

MTP-NT Ethernet Data Protocol

The Excel table [nt_digital_range.xlsb](#) shows the complete range of digital values transmitted in the TCP data stream.

This topic explains the meaning of the table columns and the conversion of digital values into bipolar values and the resulting measured values.

- The column "decimal" shows the unsigned short value, coming in the TCP data stream.
- Those values must be converted into signed short (by subtracting 32768).
- The column "bipolar" shows the result that represents the measured value.

Calculation of the bipolar value: [incoming digital value] - 32768 = [bipolar value]



Example

$$65535 - 32768 = 32767$$

$$32768 - 32768 = 0$$

$$0 - 32768 = -32768$$

Analog measurement (strain gauge, voltage etc.):

The range of bipolar values is -32768 to 32767. The full scale signal range is -32704 to 32704.



Example 1

Bridge / Strain Gauge: MTP-NT-ANALOG, MTP-NT-STG

- input range setting = ± 5 mV/V
- applied bridge unbalance = +5 mV/V
- digital value (unsigned short) = 65472
- bipolar value = 32704



Example 2

Voltage: MTP-NT-ANALOG

- input range setting = ± 10 V
- applied input voltage = +10 V
- digital value (unsigned short) = 65472
- bipolar value = 32704

Temperature measurement:

The digital output resolution is 0.05 K/step · (20 steps/Kelvin). This means that the bipolar value must be divided by 20 to get the temperature.



Example

Temperature: MTP-NT-THERMO

- sensor temperature = +100°C
- digital value (unsigned short) = 34768
- bipolar value = 2000



sensor fault message (sensor break): Temperature value = -999.0°C
unreasonable value message (overflow): Temperature value = -998.0°C

* This means the mathematically generated output resolution after linearization; the true ADC resolution depends on sensor type and temperature range and may be significantly lower.

Analog Decoder output

The bipolar full scale value (± 32704) generates an analog output voltage of ± 10 V.

Analog Decoder output (Temperature Values):

The 10 V analog full scale value corresponds to the full scale temperature of 1635.20 degrees Celsius. Therefore, the factor for obtaining the temperature value from the analog decoder output is **163.52** (example: 1 V analog output voltage multiplied by 163.52 gives the reading 163.52 degrees Celsius).

Data Stream		Analog Out	Temperature (depending on module setting)			
decimal	bipolar	(± 10 V)	-273/+1635	-273/+1000	-273/+500	-250/+250
		Volt	°C	°C	°C	°C
65535	32767	10,019264	1638,35	1001,93	500,96	250,48
65472	32704	10,000000	1635,20	1000,00	500,00	250,00
45850	13082	4,000122	654,10	400,01	200,01	100,00
39309	6541	2,000061	327,05	200,01	100,00	50,00
36039	3271	1,000183	163,55	100,02	50,01	25,00
32768	0	0,000000	0,00	0,00	0,00	0,00
27305	-5463	-1,670438	-273,15	-167,04	-83,52	-41,76
23835	-8933	-2,731470		-273,15	-136,57	-68,29
14902	-17866	-5,462940			-273,15	-136,57
64	-32704	-10,000000				-250,00
0	-32768	-10,019569				-250,49



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Contact imc

Address

imc Test & Measurement GmbH
Voltastr. 5
13355 Berlin

Phone: (Germany): +49 30 467090-0

E-Mail: info@imc-tm.de

Internet: <https://www.imc-tm.com>

Tech support

If you have problems or questions, please contact our tech support:

Phone: (Germany): +49 30 467090-26

E-Mail: hotline@imc-tm.de

Internet: <https://www.imc-tm.com/service-training/>

Service and maintenance

Our service team is at your disposal for service and maintenance inquiries:

Phone: (Germany): +49 30 629396-333

E-Mail: imc-service@axiomatrixsolutions.com

Internet: <https://www.imc-tm.com/service>

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The safe handling of measurement devices requires a good knowledge of the system. At our training center, experienced specialists are here to share their knowledge.

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