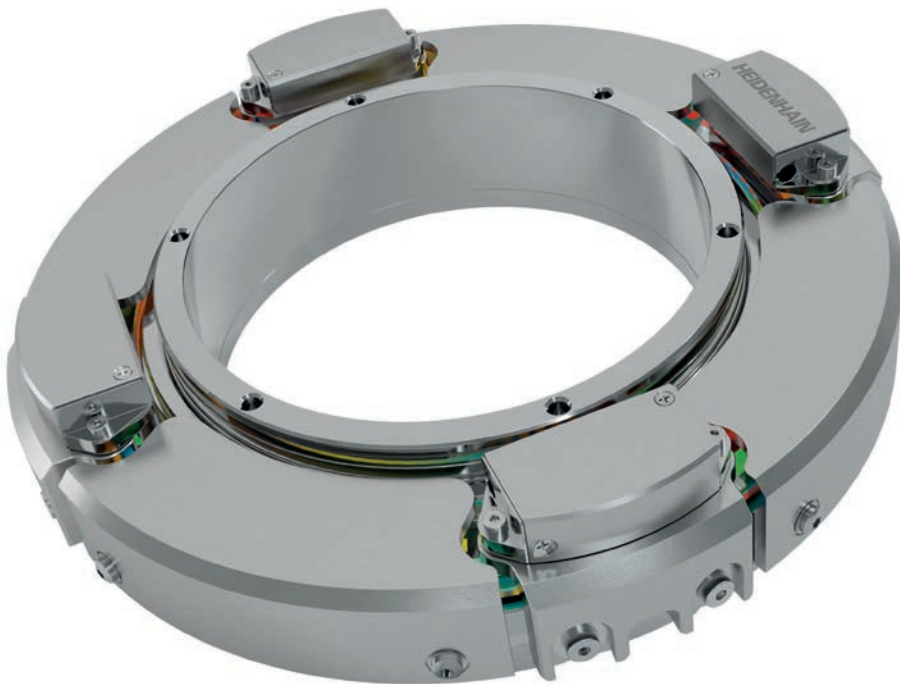




# HEIDENHAIN



Product Information

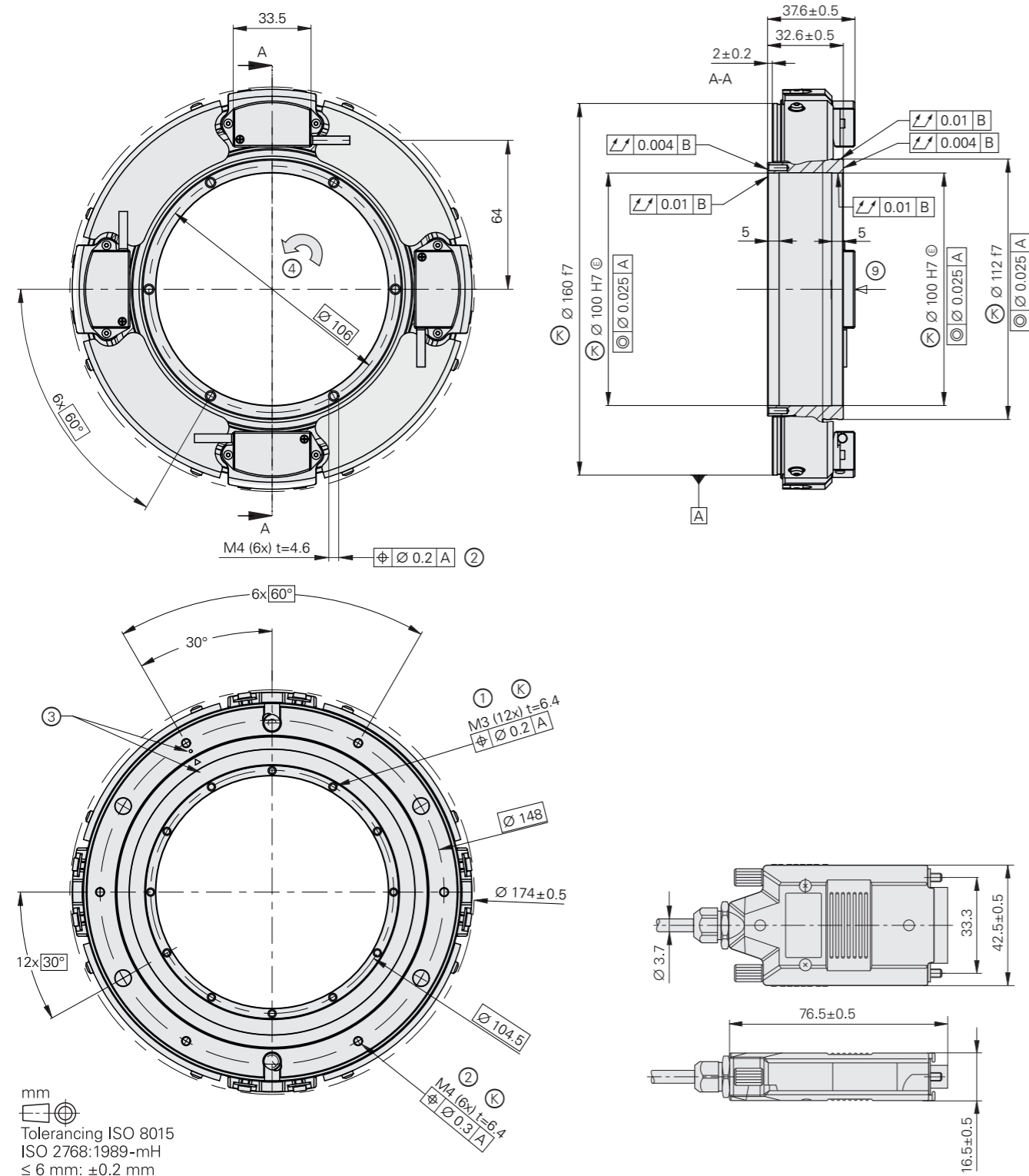
## **MRP 8081 *Dplus***

Angle Encoder Module  
with Four Scanning Heads  
and Compensation Data

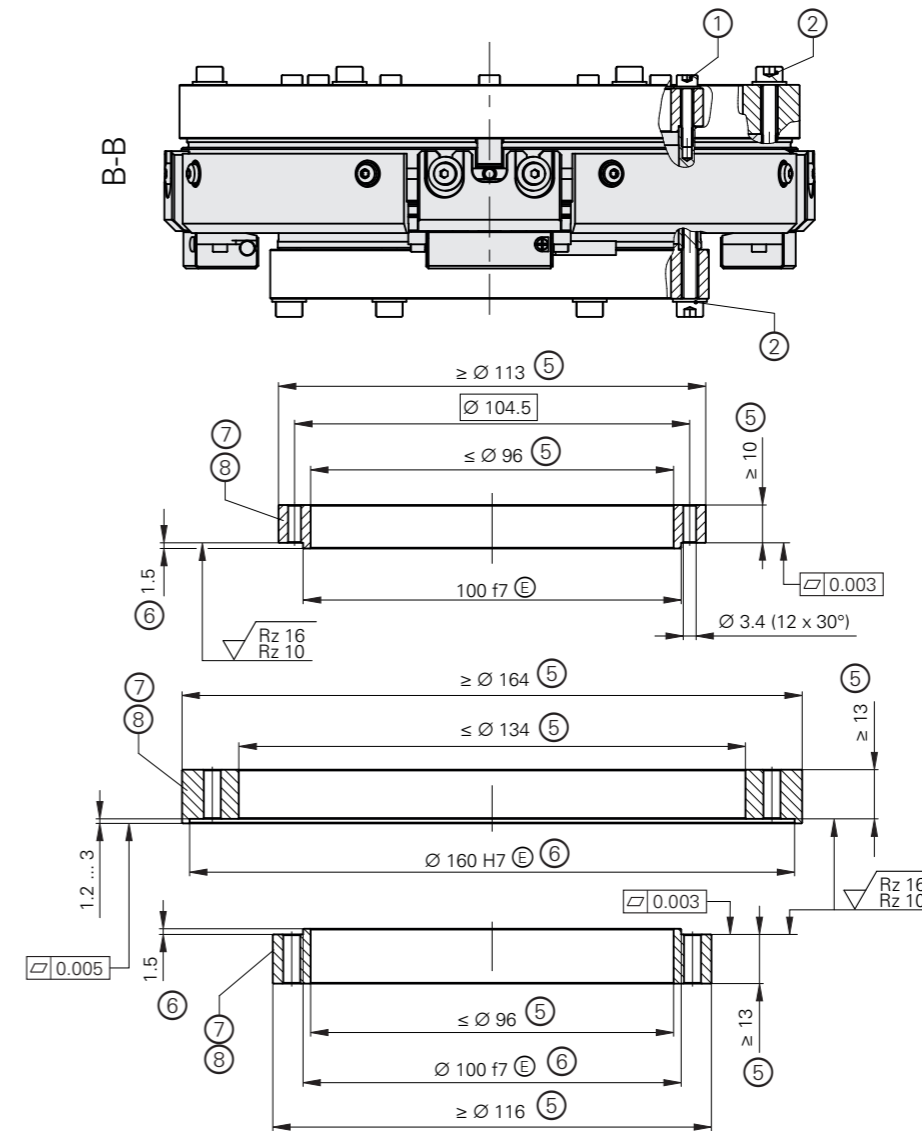
# MRP 8081 Dplus

Angle encoder module with four scanning heads and compensation data

- Very high system accuracy
- Resilient angle measurement
- Hollow shaft  $\varnothing$  100 mm
- Axial load of up to 300 N



## Mating dimensions of the mounting parts



mm  
Tolerancing ISO 8015  
ISO 2768:1989-mH  
≤ 6 mm: ±0.2 mm

### Note the information on mechanical design types and mounting.

- K = Required mating dimensions
- 1 = Tightening torque of the M3 – 8.8 cylinder head screws: 1.1 Nm ±0.05 Nm
- 2 = Tightening torque of the M4 – 8.8 cylinder head screws: 2.5 Nm ±0.13 Nm
- 3 = Mark for 0° position ±5°
- 4 = Direction of shaft rotation for output signals as per the interface description
- 5 = Required mounting dimensions for the transfer of the maximum permissible loads as per the specifications
- 6 = Optional: recommended mating dimensions
- 7 = Material for customer's mounted parts: Steel  
 $R_e \geq 235 \text{ N/mm}^2$   $R_m \geq 400 \text{ N/mm}^2$
- 8 = Thermal expansion coefficient  $\alpha_{\text{therm}}$ :  $10 \cdot 10^{-6} \text{ K}^{-1}$  to  $16 \cdot 10^{-6} \text{ K}^{-1}$
- 9 = Recommended direction of force; the recommended direction of force is to be maintained if dynamic overloading is possible

## Transferable accuracy

In order to achieve accuracies in the high-end range, customers must often perform a very complex and time-consuming calibration of the entire machine. Under the motto "transferable accuracy," HEIDENHAIN contributes to facilitating the mounting process for the customer and to transferring the high accuracy of our encoders to the customer's application without any losses. For the MRP 8081 *Dplus* encoders, this is achieved based on the following features:

- Sturdy, mechanical interface for mounting on the customer side
- Combination of rigid bearing unit and already adjusted scanning
- Four scanning heads for position calculation for resilient angle measurement
- Compensation data for boosting the system accuracy

### Electrical connection

The MRP 8081 *Dplus* angle encoder module provides four separate connections (D-sub, 15-pin) with 1 V<sub>PP</sub> interface. The EIB 74x signal converters that are available from HEIDENHAIN can be used to operate the product. The product can also be connected to downstream electronics from third-party suppliers if they provide four 1 V<sub>PP</sub> inputs.

### Compensation data file

The included compensation data file in CSV format basically contains a two-dimensional table. In this table, the angular positions from the four scanning heads, which have already been taken into account in the calculation, are assigned the corresponding compensation values for boosting the accuracy. The compensation data file is provided on a USB stick together with the encoder.

### Position calculation with an EIB 74x or downstream electronics from third-party suppliers

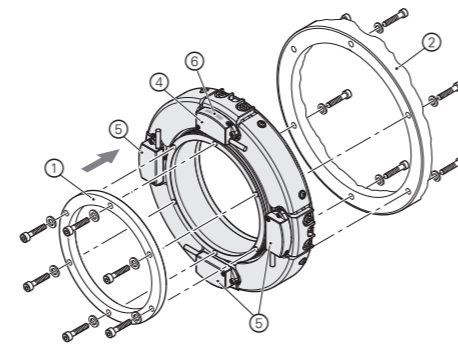
For the system to be able to reach the specified accuracy, the positions of all scanning heads need to be averaged.

$$X_{avg} = \frac{(X1_{abs} + X2_{abs} + X3_{abs} + X4_{abs})}{4}$$

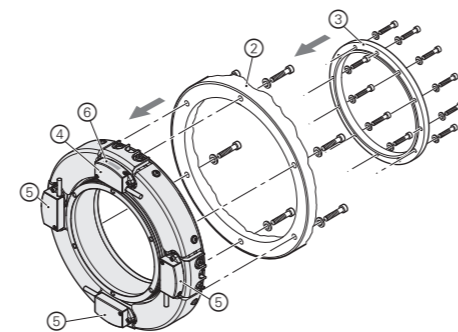
X1<sub>abs</sub> ... X4<sub>abs</sub>: Positions of the scanning heads

X<sub>avg</sub>: Arithmetic mean value of inputs X1<sub>abs</sub> to X4<sub>abs</sub>

For more information about implementing the position calculation, please refer to the MRP 8081 *Dplus* installation instructions.



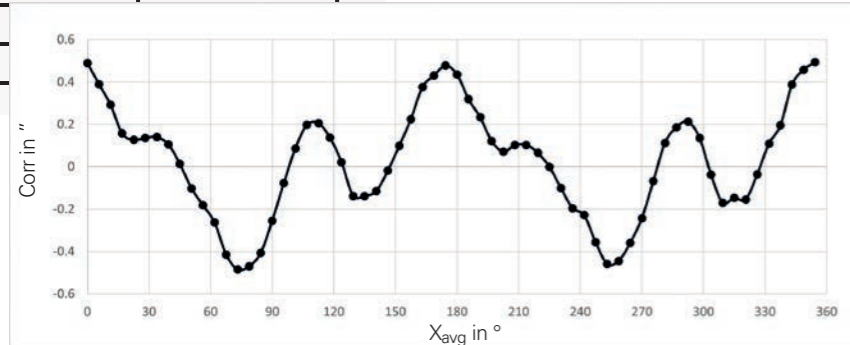
Mounting option 1



Mounting option 2

- 1 Customer rotor (mounting option 1)
- 2 Customer stator
- 3 Customer rotor (mounting option 2)
- 4 Scanning head 1 (with ID label)
- 5 Scanning heads 2 to 4 (without ID label)
- 6 ID label

X <sub>avg</sub> in °	Corr in "
0	0.489
5.625	0.397
11.250	0.274
16.875	0.188
22.500	0.144
28.125	0.151



## Specifications

Encoder	Incremental MRP 8081 <i>Dplus</i>
Measuring standard	OPTODUR circular scale
Signal periods	63000
System accuracy	±0.40"
Position error per signal period	±0.06"
Repeatability	From both directions: 0.1"
RMS position noise	Typically 0.0015"
Interface <sup>1)</sup>	4 x $\sim$ 1 V <sub>PP</sub>
Reference marks	150 (distance-coded)
Cutoff frequency -3 dB	≥ 500 kHz
Electrical connection <sup>1)</sup>	4 x 1.5 m cable with 15-pin D-sub connector; interface electronics inside the connector
Cable length <sup>1)</sup>	≤ 30 m (with HEIDENHAIN cable)
Supply voltage <sup>1)</sup>	DC 5 V ±0.25 V
Power consumption <sup>1)</sup> (maximum)	5.25 V: ≤ 950 mW
Current consumption (typical) <sup>1)</sup>	175 mA (without load)

<sup>1)</sup> Separate electrical connection for each scanning head



MRP 8081 *Dplus*

Bearing	Incremental MRP 8081 Dplus
<b>Shaft</b>	Hollow through shaft D = 100 mm
Max. permissible axial load <sup>1)</sup>	300 N (centered load)
Max. permissible radial load <sup>1)</sup>	100 N
Max. permissible tilting torque <sup>1)</sup>	6 Nm
Contact stiffness	Axial: 684 N/μm Radial: 367 N/μm (calculated values)
Resistance to tilt	1250 Nm/mrad (calculated value)
Mech. permissible speed	300 rpm
Moment of friction	≤ 0.2 Nm
Starting torque	≤ 0.2 Nm
Max. transferable shaft torque <sup>1)</sup>	10 Nm
Moment of inertia of rotor	$2.8 \cdot 10^{-3} \text{ kgm}^2$
Radial guideway accuracy	≤ 0.15 μm (measured at distance h = xx mm from the mating surface of the rotor <sup>2)</sup> )
Non-reproducible radial guideway accuracy	≤ 0.20 μm (measured at distance h = xx mm from the mating surface of the rotor <sup>2)</sup> )
Axial guideway accuracy	≤ ±0.15 μm
Axial runout of the shaft	≤ 4 μm
Wobble of the axis	0.5"
<b>Vibration</b> 55 Hz to 2000 Hz <b>Shock</b> 6 ms	≤ 200 m/s <sup>2</sup> (EN 60068-2-6) ≤ 1000 m/s <sup>2</sup> (EN 60068-2-27) (without load)
<b>Protection</b> EN 60529 <sup>3)</sup>	IP20
<b>Operating temperature</b> <b>Storage temperature</b>	0 °C to 50 °C 0 °C to 50 °C
<b>Relative air humidity</b>	≤ 75 % without condensation
<b>Mass</b>	2.15 kg (without cable or connector)

<sup>1)</sup> Purely static load, without additional vibrations or shock load

<sup>2)</sup> See the *Measuring and bearing accuracy* section in the *Angle Encoder Modules* brochure

<sup>3)</sup> When mounted

## Electrical connection

### ~ 1 V<sub>PP</sub> pin layout

15-pin D-sub connector													
	Power supply				Incremental signals						Other signals		
	4	12	2	10	1	9	3	11	14	7	5/6/8/15	13	/
	<b>U<sub>P</sub></b>	<b>Sensor</b> U <sub>P</sub>	<b>0V</b>	<b>Sensor</b> 0V	<b>A+</b>	<b>A-</b>	<b>B+</b>	<b>B-</b>	<b>R+</b>	<b>R-</b>	<b>Vacant</b> <sup>1)</sup>	<b>Vacant</b> <sup>1)</sup>	<b>Vacant</b>
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	/	Violet	Yellow

**Cable shield** connected to housing; **U<sub>P</sub>** = Power supply voltage

**Sensor:** The sense line is connected in the encoder with the corresponding power line.

Vacant pins or wires must not be used!

## HEIDENHAIN

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This Product Information document supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information document edition valid when the order is placed.

### Further information:

Comply with the requirements described in the following documents to ensure correct and intended operation.

- Brochure: *Angle Encoder Modules* 1102713-xx
- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Cables and Connectors* 1206103-xx