DTM10 Proximity Distributed Transmitter-Monitor

(Shaft Vibration, Thrust Position and Speed)

The DTM10 distributed vibration transmitter-monitor is ideal for monitoring machine vibration using proximity probes and a Modbus interface to a PLC or DCS system. The DTM also contains redundant power supplies and redundant 4-20mA transmissions. Using Provibtech's unique strategy, the DTM can interface with almost any proximity probe system without hardware changes.

Applications include:

- ✓ **Turbines**
- ✓ **Compressors**
- ✓ **Motors**
- ✓ **Pumps**
- ✓ **Fans**
- ✓ **Blowers**
- ✓ **Centrifuges**
- ✓ **Generators**
- ✓ **Turbochargers**

DTM10 Fully Configurable via Software

- ✓ **Vibration Monitor Module**
- ✓ **Thrust Position Monitor Module**
- ✓ **Speed Monitor Module**
- ✓ **Phase Reference Monitor module**

DTM10 Features

- ✓ **Interface with almost any manufacture's proximity probe system**
- ✓ **Works with or without probe driver**
- ✓ **Direct Modbus RTU interface**
- ✓ **Redundant 4-20mA outputs**
- ✓ **Redundant power supplies**
- ✓ **Measure shaft vibration, thrust position, or speed**
- ✓ **Full digital field-configuration**
- ✓ **Dual alarms (SPDT)**
- ✓ **LED indication of system OK, Alert , Danger, and Bypass**
- ✓ **Local and remote RESET/BYPASS and Trip-multiply**
- ✓ **Buffered Output for condition monitoring**
- ✓ **Aluminum case for RFI/EMI reduction**
- ✓ **Digital condition monitoring (optional)**

Specifications

Electrical

Power Supply:

22-30VDC, 150mA.

Accepts dual power supply inputs

Galvanic isolation:

Among power, circuits and alarms

Frequency Response (-3dB):

Normal frequency:	4 ~ 3.0KHz
Low frequency:	0.5 ~ 100Hz

Proximity probe Interface:

Sensitivity:

5mm and 8mm probe:	8 mV/um (200 mV/mil)
11mm probe:	4 mV/um (100 mV/mil)
25mm probe:	0.787 mV/um (20 mV/mil)

Buffered Output:

Original, un-filtered signal

Impedance:	150 Ω
Maximum cable distance:	300m (1000ft)
Sensitivity:	same as the sensor

Local BNC connection and terminal block

for phase reference monitor, buffered outputs TTL compatible signal

4-20mA Output:

Dual 4-20mA, sourced (loop power not required)

Maximum load resistance: 380 Ω

Alarm Setup: 0 ~ 100% FS.

Accuracy: $\pm$0.1%.

Relays:

Seal:	Epoxy
Capacity:	0.2A/240VAC, 0.4A/110VAC or 2.0A/24VDC, resistive load
Relay type:	SPTD
Isolation:	1000VDC

LED Machine Condition Indicator:

OK:	System OK indication
ALT:	Vibration over ALERT level
DNG:	Vibration over DANGER level
BYP:	System in BYPASS
TRX:	Digital Transmission Active

RESET/BYPASS:

Front panel push button

Remote RESET/BYPASS terminals

Trip Multiply:

Double Multiply or Triple Multiply set in DTM-CFG

Short Trip/Multi terminal to COM terminal

System alarm level will increase by a factor of 2 or 3

(DTM10-201 / 301 only)

Modbus:

RS485 Modbus RTU

Not isolated (use DTM96 for isolation)

Local push button programming:

Alert and danger set-point, ZERO calibration

Software programming (DTM-CFG):

Alert and danger set-point, time delay

ZERO and Full-Scale calibration

Full-scale high and low setup

Alarm latching/ non-latching, energized/ de-energized

Alarms programmable with alert, danger or system ok

Probe selection, linearization, and system calibration

Monitor function change: vibration, position, or speed

Modbus communication setup

Trip-multiply setup

Real-time bar-graph and alarms

Configure speed monitor to phase reference only monitor

3 layers of password protection

Digital condition monitoring (optional)

Condition management software or portable vibration data collector of ProvibTech could collect, store, and analyze machine running condition based on vibration via the bus communication of the DTM10.

Dynamic waveform data:

Real-time vibration data could be uploaded and the waveform and spectrum plot could be view by Condition management software or portable vibration data collector.

Trend Data:

The vibration data could be periodically stored by the DTM10 when it's powered on. User could collect trend data and view trend plots by Condition management

Electrical specifications continued

software or portable vibration data collector. The trend sampling interval is configured by the related DTM-CFG software. DTM10's factory default is 10 hours. Every DTM10 could store maximum 1024 trend data.

Alarm Data:

The dynamic alarm data could be stored by the DTM10 when it's powered on. The DTM10 only stores one alarm data with highest measured value. User could view waveform and spectrum plot of alarm data by Condition management software or portable vibration data collector.

Physical

Dimension:

Height:	75mm (2.95″)	
	see figure below	
Weight:	2.0lb (1.0kg)	
Case:	Aluminum cast (copper free)	
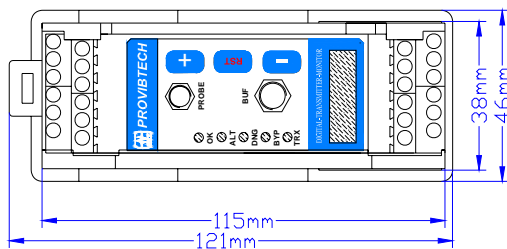
Rail Mounting

Plate Mounting

Environmental

Temperature:

Operation:	-40℃ ～ +85℃
Storage:	-50℃ ～ +100 ℃
Humidity:	90% non-condensing

Certification

CE:	certified with EMC compliance
CSA:	Class I, Div. 2, Grps A, B, C&D, T4
ATEX:	II 3G Ex nA II T4
GOST R:	2Ex nA II T4X
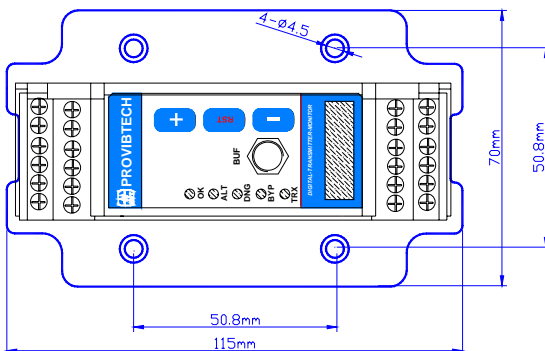
Ordering Information

DTM10-AX-BX-CX-EXX-MX-SX

Customer configurable proximity distributed transmitter-monitor

Distributed vibration monitor, fully field configurable, with Modbus RTU.

AX: Alarms

A0:   Dual alarms with epoxy sealed relays

A1:   No Alarm

BX: Mounting

B0:   DIN rail mounting.

B1:   Plate mounting.

CX: External Proximity Driver

C0:   Not required (Requires Probe and Extension Cable) (301, 302, 502 type modules)

C1:   Required (Requires Probe, Extension Cable and Probe Driver) (201, 202, 501 type modules)

EXX: Probe and Cable (Series and Length) -Purchased Separately

E00*:   TM0180, 5m Cable

E01:   TM0180, 9m Cable

E02:   8mm Probe, 3300, 5m Cable

E03:   8mm Probe, 3300, 9m Cable

E04:   8mm Probe, 7200, 5m Cable

E05:   8mm Probe, 7200, 9m Cable

E06:   TM0105, 5m Cable

E07:   TM0105, 9m Cable

E08:   TM0110, 5m Cable

E09:   TM0110, 9m Cable

E10:   11mm Probe, 3300, 5m Cable

E11:   11mm Probe, 3300, 9m Cable

E12:   11mm Probe, 7200, 5m Cable

E13:   11mm Probe, 7200, 9m Cable

E99:   Other probe systems (requiring field calibration)

MX: Digital Communication

M1*:   With Modbus

M2:   With Modbus and digital condition monitoring

SX: Approvals

S0*:   CE

S1:   CE

CSA: Class I, Div.2, Grps A, B, C&D, T4

ATEX: II 3G Ex nA II T4

GOST R: 2Ex nA II T4X

DTM10-201-AX-CX-GX-IX-MX-SX

Factory configured for vibration (probe driver required)

AX: Full Scale

A0*:   0 ~ 200um pk-pk

A1:   0 ~ 1000um pk-pk

A2:   0 ~ 100um pk-pk

A3:   0 ~ 10mil pk-pk

A4:   0 ~ 50mil pk-pk

A5:   0 ~ 5.0mil pk-pk

A6:   0 ~ 200um pk-pk   (0.5 ~ 100Hz)

A7:   0 ~ 1000um pk-pk   (0.5 ~ 100Hz)

A8:   0 ~ 100um pk-pk   (0.5 ~ 100Hz)

CX: Alarms

C0*:   Dual alarms with epoxy sealed relays

C1:   No Alarm

GX: Mounting

G0*:   DIN rail mounting.

G1:   Plate mounting.

IX: Frequency Response

I0*:   Normal Frequency   (4~3000Hz)

I1:   Low Frequency   (0.5~100Hz)

MX: Digital Communication

M1*:   With Modbus

M2:   With Modbus and digital condition monitoring

SX: Approvals.

S0*:   CE

S1:   CE

CSA: Class I, Div.2, Grps A, B, C&D,T4

ATEX: II 3G Ex nA II T4

GOST R: 2Ex nA II T4X

DTM10-202- AX-CX-GX-SX

Factory configured for axial position (probe driver required)

AX: Full Scale

A0*: -1.0 - 0 - 1.0mm (-40 - 0 - 40mil)
(requires TM0180 or other 8mm proximity probe transducer; TM0105 or other 5mm proximity probe transducer)

A1: -2.0 - 0 - 2.0mm (-80 - 0 - 80mil)
(requires TM0110 or other 11mm proximity probe transducer)

A2: -5.0 - 0 - 5.0mm (-0.2 - 0 - 0.2inch)
(requires TM0120 or other 25mm, 35mm proximity probe transducer)

A3: -12.0 - 0 - 12.0mm (-0.5 - 0 - 0.5inch)
(requires TM0150 or other 50mm proximity probe transducer)

CX: Alarms

C0*: Dual alarms with epoxy sealed relays

C1: No Alarm

GX: Mounting

G0*: DIN rail mounting.

G1: Plate mounting.

SX: Approvals

S0*: CE

S1: CE
CSA: Class I, Div.2, Grps A, B, C&D,T4
ATEX: II 3G Ex nA II T4
GOST R: 2Ex nA II T4X

DTM10-501-AX-CX-FXX-GX-SX

Factory configured for speed (probe driver required)

AX: Full Scale

A0: 0 ~ 1,000 rpm

A1*: 0 ~ 3,600 rpm

A2: 0 ~ 6,000 rpm

A3: 0 ~ 10,000 rpm

A4: 0 ~ 30,000 rpm

A5: 0 ~ 50,000 rpm

A6: phase reference output

A7: phase reference output for digital condition monitoring

CX: Alarm

C0*: Dual alarms with epoxy sealed relays

C1: No Alarm

FXX: Teeth per Revolution

F01*: 1

FXX: Customer specify, number of teeth =XX

GX: Mounting

G0*: DIN rail mounting.

G1: Plate mounting.

SX: Approvals

S0*: CE

S1: CE
CSA: Class I, Div.2, Grps A, B, C&D,T4
ATEX: II 3G Ex nA II T4
GOST R: 2Ex nA II T4X

DTM10-301-AX-CX-EXX-GX-IX-MX-SX

Factory configured for vibration (built-in probe driver)

AX: Full Scale

- A0*: 0 ~ 200um pk-pk
- A1: 0 ~ 500um pk-pk
- A2: 0 ~ 100um pk-pk
- A3: 0 ~ 10mil pk-pk
- A4: 0 ~ 25mil pk-pk
- A5: 0 ~ 5.0mil pk-pk
- A6: 0 ~ 200um pk-pk (0.5 ~ 100Hz)
- A7: 0 ~ 500um pk-pk (0.5 ~ 100Hz)
- A8: 0 ~ 100um pk-pk (0.5 ~ 100Hz)

CX: Alarms

- C0*: Dual alarms with epoxy sealed relays
- C1: No Alarm

EXX: Probe and Cable

- E00*: TM0180, 5m Cable
- E01: TM0180, 9m Cable
- E02: 8mm Probe, 3300, 5m Cable
- E03: 8mm Probe, 3300, 9m Cable
- E04: 8mm Probe, 7200, 5m Cable
- E05: 8mm Probe, 7200, 9m Cable
- E06: TM0105, 5m Cable
- E07: TM0105, 9m Cable
- E08: TM0110, 5m Cable
- E09: TM0110, 9m Cable
- E10: 11mm Probe, 3300, 5m Cable
- E11: 11mm Probe, 3300, 9m Cable
- E12: 11mm Probe, 7200, 5m Cable
- E13: 11mm Probe, 7200, 9m Cable

GX: Mounting

- G0*: DIN rail mounting.
- G1: Plate mounting.

IX: Frequency Response

- I0*: Normal Frequency (4~3000Hz)
- I1: Low Frequency (0.5~100Hz)

MX: Digital Communication

- M1*: With Modbus
- M2: With Modbus and digital condition monitoring

SX: Approvals

- S0*: CE
- S1: CE
  - CSA: Class I, Div.2, Grps A,B,C&D,T4
  - ATEX: II 3G Ex nA II T4
  - GOST R: 2Ex nA IIT4X

DTM10-302-AX-CX-EXX-GX-SX

Factory configured for axial position (built-in probe driver)

AX: Full Scale

- A0*: -1.0 - 0 - 1.0mm (-40 - 0 - 40mil)
  (Requires TM0180 or other 8mm proximity probe transducer)
- A1: -2.0 - 0 - 2.0mm (-80 - 0 - 80mil)
  (Requires TM0110 or other 11mm proximity probe transducer)

CX: Alarms

- C0*: Dual alarms with epoxy sealed relays
- C1: No Alarm

EXX: Probe and Cable

- E00*: TM0180, 5m Cable
- E01: TM0180, 9m Cable
- E02: 8mm Probe, 3300, 5m Cable
- E03: 8mm Probe, 3300, 9m Cable
- E04: 8mm Probe, 7200, 5m Cable
- E05: 8mm Probe, 7200, 9m Cable
- E06: TM0105, 5m Cable
- E07: TM0105, 9m Cable
- E08: TM0110, 5m Cable
- E09: TM0110, 9m Cable
- E10: 11mm Probe, 3300, 5m Cable
- E11: 11mm Probe, 3300, 9m Cable
- E12: 11mm Probe, 7200, 5m Cable
- E13: 11mm Probe, 7200, 9m Cable

GX: Mounting

- G0*: DIN rail mounting.
- G1: Plate mounting.

SX: Approvals

- S0*: CE
- S1: CE
  - CSA: Class I, Div.2, Grps A, B, C&D, T4
  - ATEX: II 3G Ex nA II T4
  - GOST R: 2Ex nA II T4X

DTM10-502-AX-CX-EXX-FXX-GX-SX

Factory configured for speed (built-in probe driver)

AX: Full Scale
- A0: 0 ~ 1,000 rpm
- A1*: 0 ~ 3,600 rpm
- A2: 0 ~ 6,000 rpm
- A3: 0 ~ 10,000 rpm
- A4: 0 ~ 30,000 rpm
- A5: 0 ~ 50,000 rpm
- A6: phase reference output
- A7: phase reference output for digital condition monitoring

CX: Alarms
- C0*: Dual alarms with epoxy sealed relays
- C1: No Alarm

EXX: Probe and Cable
- E00*: TM0180, 5m Cable
- E01: TM0180, 9m Cable
- E02: 8mm Probe, 3300, 5m Cable
- E03: 8mm Probe, 3300, 9m Cable
- E04: 8mm Probe, 7200, 5m Cable
- E05: 8mm Probe, 7200, 9m Cable
- E06: TM0105, 5m Cable
- E07: TM0105, 9m Cable
- E08: TM0110, 5m Cable
- E09: TM0110, 9m Cable
- E10: 11mm Probe, 3300, 5m Cable
- E11: 11mm Probe, 3300, 9m Cable
- E12: 11mm Probe, 7200, 5m Cable
- E13: 11mm Probe, 7200, 9m Cable

FXX: Teeth per Revolution
- F01*: 1
- FXX: Customer specify, number of teeth =XX

GX: Mounting.
- G0*: DIN rail mounting.
- G1: Plate mounting.

SX: Approvals
- S0*: CE
- S1: CE
  - CSA: Class I, Div.2, Grps A, B, C&D, T4
  - ATEX: II 3G Ex nA II T4
  - GOST R: 2Ex nA IIT 4X

* Denote factory default.

Optional Accessories

DTM-CAL
The DTM field calibration kit is capable of calibrating any 5mm, 8mm, or 11mm probe system. The kit includes:
- ✓ DTM-CFG configuration and calibration software CD
- ✓ RS485-USB converter with cable
- ✓ TM0540 proximity probe field calibration kit

DTM-CFG-K
The DTM configuration and calibration software kit includes:
- ✓ DTM-CFG configuration and calibration software CD
- ✓ RS485-USB converter with cable

TM900
Power converter with isolation. Converts 95-250 VAC into 24VDC and is capable of powering up to five DTM modules.
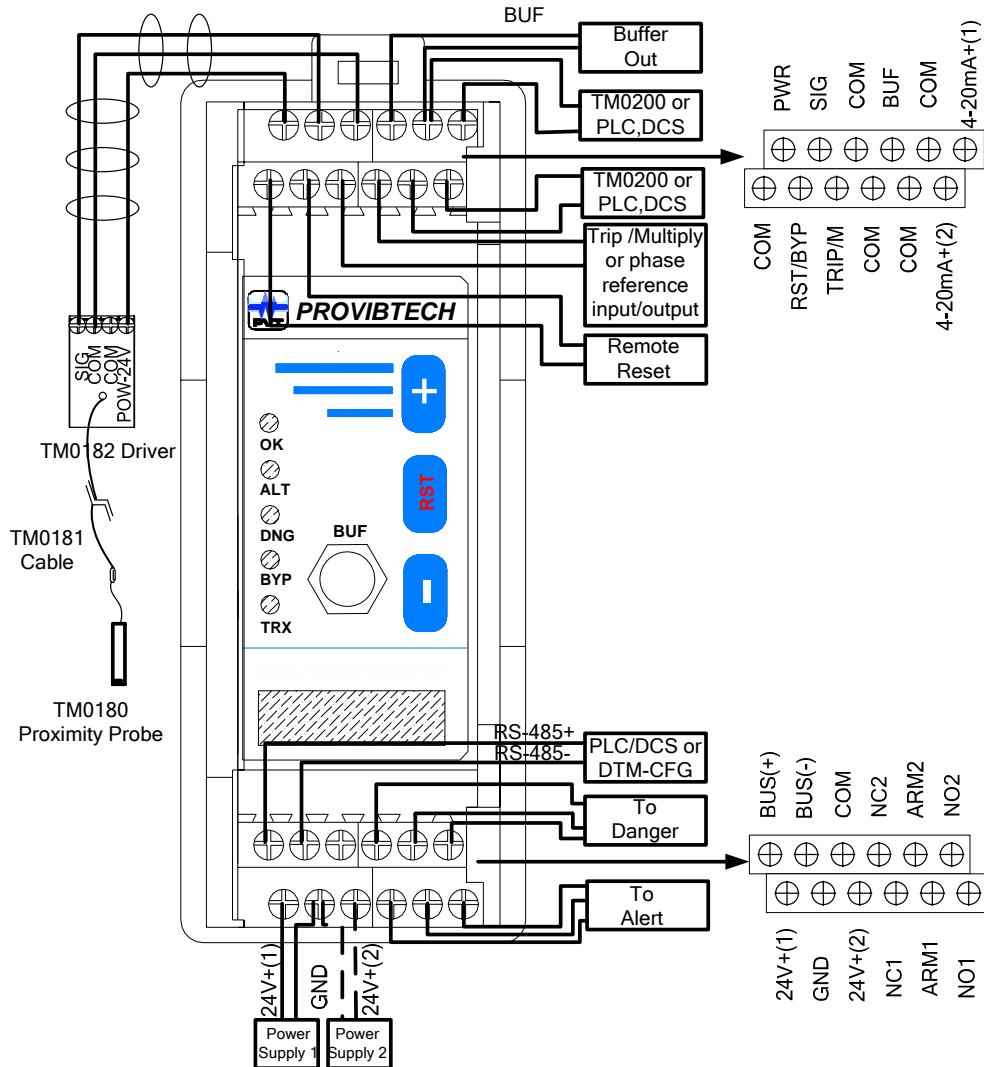
Proximity Sensor Systems
- ✓ **TM0180:** 8mm probe
- ✓ **TM0105:** 5mm probe
- ✓ **TM0110:** 11mm probe
- ✓ **TM0181:** Extension cable
- ✓ **TM0182:** Probe driver
- ✓ **TM0120:** 25mm probe system

DTM10 System Installation
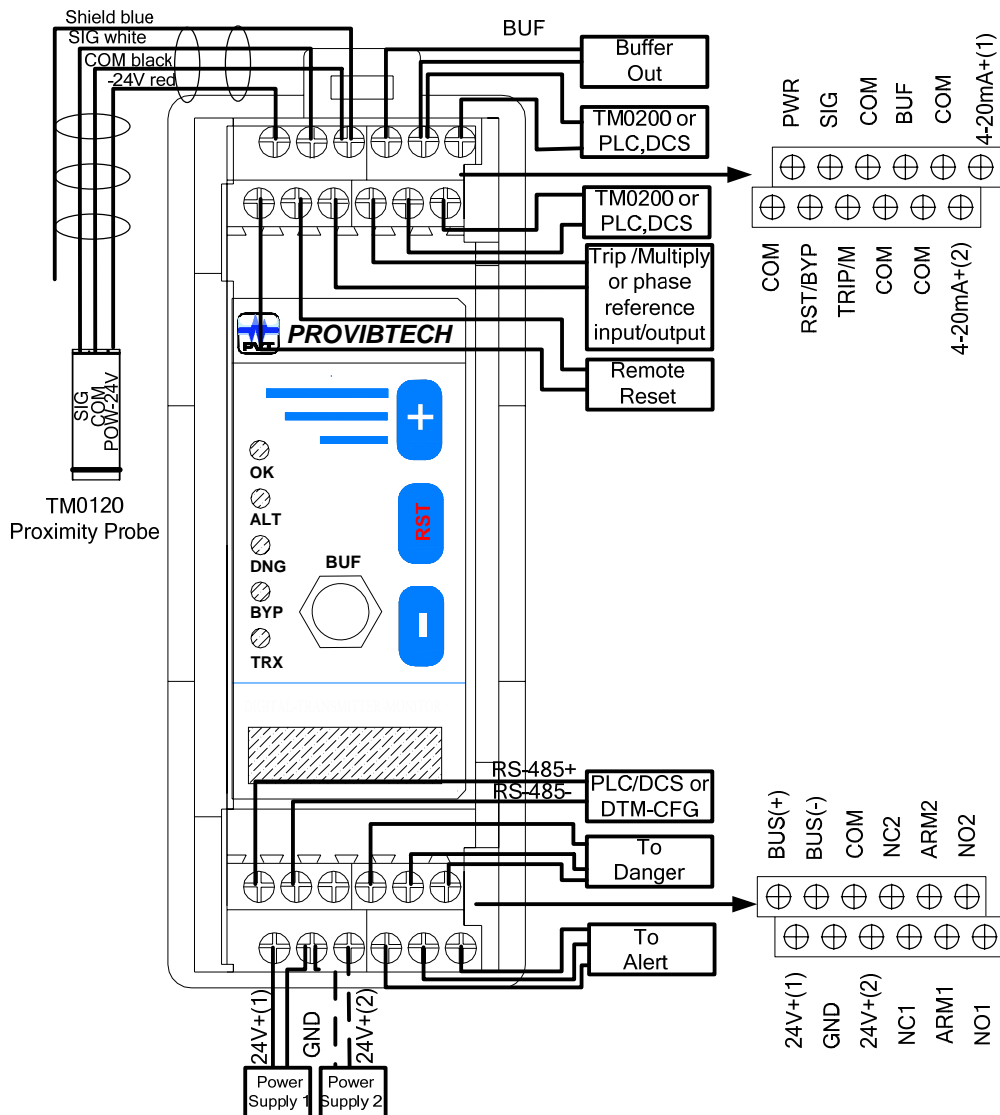
DTM10-201/202/501 Field-Wiring Diagram

Note:

- ✓ Power supply 2 and 4-20mA(2) are optional outputs used for redundancy.
- ✓ Alert and Danger relays are shown connected as normally open. Connect ARM and NC for normally closed.
- ✓ Connecting COM and RST/BYP with an external continuous or momentary closed switch will initiate a remote reset. Temporarily closing the switch will result in a system reset, continuous close will result in a system bypass.
- ✓ If the DTM10-201 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Moreover, the DTM10-201 won't provide Multiply Alarm function anymore, so you should set Multiply Alarm property to "None" by DTM-CFG software.
- ✓ If Full Scale of DTM10-501 is phase reference output (A6), Buffer output terminal will provide phase reference signal.
- ✓ If Full Scale of DTM10-501 is phase reference output for digital condition monitoring (A7), Trip/Multi terminal provides the phase reference signal for the DTM10-201, DTM10-301 or DM200. A DTM10-501 can provide the phase reference signal for up to 6 DTMs or DM200s.

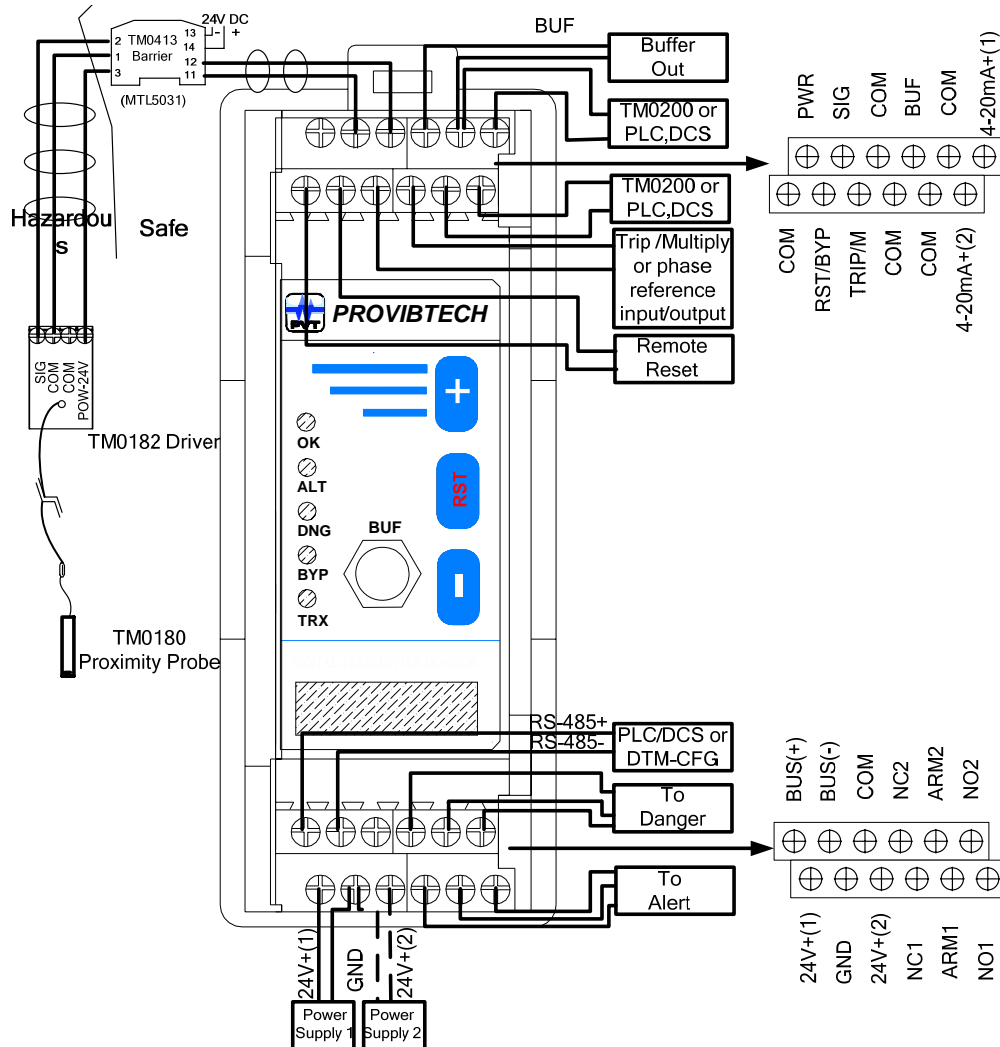## DTM10-201/202/501 Field-Wiring Diagram (Probe is TM0120)

Note:

✓ Power supply 2 and 4-20mA(2) are optional outputs used for redundancy.

✓ Alert and Danger relays are shown connected as normally open. Connect ARM and NC for normally closed.

✓ Connecting COM and RST/BYP with an external continuous or momentary closed switch will initiate a remote reset. Temporarily closing the switch will result in a system reset, continuous close will result in a system bypass.

✓ If the DTM10-201 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Moreover, the DTM10-201 won't provide Multiply Alarm function anymore, so you should set Multiply Alarm property to "None" by DTM-CFG software.

✓ If Full Scale of DTM10-501 is phase reference output (A6), Buffer output terminal will provide phase reference signal.

✓ If Full Scale of DTM10-501 is phase reference output for digital condition monitoring (A7), Trip/Multi terminal provides the phase reference signal for the DTM10-201, DTM10-301 or DM200. A DTM10-501 can provide the phase reference signal for up to 6 DTMs or DM200s.

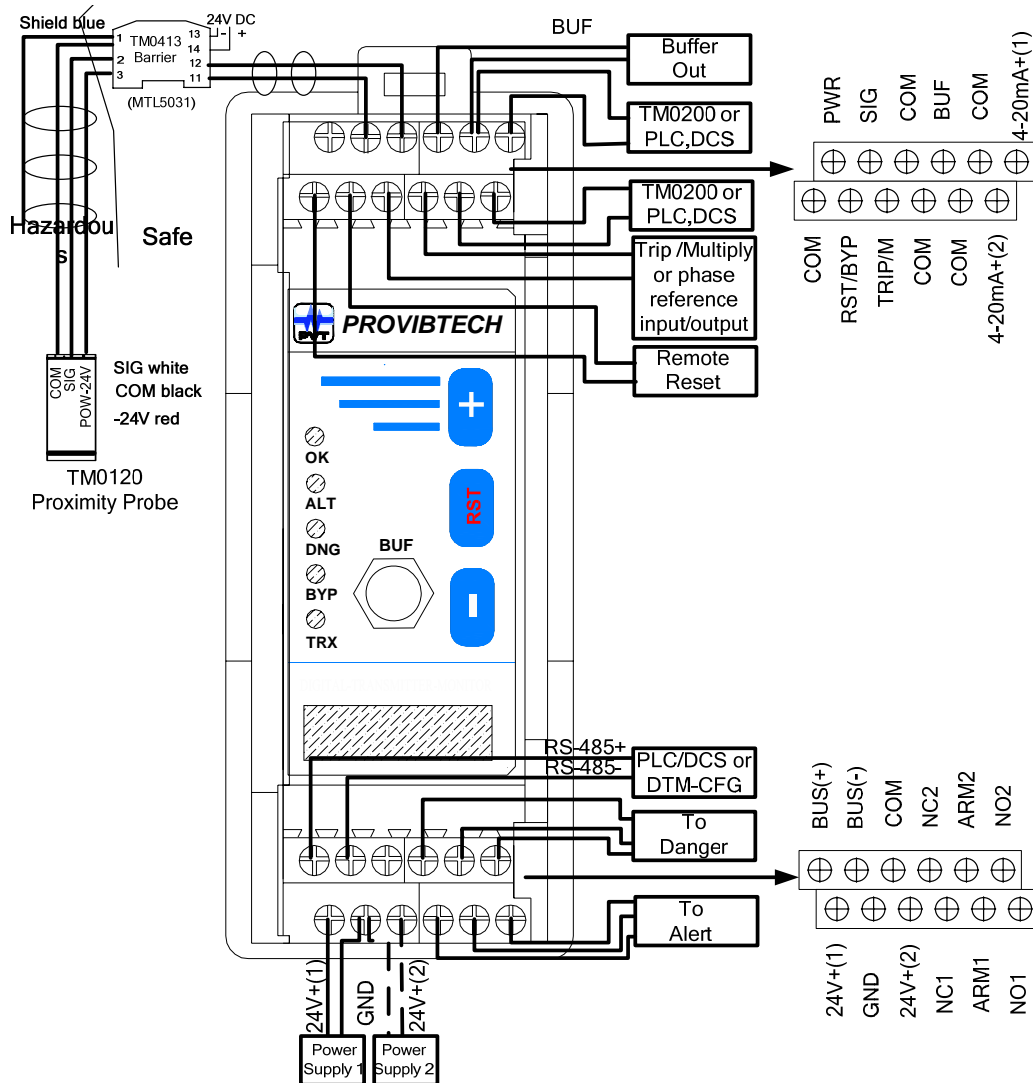## DTM10-201/202/501 Hazardous Area Field-Wiring Diagram

Note:

- ✓ Power supply 2 and 4-20mA(2) are optional outputs used for redundancy.
- ✓ Alert and Danger relays are shown connected as normally open. Connect ARM and NC for normally closed.
- ✓ Connecting COM and RST/BYP with an external continuous or momentary closed switch will initiate a remote reset. Temporarily closing the switch will result in a system reset, continuous close will result in a system bypass.
- ✓ If the DTM10-201 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Moreover, the DTM10-201 won't provide Multiply Alarm function anymore, so you should set Multiply Alarm property to "None" by DTM-CFG software.
- ✓ If Full Scale of DTM10-501 is phase reference output (A6), Buffer output terminal will provide phase reference signal.
- ✓ If Full Scale of DTM10-501 is phase reference output for digital condition monitoring (A7), Trip/Multi terminal provides the phase reference signal for the DTM10-201, DTM10-301 or DM200. A DTM10-501 can provide the phase reference signal for up to 6 DTMs or DM200s.

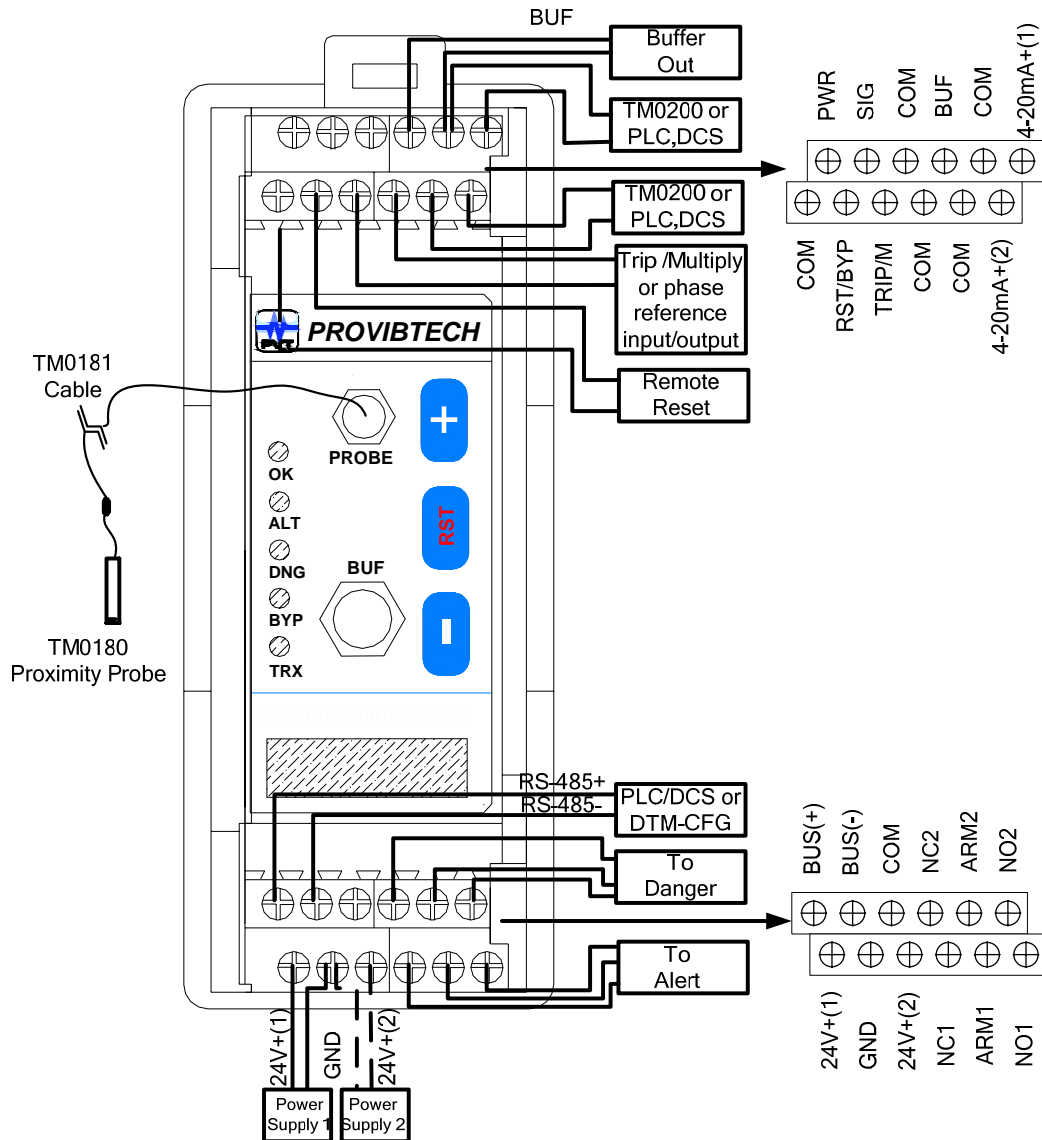## DTM10-201/202/501 Hazardous Area Field-Wiring Diagram (Probe is TM0120)

Note:

✓ Power supply 2 and 4-20mA(2) are optional outputs used for redundancy.

✓ Alert and Danger relays are shown connected as normally open. Connect ARM and NC for normally closed.

✓ Connecting COM and RST/BYP with an external continuous or momentary closed switch will initiate a remote reset. Temporarily closing the switch will result in a system reset, continuous close will result in a system bypass.

✓ If the DTM10-201 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Moreover, the DTM10-201 won't provide Multiply Alarm function anymore, so you should set Multiply Alarm property to "None" by DTM-CFG software.

✓ If Full Scale of DTM10-501 is phase reference output (A6), Buffer output terminal will provide phase reference signal.

✓ If Full Scale of DTM10-501 is phase reference output for digital condition monitoring (A7), Trip/Multi terminal provides the phase reference signal for the DTM10-201, DTM10-301 or DM200. A DTM10-501 can provide the phase reference signal for up to 6 DTMs or DM200s.

DTM10-301/302/502 Field-Wiring Diagram

Note:

✓ Power supply 2 and 4-20mA(2) are optional outputs used for redundancy.

✓ Alert and Danger relays are shown connected as normally open. Connect ARM and NC for normally closed.

✓ Connecting COM and RST/BYP with an external continuous or momentary closed switch will initiate a remote reset. Temporarily closing the switch will result in a system reset, continuous close will result in a system bypass.

✓ If the DTM10-201 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Moreover, the DTM10-201 won't provide Multiply Alarm function anymore, so you should set Multiply Alarm property to "None" by DTM-CFG software.

✓ If Full Scale of DTM10-501 is phase reference output (A6), Buffer output terminal will provide phase reference signal.

✓ If Full Scale of DTM10-501 is phase reference output for digital condition monitoring (A7), Trip/Multi terminal provides the phase reference signal for the DTM10-201, DTM10-301 or DM200. A DTM10-501 can provide the phase reference signal for up to 6 DTMs or DM200s.

✓