shock 6 ms	≤ 20 m/s^2 ≤ 300 m/s^2		
Operating temperature Storage temperature	0 to 70 °C –30 to 80 °C		
Protection IEC 60529	IP 00		
Weight	Approx. 0.1 kg		

Caution:
The permitted limits for the power supply of the connected encoder must not be exceeded.

[1] Without current consumption by the encoder and without output load:
  Subsequent electronics with the recommended input circuitry increase current consumption by approx. 80 mA
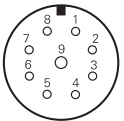
Dimensions in mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
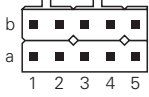
Ⓕ = Space needed for
  mounting
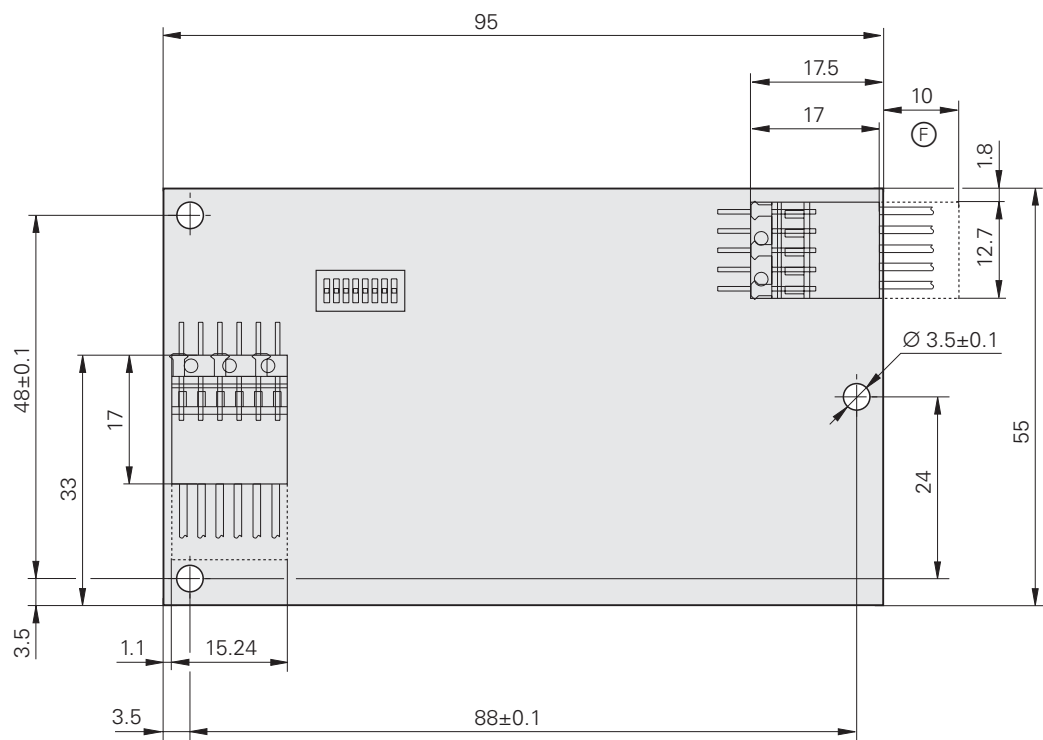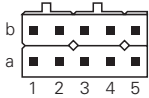
Electrical Connection
Pin Layout
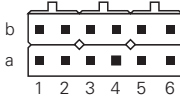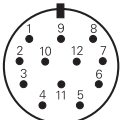
Input for IDP 181/IDP 182

10-pin PCB connector										12-pin M23 flange socket	

	Power supply				Incremental signals						Other signals	
	1b	2b	1a	2a	5b	5a	4b	4a	3b	3a	/	/
	12	2	10	11	5	6	8	1	3	4	7	9
	U_P	Sensor U_P	0 V	Sensor 0 V	A+	A–	B+	B–	R+	R–	Vacant	Vacant
	Brown/Green	Blue	White/Green	White	Brown	Green	Gray	Pink	Red	Black	/	/

Input for IDP 101

10-pin PCB connector											

	Power supply				Incremental signals						
	1b	2b	/	1a	5b	5a	4b	4a	3b	3a	2a
	3	4	Housing	9	1	2	5	6	7	8	/
	U_P	0 V	External shield	Inside shield	I_1+	I_1-	I_2+	I_2-	I_0+	I_0-	Vacant
	Brown	White	/	White/Brown	Green	Yellow	Blue	Red	Gray	Pink	/

Output

12-pin PCB connector												

		Power supply				Incremental signals						Other signals	
	2a	2b	1a	1b	6b	6a	5b	5a	4b	4a	3a	3b	/
	12	2	10	11	5	6	8	1	3	4	7	/	9
	U_P	Sensor U_P	0 V	Sensor 0 V	U_{a1}	$\overline{U_{a1}}$	U_{a2}	$\overline{U_{a2}}$	U_{a0}	$\overline{U_{a0}}$	$\overline{U_{aS}}$	U_{aS}	Vacant
	Brown/Green	Blue	White/Green	White	Brown	Green	Gray	Pink	Red	Black	Violet	/	/

Shield is on housing; **U_P** = power supply
Sensor: The sensor line is connected in the encoder with the corresponding power line.
Vacant pins or wires must not be used!
Color assignment applies only to extension cable.

Connecting Elements and Cables
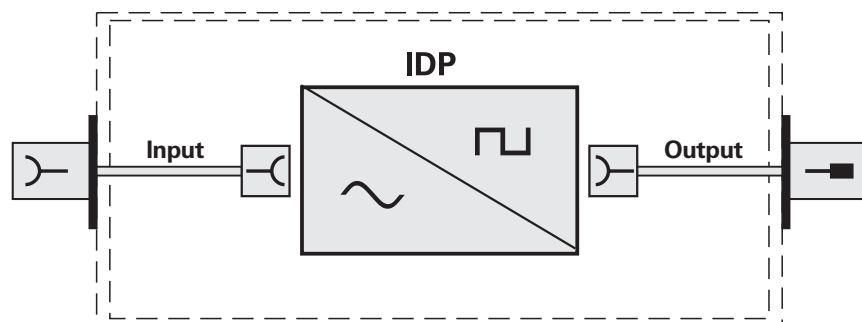
Input

IDP 18x input assembly
Wired with 12-pin flange socket (female)
and 10-pin PCB connector
Length: 70 mm
Id. Nr. 297 051-08

IDP 101 input assembly
Wired with 9-pin flange socket (female)
and 10-pin PCB connector

Length	Id. Nr.
70 mm	298 071-02
110 mm	298 071-09
150 mm	298 071-10

Output

IDP output assembly
Wired with 12-pin flange socket (male)
and 12-pin PCB connector
Length: 70 mm
Id. Nr. 297 051-01

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