SpeedTalker-DN (UI)

DeviceNet Universal-Input shaft Speed Monitor

USER'S MANUAL

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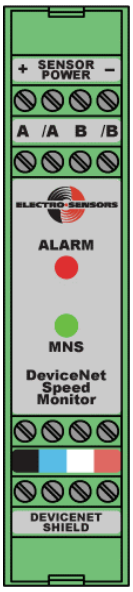
990-003300 Revision B

Organization

1. Overview



The SpeedTalker-DN (UI) converts pulse frequencies from external sensors to RPM units, providing tachometer measurement of up to two rotating shafts and the status of eight alarm functions over DeviceNet.
The electrically-isolated inputs are compatible with almost all pulse-output sensors and signal sources including incremental shaft encoders, prox, photo-eye and Hall-effect sensors. Sensor signals may be single-ended or differential, single-channel or quadrature.
The unit is network-powered and provides isolated dc sensor power.
Measurable shaft speeds range from 0.0 to 3,276.7 RPM and the unit may be configured for unidirectional or bidirectional speed measurement.
Each configurable alarm function has on/off, greater/less than, speed threshold, delay time and minimum on-time settings.
Configuration is handled over DeviceNet with parameter settings stored in non-volatile memory. An electronic data sheet (EDS) file is provided to aid configuration.
RPM measurements and Alarm Status are accessible over the Poll I/O and Explicit Messaging connections and Alarm Status is provided over the COS I/O connection for slave-initiated alarm notification.

2. Operation

2.1 Sensor power (TB1)

Electrically-isolated 24Vdc power is provided for sensors - see 5. Specifications - Terminal Diagram.

2.2 Sensor inputs (TB2)

There are two electrically-isolated sensor input channels (A and B).
Each channel has two terminals (A and /A for channel A, B and /B for channel B) and is compatible with single-ended (sourcing, sinking, line-driver) and differential signals (RS422 and others) - see 5. Specifications - Terminal Diagram, Sensor Connection Diagrams.
The two channels have an internal dual DIP Switch to configure the inputs for 24V or 5V signal levels - see 3.1 Configuring sensor input voltage. The factory default setting is 24V.
Note: Signals exceeding 5.5V across inputs configured for 5V can result in damage.

2.3 ALARM led

The ALARM led is provided to indicate the state of one or more configurable Alarm functions (see 2.7 Alarm functions)

2.4 MNS led

The combined Module/Network Status (MNS) led is provided to aid setup, diagnostics and troubleshooting. Its operation is standard DeviceNet.

MNS LED state	Meaning
Off	Not Powered / Not On-Line
Flashing Green	On-Line, Not Connected
Green	On-Line, Connected
Flashing Red	Minor Fault (e.g. I/O Connection timed-out)
Red	Critical Fault (e.g. duplicate MAC ID or CAN Bus-off)

2.5 DeviceNet terminals (TB3, TB4) - see 5. Specifications - Terminal Diagram.

2.6 Speed (RPM) measurement

Speed

There are two speed measurements: Primary Speed and Secondary Speed.
Both are Speed Object attributes and are also part of the Assembly Object Data attribute (Poll I/O connection). See the Device Profile for details.

Configuration

The speed measurements are governed by the following configuration parameters:
Mode, Primary PPR, Secondary PPR, Primary Min Speed and Secondary Min Speed.
All are Speed Object attributes. See the descriptions below and the Device Profile for details.

Measurement Mode (Mode)

Two bits of the Mode attribute are utilized:
Bi-Dir bit (Bidirectional / Unidirectional)
When configured for Unidirectional (0), the A and B input channels operate independently. The A channel RPM appears in the Primary Speed attribute and the B channel RPM appears in the Secondary Speed attribute. This allows measuring up to two shaft RPMs simultaneously.
When configured for Bidirectional (1), the A and B channels function together as quadrature inputs. In this case the measured RPM appears in the Primary Speed and zero appears in the Secondary Speed (unused).
Unsigned bit (Unsigned / Signed - affects Bidirectional operation only)
When configured for Signed (0), Primary Speed's arithmetic sign indicates rotation direction:
Positive indicates forward rotation (A channel leading B),
Negative indicates reverse rotation (B channel leading A).
When configured for Unsigned (1), Primary Speed's value is always positive. In this case the shaft rotation direction can be indicated by using a Primary channel Speed Alarm (e.g. a Less Than alarm with zero RPM threshold will indicate reverse motion) - see Alarm Functions.

PPR (Primary PPR, Secondary PPR)

Set these to the number of pulses the corresponding sensor puts out per shaft revolution.
In Unidirectional mode, enter channel A's sensor PPR into Primary PPR and (if used) channel B's sensor PPR into Secondary PPR.
In Bidirectional mode, enter the sensor/encoder PPR into Primary PPR (Secondary PPR is unused).

Min Speed (Primary Min Speed, Secondary Min Speed)

Set each of these to the minimum shaft speed (RPM) below which you want the corresponding *measured* speed to be zero. Together with PPR, this setting determines the maximum wait-time (from the last pulse) for a new pulse to arrive: max wait (sec) = 60 / (PPR * Min Speed).
When no pulse arrives in this time, the corresponding measured Speed goes to zero.
Increasing this setting speeds-up stopped shaft detection at the expense of indicating all lower RPMs as zero. Decreasing this setting lowers the measurable RPM at the expense of slowing down stopped shaft detection.
In Unidirectional mode, enter the desired channel A shaft minimum into Primary Min Speed and (if used) the channel B shaft minimum into Secondary Min Speed.
In Bidirectional mode, enter the desired shaft minimum into Primary Min Speed (Secondary Min Speed is unused).

2.7 Alarm functions (including ALARM led)

Eight configurable alarm functions are provided for detecting Greater/Less speed conditions. Each may be used individually or in any combination with the others.
Four functions are assigned to Primary Speed (Primary Alarm 1 ... 4) and four to Secondary Speed (Secondary Alarm 5 ... 8). All alarm functions work independently of the others.
The Primary Alarm1 ... 4 Threshold values may be positive or negative for direction-specific thresholds in bidirectional mode.

Alarm Status

The eight one-bit alarm states (Alarmed/Not-Alarmed) are given in the Alarm Status attribute of the Alarm Object and also as part of the Assembly object's Data attribute (Poll I/O connection). Alarm Status is also available over the COS I/O connection for applications requiring sensor-initiated Greater/Less speed notification. See the Device Profile for details.

Configuration

The eight alarm functions are governed by several configuration parameters.
All alarm function configuration parameters are Alarm Object attributes.

The following parameters affect *all eight* alarm functions:
Alarm LED Assign, Alarm ON/OFF Set, Alarm Greater/Less Set and Threshold % Hysteresis.
See the descriptions below and the Device Profile for details.

ALARM led assign (Alarm LED Assign)

Each of this parameter's eight bits (from high to low) assigns the corresponding alarm function (8...1) to the ALARM led.
The ALARM led is ON when *one or more* assigned alarm functions is *alarmed*.
The ALARM led is OFF when *all* assigned alarm functions are *not-alarmed*.

Alarm ON/OFF (Alarm ON/OFF Set)

Each of this parameter's eight bits (from high to low) turns the corresponding alarm function (8...1) ON(1) / OFF(0). Use this parameter to enable/disable the alarm functions.

Alarm Greater/Less (Alarm Greater/Less Set)

Each of this parameter's eight bits (from high to low) configures the corresponding alarm function (8...1) for Greater(1) / Less(0) functionality.
When ON and set for greater, a function becomes alarmed when measured speed is *greater than* the Alarmed trip-point and becomes not-alarmed when it is *less than* the Not-Alarmed trip-point.
When ON and set for less, a function becomes alarmed when measured speed is *less than* the Alarmed trip-point and becomes not-alarmed when it is *greater than* the Not-Alarmed trip-point.

Alarm Hysteresis (Threshold % Hysteresis)

This parameter works with each function's Alarm Threshold and Greater/Less setting to determine the RPM trip-point for *exiting* the Alarmed state. It has no effect on the RPM trip-point for *entering* the Alarmed state.

Alarmed trip-point = Alarm Threshold
Not-Alarmed trip-point = (1 ± Threshold % Hysteresis/100) * Alarm Threshold
Note: + or - depends on the Greater/Less setting and Alarm Threshold sign.
The Not-Alarmed trip-point is always on the Not-Alarmed side of Alarm Threshold.

2.7 Alarm functions (cont.)

Additionally, *each of the eight* alarm function has the following three parameters:
Threshold, On Delay Time, On Min Time.
See the descriptions below and the Device Profile for details.

Alarm Threshold (Secondary Alarm8...5 Threshold, Primary Alarm4...1 Threshold)

Sets the function's Speed (RPM) trip-point for *entering* the Alarmed state and works with Threshold % Hysteresis and the function's Alarm Greater/Less setting to determine the Speed (RPM) trip-point for *exiting* the Alarmed state. See Alarm Hysteresis for a complete description of the trip-points.
The Primary Alarm4...1 Threshold values may be positive or negative.
In bidirectional mode (Mode Bi-Dir bit = 1), use positive values for forward-direction thresholds and negative values for reverse-direction thresholds.
In unidirectional mode (Mode Bi-Dir bit = 0), use only positive values.

Alarm ON Delay Time (Secondary Alarm8...5 ON Delay Time, Primary Alarm4...1 ON Delay Time)

Sets the time that measured speed must be *continuously* at alarm levels for the function to enter the Alarmed state. This setting is useful for avoiding nuisance alarms resulting from transient speed excursions into alarm levels.

Alarm ON Minimum Time (Secondary Alarm8...5 ON Min Time, Primary Alarm4...1 ON Min Time)

Sets the minimum time a function stays Alarmed once it has entered the Alarmed state. Increasing the duration of potentially short Alarmed states allows the control system more time to detect them.

3. Setup

3.1 Configuring the sensor inputs

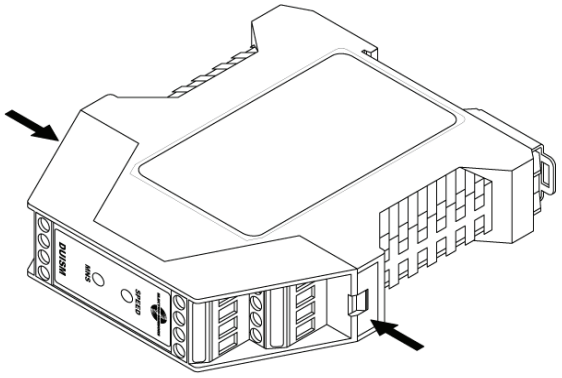
Notes: Each sensor input channel is configurable for 24V (factory default) or 5V signal levels.
Use the 24V setting for 24V supply-level signals (e.g. NPN, PNP, HTL).
Use the 5V setting for 5V (or less) signals (e.g. RS422, 5V logic).

1. Press the two housing release tabs (one at a time) with a small screwdriver or similar object in the direction indicated by the arrows. Each tab should click as it releases.
2. Slide the PCB assembly out of the housing as shown.
3. Locate the internal DIP Switch on the PCB assembly as shown. Note the two sliders (1 and 2) and their ON and OFF positions (OFF is the position opposite to ON).
4. Set the sliders for the desired input channel voltages using the information given in the table.

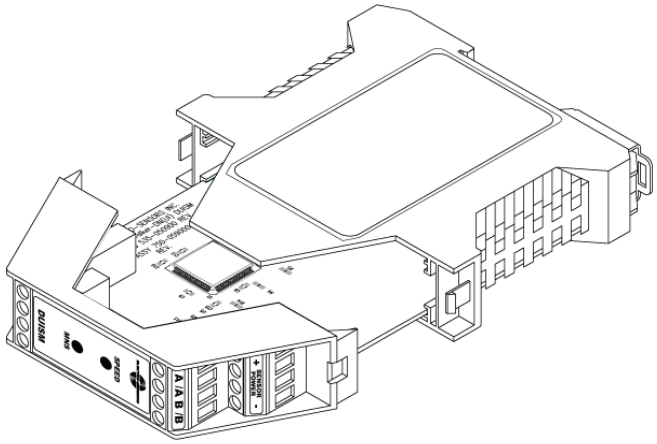
DIP Switch input voltage configuration

Channel	Slider	24V	5V
A	1	OFF	ON
B	2	OFF	ON

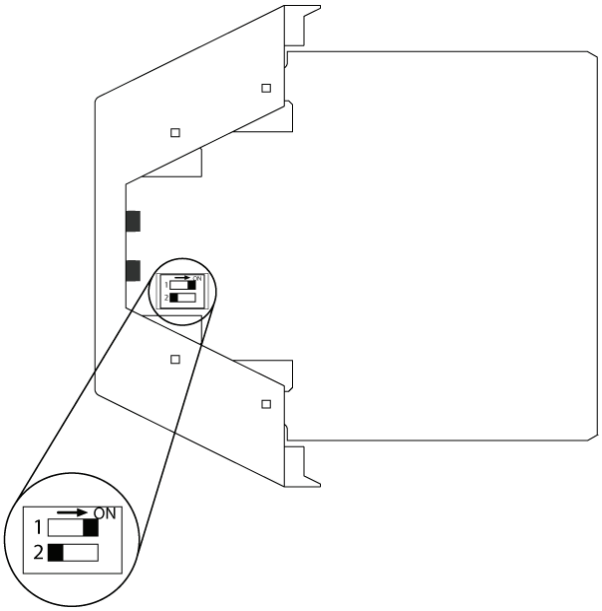
5. With the PCB assembly and housing oriented as shown and with the pcb engaged in the housing's internal tracks, slide the PCB assembly back into the housing until both tabs click shut.



Press housing release tabs in



Slide PCB assembly in/out



Locate internal DIP switch, sliders, positions

3.2 Cabling, power-ON and getting on-line

1. With the network powered-OFF, connect the sensor outputs to the sensor input terminals and the sensor power wires to the SENSOR POWER terminals - see 5. Specifications, Sensor Connection Diagrams.
2. Connect DeviceNet network cable to the color-coded DeviceNet (TB3) and DeviceNet Shield (TB4) terminals. see 5. Specifications, Terminal Diagram.
3. When the network is powered-ON, the MNS LED will sequence through a brief test: GREEN-RED-OFF.
4. If there are no MAC ID or Baud Rate conflicts on the network, the MNS LED will then flash GREEN indicating the node is on-line but not connected.

3.3 Set MAC ID, Baud Rate (DeviceNet Commissioning Tool required)

1. Once on-line, scan the network to find the SpeedTalker-DN (UI). Once found, you may change the MAC ID and/or Baud Rate. The factory defaults are MAC ID 63 and Baud Rate 125k.
2. MAC ID changes take effect immediately, initiating a reset sequence similar to that of power-on. Baud Rate changes don't take effect until SpeedTalker-DN (UI) power is cycled off/on.

3.4 Configure SpeedTalker parameters (DeviceNet Configuration Tool required)

1. Register the SpeedTalker-DN (UI) EDS file with your DeviceNet Configuration Tool. Your DeviceNet Configuration Tool uses this file to create a user-friendly interface to the configuration parameters.
2. Speed configuration parameters:
   - 2.1 Mode
     Configure the Bi-Dir (bit 0) and Unsigned (bit 1) bits for desired operation.
   - 2.2 Primary PPR, Secondary PPR
     Enter the Primary PPR and/or Secondary PPR (if used) values.
   - 2.3 Primary Min Speed, Secondary Min Speed
     Enter the minimum shaft speeds (RPM) below which you want the *measured* RPM to be zero.

   The speed parameters may be changed in any order. Changes take effect immediately.
3. Alarm configuration parameters:
   Set the configuration parameters for any/all desired Alarm functions.
   Alarm parameters may be changed in any order. Changes take effect immediately.

3.5 Configure Scanner (DeviceNet Configuration Tool required)

1. Add the SpeedTalker to the Scanner's scanlist:
   Select the SpeedTalker-DN (UI) from the Scanner's list of available devices and add it to the scanlist.
2. Select and map the SpeedTalker Inputs:
   - 2.1 Select the desired SpeedTalker-DN (UI) input (Poll or COS) from the Scanner's list of available inputs.
     The Poll connection produces the Assembly Object's data attribute value (Class ID = 4, Instance = 101, Attribute = 3).
     The COS connection produces the Alarm Object's Alarm Status attribute value (Class ID = 101, Instance = 1, Attribute = 29).

3.5 Configure Scanner (cont.)

2.2 Map the selected input to the desired Scanner memory locations.
For the Poll connection, set the byte offset and bit length to map the desired Data Components (Primary RPM, Secondary RPM and Alarm Status) from the I/O Assembly.

See 4.2 I/O Data Format for details.

For Primary Speed only, set the byte offset to 0 and bit length to 16.
For Primary and Secondary Speeds, set the byte offset to 0 and bit length to 32.
For Secondary Speed only, set the byte offset to 2 and bit length to 16.
For Alarm Status only, set the byte offset to 4 and bit length to 8.
For Primary Speed, Secondary Speed and Alarm Status, set the byte offset to 0 and bit length to 40.

3.6 Interpreting I/O data

1. Primary Speed
   - Data type: 16-bit signed integer (INT)
   - User-units: RPM
   - Resolution: 0.1 RPM
     Minimum value (0x8000) represents -3,276.8 RPM (reverse direction)
     Zero value (0x0000) represents 0.0 RPM (stopped)
     Maximum value (0x7FFF) represents 3,276.7 RPM (forward direction)
   - Source: Speed Object's Primary Speed attribute (class/inst./attr. 100/1/4)

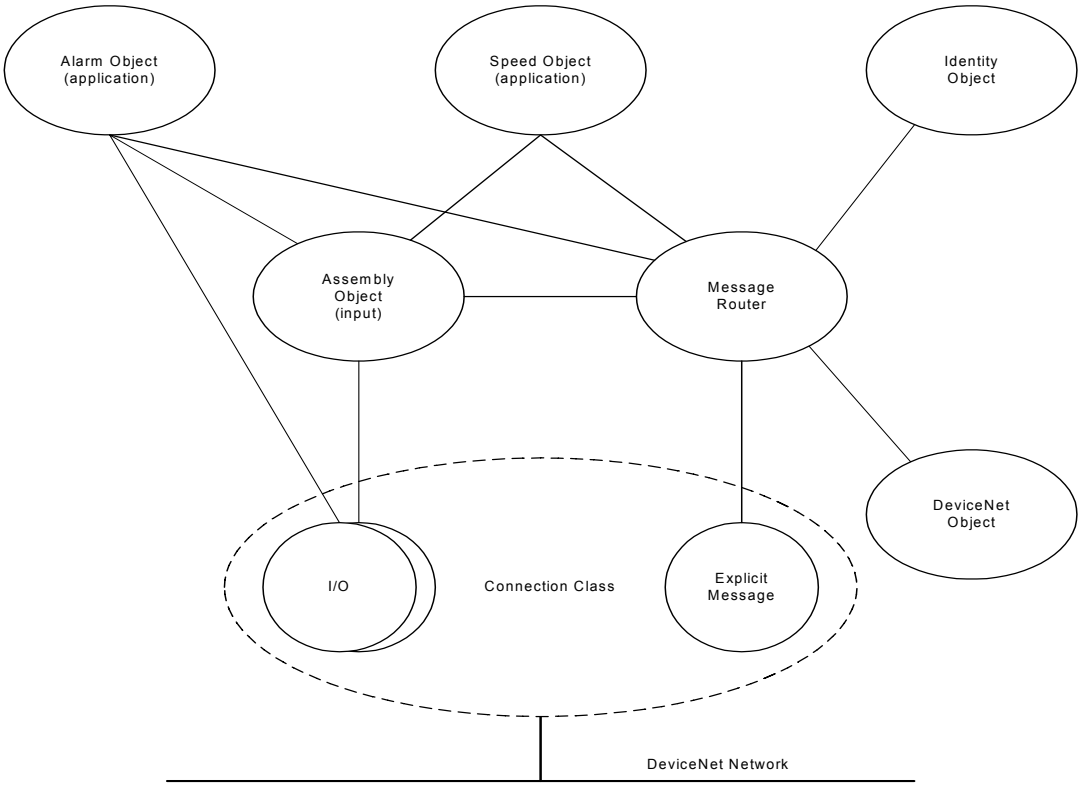
2. Secondary Speed
   - Data type: 16-bit signed integer (INT)
   - User-units: RPM
   - Resolution: 0.1 RPM
     Zero value (0x0000) represents 0.0 RPM
     Maximum value (0x7FFF) represents 3,276.7 RPM
   - Source: Speed Object's Secondary Speed attribute (class/inst./attr. 100/1/7)

3. Alarm Status
   - Data type: 8-bit boolean (BYTE)
   - Assignment: Bit 0 Primary Alarm 1 status
     Bit 1 Primary Alarm 2 status
     Bit 2 Primary Alarm 3 status
     Bit 3 Primary Alarm 4 status
     Bit 4 Secondary Alarm 5 status
     Bit 5 Secondary Alarm 6 status
     Bit 6 Secondary Alarm 7 status
     Bit 7 Secondary Alarm 8 status
   - Bit encoding: 0 - Not Alarmed, 1 - Alarmed
   - Source: Alarm Object's Alarm Status attribute (class/inst./attr. 101/1/16)

See 4.2.2 (Format of I/O Assembly Data) for byte ordering.

4. DeviceNet Device Profile

4.1 Object model



4.1.1 Objects present (generic device profile)

Object	Class ID code	Optional/required	# Instances
Identity	1	Required	1
Message Router	2	Required	1
DeviceNet	3	Required	1
Assembly	4	Required	1
Connection	5	Required	3 (Expl Mes, Poll I/O, COS I/O)
Speed (application)	100	[1 app. obj. req'd]	1
Alarm (application)	101	[1 app. obj. req'd]	1

4.1.2 Object Interfaces

Object	Interface
Identity	Message Router
Message Router	Explicit Messaging Connection Instance
DeviceNet	Message Router
Assembly	Poll I/O Connection or Message Router
Connection(s)	Message Router
Speed (application)	Assembly or Message Router
Alarm (application)	COS I/O Connection, Assembly or Message Router

4.1.3 Objects that affect behavior

Object	Effect on behavior
Identity	Supports the Reset service
Message Router	No effect
DeviceNet	Configures port attributes (baud, MAC ID, BOI proc.)
Assembly	Defines I/O data format
Connection	Contains the number of logical ports into or out of device
Speed (application)	Configures Mode, sensor PPRs, Minimum measurable Speeds
Alarm (application)	Configures speed thresholds, time delays, min. ON times, over/under functionality, ON/OFF and hysteresis for Alarm 8... Alarm 1 functions

4.1.4 Object instance attributes (by Class, Instance)

Identity Object (Class ID = 1, Instance = 1)

Attrib. ID	Access Rule	Name	Data Type	Value
1	Get	Vendor ID	UINT	804
2	Get	Device Type	UINT	0 (generic profile)
3	Get	Product Code	UINT	3
4	Get	Revision	STRUCT of	
		Major rev.	USINT	---
		Minor rev.	USINT	---
5	Get	Status	WORD	[realtime code]
6	Get	Serial Number	UDINT	[unique code]
7	Get	Product Name	SHORT- STRING	"SpeedTalker-DN (UI)"
8	Get	State	USINT	0-5

Message Router Object (Class ID = 2, Instance = 1)
No externally visible interface to this object instance.

DeviceNet Object (Class ID = 3, Instance = 1)

Attrib ID	Access Rule	Name	Data Type	Value
1	Get/Set	MAC ID	USINT	63 (fac. def.)
2	Get/Set	Baud Rate	USINT	0 (fac. def. 125k)
3	Get/Set	BOI	BOOL	0 (fac. def. OFF)
4	Get/Set	Bus-Off Counter	USINT	0 (reset val)
5	Get	Allocation Info	STRUCT of:	
		Allocation Choice	BYTE	[alloc byte]
		Master's MAC ID	USINT	[master MAC ID dependent]

Assembly Object (Class ID = 4, Instance = 101)

Attrib ID	Access Rule	Name	Data Type	Value
3	Get	Data	Array of bytes:	Primary Speed (low)
				Primary Speed (high)
				Secondary Speed (low)
				Secondary Speed (high)
				Alarm (8...1) Status

4.1.4 Object instance attributes (cont.)

Explicit Messaging Connection Object (Class ID = 5, Instance = 1)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0x00 (reset)
2	Get	instance_type	USINT	0x00 (explicit)
3	Get	transportClass_trigger	BYTE	0x83
4	Get	produced_connection_id	UINT	[slave MAC ID dependent]
5	Get	consumed_connection_id	UINT	[slave MAC ID dependent]
6	Get	initial_comm_characteristics	BYTE	0x21 (prod grp 2, cons grp 2)
7	Get	produced_connection_size	UINT	37
8	Get	consumed_connection_size	UINT	37
9	Get/Set	expected_packet_rate	UINT	2500 (default in mS)
12	Get	watchdog_timeout_action	USINT	1 (default - auto delete)
13	Get	produced_conn_path_length	UINT	0 (default)
14	Get	produced_connection_path	EPATH	Empty
15	Get	consumed_conn_path_length	UINT	0 (default)
16	Get	consumed_connection_path	EPATH	Empty
17	Get	production_inhibit_time	UINT	0 (mS)

Poll I/O Connection Object (Class ID = 5, Instance = 2)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0x00 (reset)
2	Get	instance_type	USINT	0x01 (I/O)
3	Get	transportClass_trigger	BYTE	0x83
4	Get	produced_connection_id	UINT	[slave MAC ID dependent]
5	Get	consumed_connection_id	UINT	[slave MAC ID dependent]
6	Get	initial_comm_characteristics	BYTE	0x01 (prod grp 1, cons grp 2)
7	Get	produced_connection_size	UINT	5
8	Get	consumed_connection_size	UINT	0
9	Get/Set	expected_packet_rate	UINT	[must be set]
12	Get	watchdog_timeout_action	USINT	0 (default - Timed Out state)
13	Get	produced_conn_path_length	UINT	6
14	Get	produced_connection_path	EPATH	"20 04 24 65 30 03"
15	Get	consumed_conn_path_length	UINT	6
16	Get	consumed_connection_path	EPATH	"20 64 24 01 30 04"
17	Get/Set	production_inhibit_time	UINT	0 (mS)

4.1.4 Object instance attributes (cont.)

COS I/O Connection Object (Class ID = 5, Instance = 4)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0x00 (reset)
2	Get	instance_type	USINT	0x01 (I/O)
3	Get	transportClass_trigger	BYTE	0x12 or 0x10 [per ack setting]
4	Get	produced_connection_id	UINT	[slave MAC ID dependent]
5	Get	consumed_connection_id	UINT	[slave MAC ID dependent]
6	Get	initial_comm_characteristics	BYTE	0x01 or 0x0F [per ack setting]
7	Get	produced_connection_size	UINT	1
8	Get	consumed_connection_size	UINT	0
9	Get/Set	expected_packet_rate	UINT	[must be set]
12	Get	watchdog_timeout_action	USINT	0 (default - Timed Out state)
13	Get	produced_conn_path_length	UINT	6
14	Get	produced_connection_path	EPATH	"20 65 24 01 30 10"
15	Get	consumed_conn_path_length	UINT	6
16	Get	consumed_connection_path	EPATH	"20 64 24 01 30 04"
17	Get/Set	production_inhibit_time	UINT	0 (mS)

4.1.4 Object instance attributes (cont.)

Speed (application) Object (Class ID = 100, Instance = 1)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get/Set	Mode	BYTE	0x00 (fac. def.), bits: 1 ON, 0 OFF
2	Get/Set	Primary PPR	UINT	60 (fac. def.), range: 1 → 2500
3	Get/Set	Primary Minimum Speed	UINT	10 (fac. def.), range: 1 → 32767
4	Get	Primary Speed	INT	[unsigned/signed, measured RPM]
5	Get/Set	Secondary PPR	UINT	60 (fac. def.), range: 1 → 2500
6	Get/Set	Secondary Minimum Speed	UINT	10 (fac. def.), range: 1 → 32767
7	Get	Secondary Speed	INT	[measured RPM]

Alarm (application) Object (Class ID = 101, Instance = 1)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get/Set	Primary Alarm1 Threshold	INT	10 (fac. def), -32768 → 32767
2	Get/Set	Primary Alarm1 On Delay Time	USINT	10 (fac. def), 0 → 250
3	Get/Set	Primary Alarm1 On Min Time	USINT	10 (fac. def), 0 → 250
4	Get/Set	Primary Alarm2 Threshold	INT	10 (fac. def), -32768 → 32767
5	Get/Set	Primary Alarm2 On Delay Time	USINT	10 (fac. def), 0 → 250
6	Get/Set	Primary Alarm2 On Min Time	USINT	10 (fac. def), 0 → 250
7	Get/Set	Primary Alarm3 Threshold	INT	10 (fac. def), -32768 → 32767
8	Get/Set	Primary Alarm3 On Delay Time	USINT	10 (fac. def), range 0 → 250
9	Get/Set	Primary Alarm3 On Min Time	USINT	10 (fac. def), range 0 → 250
10	Get/Set	Primary Alarm4 Threshold	INT	10 (fac. def), -32768 → 32767
11	Get/Set	Primary Alarm4 On Delay Time	USINT	10 (fac. def), range 0 → 250
12	Get/Set	Primary Alarm4 On Min Time	USINT	10 (fac. def), range 0 → 250
13	Get/Set	Secondary Alarm5 Threshold	INT	10 (fac. def), 0 → 32767
14	Get/Set	Secondary Alarm5 On Delay Time	USINT	10 (fac. def), 0 → 250
15	Get/Set	Secondary Alarm5 On Min Time	USINT	10 (fac. def), 0 → 250
16	Get/Set	Secondary Alarm6 Threshold	INT	10 (fac. def), 0 → 32767
17	Get/Set	Secondary Alarm6 On Delay Time	USINT	10 (fac. def), 0 → 250
18	Get/Set	Secondary Alarm6 On Min Time	USINT	10 (fac. def), 0 → 250
19	Get/Set	Secondary Alarm7 Threshold	INT	10 (fac. def), 0 → 32767
20	Get/Set	Secondary Alarm7 On Delay Time	USINT	10 (fac. def), range 0 → 250
21	Get/Set	Secondary Alarm7 On Min Time	USINT	10 (fac. def), range 0 → 250
22	Get/Set	Secondary Alarm8 Threshold	INT	10 (fac. def), 0 → 32767
23	Get/Set	Secondary Alarm8 On Delay Time	USINT	10 (fac. def), range 0 → 250
24	Get/Set	Secondary Alarm8 On Min Time	USINT	10 (fac. def), range 0 → 250
25	Get/Set	Threshold % Hysteresis	USINT	10 (fac. def), range 0 → 250
26	Get/Set	Alarm(8...1) Greater/Less Set	BYTE	0x00 (def), bits: 1 Greater, 0 Less
27	Get/Set	Alarm(8...1) On/Off Set	BYTE	0x00 (def), bits: 1 ON, 0 OFF
28	Get/Set	Alarm (8...1) LED Assign	BYTE	0x00 (def), bits: 1 ON, 0 OFF
29	Get	Alarm(8...1) Status	BYTE	bits: 1 ALARM, 0 NOT ALARM

4.1.4 Object instance attributes (cont.)

Application Object (Speed, Alarm) attribute user units

Speed settings and measurements are in RPM.
Time settings are in seconds.
Hysteresis settings are in %.

Application Object (Primary Speed, Secondary Speed, Alarm) attribute encoding

All integer type (INT, UINT, USINT) attributes (*except PPR attributes*) have unit resolutions of 0.1 (e.g. 125 indicates 12.5 RPM, 12.5 seconds or 12.5 %).
Primary and Secondary PPR attributes have unit resolutions of 1 (e.g. 125 indicates 125 PPR).
Bit assignment for BYTE type attributes:

Mode

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
--	--	--	--	--	--	Unsigned	Bi-Dir

Alarm (8...1): Greater/Less Set, On/Off Set, LED Assign, Status

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
SecAlarm8	SecAlarm7	SecAlarm6	SecAlarm5	PriAlarm4	PriAlarm3	PriAlarm2	PriAlarm1

4.2 I/O Data Format

4.2.1 I/O Assembly Instances

Number	Type	Name
1	Input	Input data

4.2.2 Format of I/O Assembly Data

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Primary Speed Low							
1	Primary Speed High							
2	Secondary Speed Low							
3	Secondary Speed High							
4	SecAlarm8	SecAlarm7	SecAlarm6	SecAlarm5	PriAlarm4	PriAlarm3	PriAlarm2	PriAlarm1

4.2.3 I/O Assembly Data Attribute Mapping

Data Component Name	Class		Inst. Number	Attribute		Data Type
	Name	Number		Name	Number	
Primary Speed	Speed	100	1	Pri. Speed	4	INT
Secondary Speed	Speed	100	1	Sec. Speed	7	UINT
Alarm(8...1) Status	Alarm	101	1	Alarm Status	29	BYTE

Notes:

Speed Value resolution is 0.1 (range 0 → 32,767 indicates 0.0 → 3,276.7 RPM).

I/O Assembly Data (class/inst./attr. 4/101/3) is produced by the Poll connection.

Alarm Status (class/inst./attr. 101/1/29) is produced by the COS connection.

4.3 Device Configuration

Configurable parameters and definition of public interface

4.3.1 Configuration parameter listing (EDS) and effect on behavior

Number	Name	Effect on behavior
1	Mode	Bit 1 sets Primary Speed unsigned(1) / signed(0) Bit 0 sets bidirectional(1) / unidirectional(0)
2	Primary Pulses/Rev	Sets the primary pulses per revolution
3	Primary Minimum Speed	Sets the primary speed below which measured speed is 0
4	Primary Speed (read-only)	[not writeable - no effect on behavior]
5	Secondary Pulses/Rev	Sets the secondary pulses per revolution
6	Secondary Minimum Speed	Sets the secondary speed below which measured speed is 0
7	Secondary Speed (read-only)	[not writeable - no effect on behavior]
8	Primary Alarm 1 threshold	Sets speed level for Alarm 1 Greater/Less functions
9	Primary Alarm 1 ON delay	Sets min time measured speed at alarm-level for alarmed state
10	Pri Alarm 1 ON min time	Sets minimum time Alarm 1 stays in alarmed state
11	Primary Alarm 2 threshold	Sets speed level for Alarm 2 Greater/Less functions
12	Primary Alarm 2 ON delay	Sets min time measured speed at alarm-level for alarmed state
13	Pri Alarm 2 ON min time	Sets minimum time Alarm 2 stays in alarmed state
14	Primary Alarm 3 threshold	Sets speed level for Alarm 3 Greater/Less functions
15	Primary Alarm 3 ON delay	Sets min time measured speed at alarm-level for alarmed state
16	Pri Alarm 3 ON min time	Sets minimum time Alarm 3 stays in alarmed state
17	Primary Alarm 4 threshold	Sets speed level for Alarm 4 Greater/Less functions
18	Primary Alarm 4 ON delay	Sets min time measured speed at alarm-level for alarmed state
19	Pri Alarm 4 ON min time	Sets minimum time Alarm 4 stays in alarmed state
20	Secondary Alarm 5 thresh	Sets speed level for Alarm 5 Greater/Less functions
21	Sec Alarm 5 ON delay	Sets min time measured speed at alarm-level for alarmed state
22	Sec Alarm 5 ON min time	Sets minimum time Alarm 5 stays in alarmed state
23	Secondary Alarm 6 thresh	Sets speed level for Alarm 6 Greater/Less functions
24	Sec Alarm 6 ON delay	Sets min time measured speed at alarm-level for alarmed state
25	Sec Alarm 6 ON min time	Sets minimum time Alarm 6 stays in alarmed state
26	Secondary Alarm 7 thresh	Sets speed level for Alarm 7 Greater/Less functions
27	Sec Alarm 7 ON delay	Sets min time measured speed at alarm-level for alarmed state
28	Sec Alarm 7 ON min time	Sets minimum time Alarm 7 stays in alarmed state
29	Secondary Alarm 8 thresh	Sets speed level for Alarm 8 Greater/Less functions
30	Sec Alarm 8 ON delay	Sets min time measured speed at alarm-level for alarmed state
31	Sec Alarm 8 ON min time	Sets minimum time Alarm 8 stays in alarmed state
32	Alarm threshold hysteresis	Sets hysteresis - applies to all Alarm thresholds
33	Alarm 8...1 Greater/Less	Bits 7...0 select Alarm 8...1 functions: 1-Greater / 0-Less
34	Alarm 8...1 ON/OFF	Bits 7...0 turn Alarm 8...1 functions on/off: 1-ON / 0-OFF
35	Alarm 8...1 status(read only)	[not write-able - no effect on behavior]

4.3.2 Configuration Parameter Mapping (EDS)

Number	Name	Class		Inst.	Attrib.	Data
		Name	Number	Number	Number	Type
1	Mode	Speed	100	1	1	BYTE
2	Primary Pulses/Rev	Speed	100	1	2	UINT
3	Primary Minimum Speed	Speed	100	1	3	UINT
4	Primary Speed (read-only)	Speed	100	1	4	INT
5	Secondary Pulses/Rev	Speed	100	1	5	UINT
6	Secondary Minimum Speed	Speed	100	1	6	UINT
7	Secondary Speed (read-only)	Speed	100	1	7	INT
8	Primary Alarm 1 threshold	Alarm	101	1	1	INT
9	Primary Alarm 1 ON delay	Alarm	101	1	2	USINT
10	Pri Alarm 1 ON min time	Alarm	101	1	3	USINT
11	Primary Alarm 2 threshold	Alarm	101	1	4	INT
12	Primary Alarm 2 ON delay	Alarm	101	1	5	USINT
13	Pri Alarm 2 ON min time	Alarm	101	1	6	USINT
14	Primary Alarm 3 threshold	Alarm	101	1	7	INT
15	Primary Alarm 3 ON delay	Alarm	101	1	8	USINT
16	Pri Alarm 3 ON min time	Alarm	101	1	9	USINT
17	Primary Alarm 4 threshold	Alarm	101	1	10	INT
18	Primary Alarm 4 ON delay	Alarm	101	1	11	USINT
19	Pri Alarm 4 ON min time	Alarm	101	1	12	USINT
20	Secondary Alarm 5 thresh	Alarm	101	1	13	INT
21	Sec Alarm 5 ON delay	Alarm	101	1	14	USINT
22	Sec Alarm 5 ON min time	Alarm	101	1	15	USINT
23	Secondary Alarm 6 thresh	Alarm	101	1	16	INT
24	Sec Alarm 6 ON delay	Alarm	101	1	17	USINT
25	Sec Alarm 6 ON min time	Alarm	101	1	18	USINT
26	Secondary Alarm 7 thresh	Alarm	101	1	19	INT
27	Sec Alarm 7 ON delay	Alarm	101	1	20	USINT
28	Sec Alarm 7 ON min time	Alarm	101	1	21	USINT
29	Secondary Alarm 8 thresh	Alarm	101	1	22	INT
30	Sec Alarm 8 ON delay	Alarm	101	1	23	USINT
31	Sec Alarm 8 ON min time	Alarm	101	1	24	USINT
32	Alarm threshold hysteresis	Alarm	101	1	25	USINT
33	Alarm 8...1 OVER/UNDER	Alarm	101	1	26	BYTE
34	Alarm 8...1 ON/OFF	Alarm	101	1	27	BYTE
35	Alarm 8...1 status(read only)	Alarm	101	1	28	BYTE

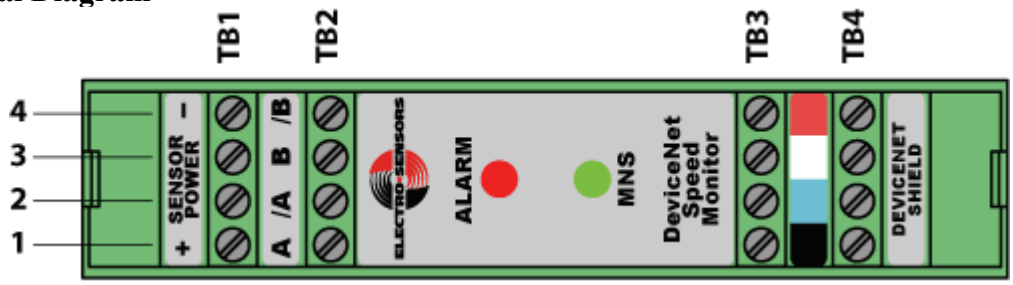
4.3.3 Configuration Parameter Groups (EDS)

Group Number	Group Name	Parameter Number	Parameter Name
1	Speed Configuration	1	Mode
		2	Primary Pulses/Rev
		3	Primary Minimum Speed
		4	Primary Speed (read-only)
		5	Secondary Pulses/Rev
		6	Secondary Minimum Speed
		7	Secondary Speed (read-only)
2	Alarm Configuration	8	Primary Alarm 1 threshold
		9	Primary Alarm 1 ON delay
		10	Pri Alarm 1 ON min time
		11	Primary Alarm 2 threshold
		12	Primary Alarm 2 ON delay
		13	Pri Alarm 2 ON min time
		14	Primary Alarm 3 threshold
		15	Primary Alarm 3 ON delay
		16	Pri Alarm 3 ON min time
		17	Primary Alarm 4 threshold
		18	Primary Alarm 4 ON delay
		19	Pri Alarm 4 ON min time
		20	Secondary Alarm 5 thresh
		21	Sec Alarm 5 ON delay
		22	Sec Alarm 5 ON min time
		23	Secondary Alarm 6 thresh
		24	Sec Alarm 6 ON delay
		25	Sec Alarm 6 ON min time
		26	Secondary Alarm 7 thresh
		27	Sec Alarm 7 ON delay
		28	Sec Alarm 7 ON min time
		29	Secondary Alarm 8 thresh
		30	Sec Alarm 8 ON delay
		31	Sec Alarm 8 ON min time
		32	Alarm threshold hysteresis
		33	Alarm 8...1 OVER/UNDER
		34	Alarm 8...1 ON/OFF
		35	Alarm 8...1 status(read only)
3	Monitor	4	Primary Speed (read-only)
		7	Secondary Speed (read-only)
		35	Alarm 8...1 status(read only)

Note: The configuration parameters are defined in the Electronic Data Sheet (EDS) only. The SpeedTalker-DN (UI) does not contain Parameter Objects.

5. Specifications

Terminal Diagram

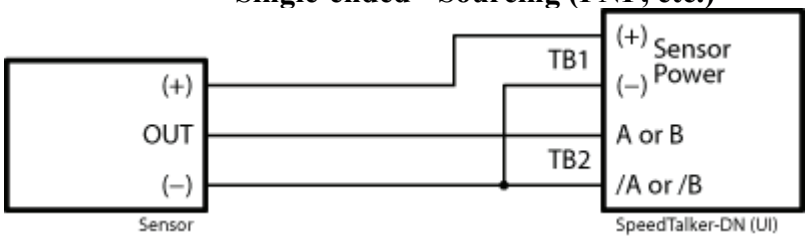


Notes:

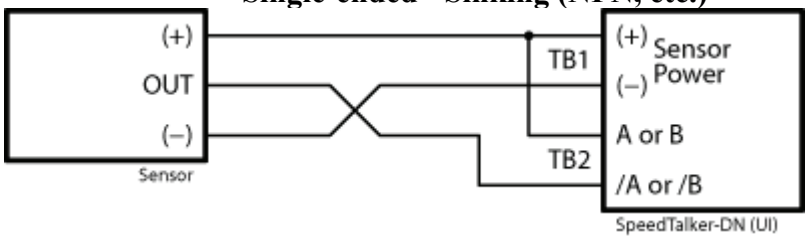
TB1 pins 1, 2 are SENSOR POWER **(+)**; pins 3, 4 are SENSOR POWER **(-)**
TB2 pins 1, 2 are Channel A inputs (A, /A); pins 3, 4 are Channel B inputs (B, /B)
TB3 pins 1, 2, 3, 4 are DeviceNet **V-, CAN-L, CAN-H, V+** (respectively)
TB4 pins 1 → 4 are DEVICENET SHIELD (drain)

Sensor Connection Diagrams

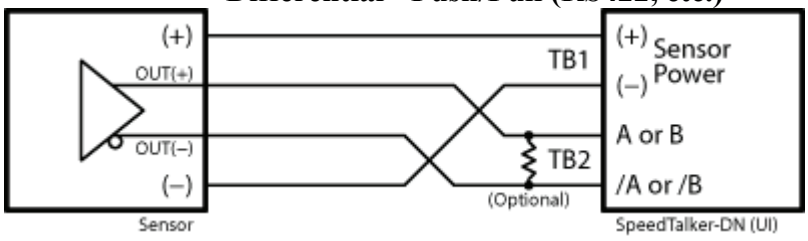
Single-ended - Sourcing (PNP, etc.)



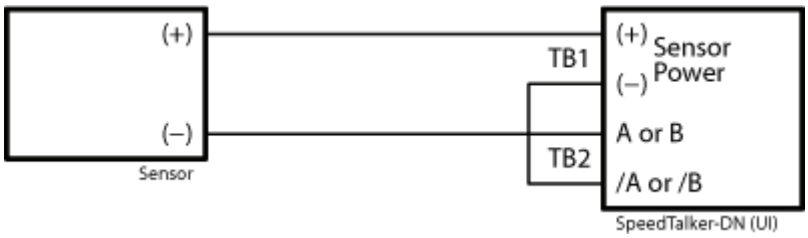
Single-ended - Sinking (NPN, etc.)



Differential - Push/Pull (RS422, etc.)



2-Wire



5. Specifications (cont.)*

Sensor input channels (A to /A, B to /B)	Resistance (Ri)	2.2 kΩ (24V input setting) 220 Ω (5V input setting)
	Input current range	+5 → +25 mA (Vin + or high) -25 → +0.3 mA (Vin - or low)
	RS422 compatibility	Yes (5V input setting) For Ri = 120 Ω, use an external 270 Ω resistor across inputs.
Sensor input channel isolation	2500 Vrms	
Sensor power	24Vdc, 125mA (-20 → 50°C), 40mA (70°C)	
Sensor power isolation	500 V rms (min)	
Pulse frequency range	0.0112 → 31,250 Hz	
Speed measurement range	-3,276.8 → 3,276.7 RPM	
Speed measurement/threshold resolution	0.1 RPM	
Speed measurement error (max)	0.02 % ± 0.05 RPM	
Speed/Alarm re-calculation period	8.192 mS	
DeviceNet implementation	Node type	Group 2 Only slave
	Connections	Poll, COS, Explicit Message
	Device profile	Generic Device
	Baud rates	125k, 250k, 500k
	LED indicators	Module/Network Status (MNS)
	Configuration	Electronic Data Sheet (EDS) file
Conformance	Passed DeviceNet conformance composite 18 (ODVA conformance file 10390)	
Operating power (network supplied)	11Vdc / 70mA (max) → 25Vdc / 50 mA (max) (0mA Sensor Power load)	
Operating temperature	-20 → 70 °C (-4 → 158 °F)	
Mounting	35 mm DIN rail	
Weight	114 g (0.25 Lb)	
Dimensions	99 x 114.5 x 22.5 mm (3.9 x 4.5 x 0.89 in)	

** Specifications subject to change without notice*