DTM20 Seismic Vibration Distributed Transmitter-Monitor

(Acceleration, Velocity, Displacement)

The DTM20 distributed Seismic vibration transmitter-monitor provides a simple and cost-effective solution for monitoring "balance-of-plant" equipment. The DTM's smart design is extremely reliable with redundancy in power supply inputs, 4-20mA outputs and relay outputs, as well as, a Modbus communication port. The DTM20 monitor can interface with almost any vibration sensor (accelerometer or velocity transducer). The DTM is fully digital and may be configured in the field or come pre-configured from the factory.

DTM20 Features

Designed with reliability

Redundant power supplies

Redundant 4-20mA outputs

Dual dry-contact relay outputs

Trip multiply and Bypass

Galvanic isolation for solid signal processing

Power input isolation

Sensor signal conditioning isolation

Transmission 4-20mA output isolation

Relay output isolation

Band-pass filter to further isolate unwanted noise

Programmable sharp 8th-pole low-pass filter further eliminate high frequency band noise, thus obtains reliable vibration signal.

Fully field programmable by CFG software

DTM20-CFG can easily change any configuration of the monitor.

Calibration of the system is available with CFG software

Condition Monitoring by digital link

Static (trend, overall, alarms, GAP, system OK)

Dynamic (waveform, spectrum, phase reference, waterfall)

Data will be directly transferred into server with no needs of additional interface hardware

MODBUS digital communication

Build-in Modbus RTU digital communication

More information from Modbus line

Work with variety of vibration sensors

Accelerometer

Velocity sensor

Low frequency sensor

Electro-magnetic velocity sensor

Backward compatible with TM101

Field adjustment with on-monitor push button (without software)

ZERO calibration

Alert set point

Danger set point

Specifications

Electrical

Power:

Redundant. Accept dual power input

20-30VDC   @150mA

Isolation: 1000VDC power to signal conditioner circuit

Frequency Response (-3dB):

Nominal Frequency:

2 ~ 3KHz

Low Frequency:

0.5 ~ 100Hz

High Frequency:

10 – 20KHz (peak)

Filters:

Low-pass filter (field programmable):

8-pole (160 dB per decade, 48 dB per octave)

100Hz to 10kHz, field programmed by CFG

High-pass filter (factory setting):

2-pole (40 dB per decade, 12 dB per octave)

4 options (0.5Hz,2Hz,10Hz,100Hz) or custom

Piezo Sensor Interface:

Sensitivity:

100mV/g

100mV/in/sec

4mV/um

or any sensitivity specified

Current Source

Nominal   4mA@24VDC

Seismic Velocity Sensor Interface:

Sensitivity:

User specified for any vibration sensor

Software programmable

Accuracy:

Typical +/-1% FS

Maximum +/-2% FS

Buffered Output:

Original vibration, un-filtered

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

Local BNC connector

On line CM terminals

Overall Vibration output:

Up to two 4-20mA output

4-20mA(1):

Source. Output to controller.

Sharing signal ground

Maximum load resistance 500 Ω

4-20mA(2):

Passive. Loop powered by controller.

Galvanic isolation, 1000VDC

Power supply range: 16-30VDC

Alarm Set point:

5 ~ 100% FS

Accuracy:

±0.1%.

Relays:

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

Push Buttons:

SET: System on-site calibration and alarm setting

+ :   Adjustment increment

- :   Adjustment decrement

DTM Distributed Transmitter-Monitor

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 or Triple Multiply set by DTM-CFG. This feature is not available with (M2,M4 and M6 option)
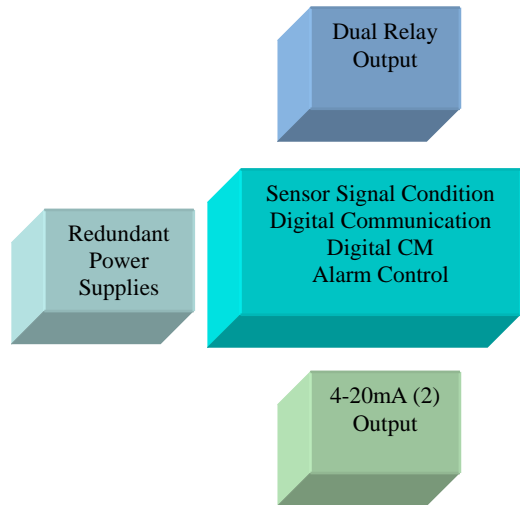
Modbus RTU

RS485 Modbus RTU (Non-isolated. Use DTM96 for isolation)

Software programming (DTM-CFG):

Measurement Units A, V, D

Alert and danger set-point, time delay

ZERO and Full-Scale calibration

Low-pass filter corner frequency setup

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

Relay programmable with alert, danger or system OK

Sensor selection, sensitivity setup

System calibration

Digital communication setup

Trip-multiply setup

Real-time bar-graph and alarms

3 layers of password protection

Digital Condition Monitoring

Terminals

RS485 for both Modbus RTU and condition monitoring

Software PCM360-LT

Work with PCM360-LT plant condition management software

Dual Relay Output

Redundant Power Supplies

Sensor Signal Condition
Digital Communication
Digital CM
Alarm Control

4-20mA (2) Output

Building Block of DTM20
All modules are galvanically isolated
Additional digital output isolation vs. DTM96

The vibration data could be periodically stored by the DTM20 when it's powered on. User could collect trend data and view trend plots by Condition management software or portable vibration data collector. The trend sampling interval is configured by the related DTM-CFG software. DTM20's factory default is 10 hours. Every DTM20 could store maximum 1024 trend data.

Dynamic waveform:

Real-time vibration data, 2000 sets per data acquisition.

Alarms:

Up to 1000 alarms can be stored in DTM20.

Trend:

Up to 1000 trend data can be stored in DTM20.

Spectrum:

Up to 800 lines of resolution.

Physical

Dimension:

Height: 75mm (2.95″)

see figure below

Weight: 2.0lb (1.0kg)

Environmental

Temperature:

Operation:	-40℃ ~ +85℃.
Storage:	-50℃ ~ +100℃.

Humidity: 90% non-condensing.

Case: Aluminum cast (copper free)

Certification

CE certified with EMI compliance

CSA:	Class I, Div. 2,Grps A,B,C&D,T4
ATEX:	II 3G ExnA II T4
GOST R:	2ExnAIIT4X

Rail Mounting

Plate Mounting

Hazardous area

Marking:

ATEX Standards:

  EN 60079-0

  EN 60079-15

Special condition in hazardous area:

－ The ambient temperature range is: -40℃≤Ta≤70℃

－ DTMs must be placed inside an enclosure that is in accordance with EN 60079-15:2005.

－ Provisions must be made externally to prevent the rated voltage from being exceeded by transient disturbances of more than 40 %.
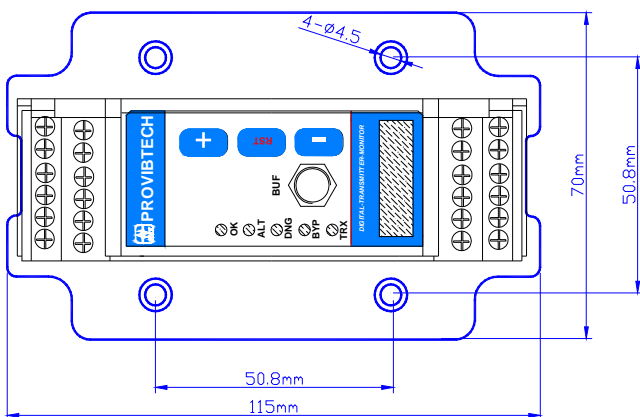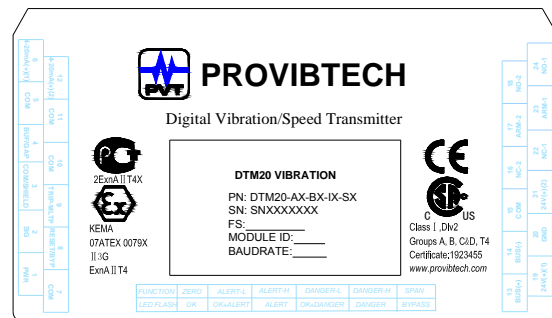
Ordering Information

DTM20-101-AXX-CX-GX-HX-IX-JX-MX-SX

Factory pre-configured seismic monitor

AXX: Full Scale.

A00:   0 - 200um pk-pk
A01:   0 - 500um pk-pk
A02:   0 - 100um pk-pk
A03:   0 - 250um pk-pk
A05:   0 - 125um pk-pk
A06*: 0 - 50mm/s pk
A07:   0 - 100mm/s pk
A08:   0 - 20mm/s pk
A11:   0 - 25mm/s pk
A12:   0 - 5.0g pk
A13:   0 - 10g pk
A14:   0 – 8mil pk-pk
A15:   0 – 20mil pk-pk
A16:   0 – 4mil pk-pk
A17:   0 – 10mil pk-pk
A18:   0 – 5mil pk-pk
A19:   0 – 2.0 ips pk
A20:   0 – 4.0 ips pk
A21:   0 – 0.8 ips pk
A22:   0 – 1.0 ips pk
A26:   0 - 50mm/s rms
A27:   0 - 100mm/s rms
A28:   0 - 20mm/s rms
A31:   0 - 25 mm/s rms
A32:   0 - 2.0 ips rms
A33:   0 - 4.0 ips rms
A34:   0 - 0.8 ips rms
A35:   0 - 1.0 ips rms
A36:   0 - 20g pk
A37:   0 - 50g pk

CX: Alarms.

C0*:   Dual alarms with epoxy sealed relays.

C1:   No Alarm.

GX: Mounting.

G0*:   DIN rail mounting.

G1:   Plate mounting.

HX: Sensor (not include).

H0*:   TM0782A or any ICP accelerometer with 100mV/g
       (A00~A05 not available)

H1: TM0793V or any ICP velocity sensor with 4mV/mm/s
     (A12, 13, 36, 37 not applicable)
H2: TM079VD (A12, 13 not available)
HXXX: Seismic velocity sensor, Sensitivity = XXX
     mV/in/sec (A12, 13, 36, 37 not available)

IX: Frequency Response

I0*:   Normal Frequency (2 ~ 3KHz, H2 not available)
I1:   Low Frequency (0.5~100Hz)
I2:   High frequency (10 – 20KHz,
       A12, 13, 36, 37 only with accelerometer)
IXXX-YYYY**:
       XXX: Hi-pass filter;
       YYYY: low pass filter

MX: Condition Monitoring,

   4-20mA with Galvanic Isolation***

M1*: 4-20mA without isolation. No CM
M2:   4-20mA without isolation . With CM
M3: 4-20mA with isolation. No CM
M4: 4-20mA with isolation. With CM
M5: Dual 4-20mA, No CM
M6: Dual 4-20mA, with CM

SX: Approvals

S0*:   CE
S1:   CE
       CSA: Class I, Div. 2,Grps A,B,C&D,T4
       ATEX: II 3G ExnA II T4
       GOST R: 2ExnAIIT4X

* Denotes factory default.
** Low pass has to be 5X more than hi pass filter.
** Galvanic isolation requires loop powered configuration.

DTM20-AX-BX-IX-MX-SX

Field programmable seismic monitor

AX: Sensor and Alarm
A0:   ICP sensor, Dual alarms
A1:   ICP sensor, No alarm
A2:   Seismic velocity, Dual alarms
A3:   Seismic velocity, No alarm
A4:   Looseness monitoring, Dual alarms

BX: Mounting.
B0:   DIN rail mounting.
B1:   Plate mounting.

IX: Frequency Response
I0*:   Normal Frequency (2 ~ 3KHz, H2 not available)
I1:   Low Frequency (0.5~100Hz)
I2:   High frequency (10 – 20KHz,
       A12, 13, 36, 37 only with accelerometer)

IXXX-YYYY**:

    XXX: Hi-pass filter;

    YYYY: low pass filter

MX: Condition Monitoring,

    4-20mA with Galvanic Isolation***

  M1*: 4-20mA without isolation. No CM

  M2: 4-20mA without isolation . With CM

  M3: 4-20mA with isolation. No CM

  M4: 4-20mA with isolation. With CM

  M5: Dual 4-20mA, No CM

  M6: Dual 4-20mA, with CM

SX: Approvals.

  S0*: CE

  S1:   CE

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

       ATEX: II 3G ExnA II T4

       GOST R: 2Ex nA II T4X

** Low pass has to be 4X more than hi pass filter.

** Galvanic isolation requires loop powered configuration.

  .

Optional Accessories

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.
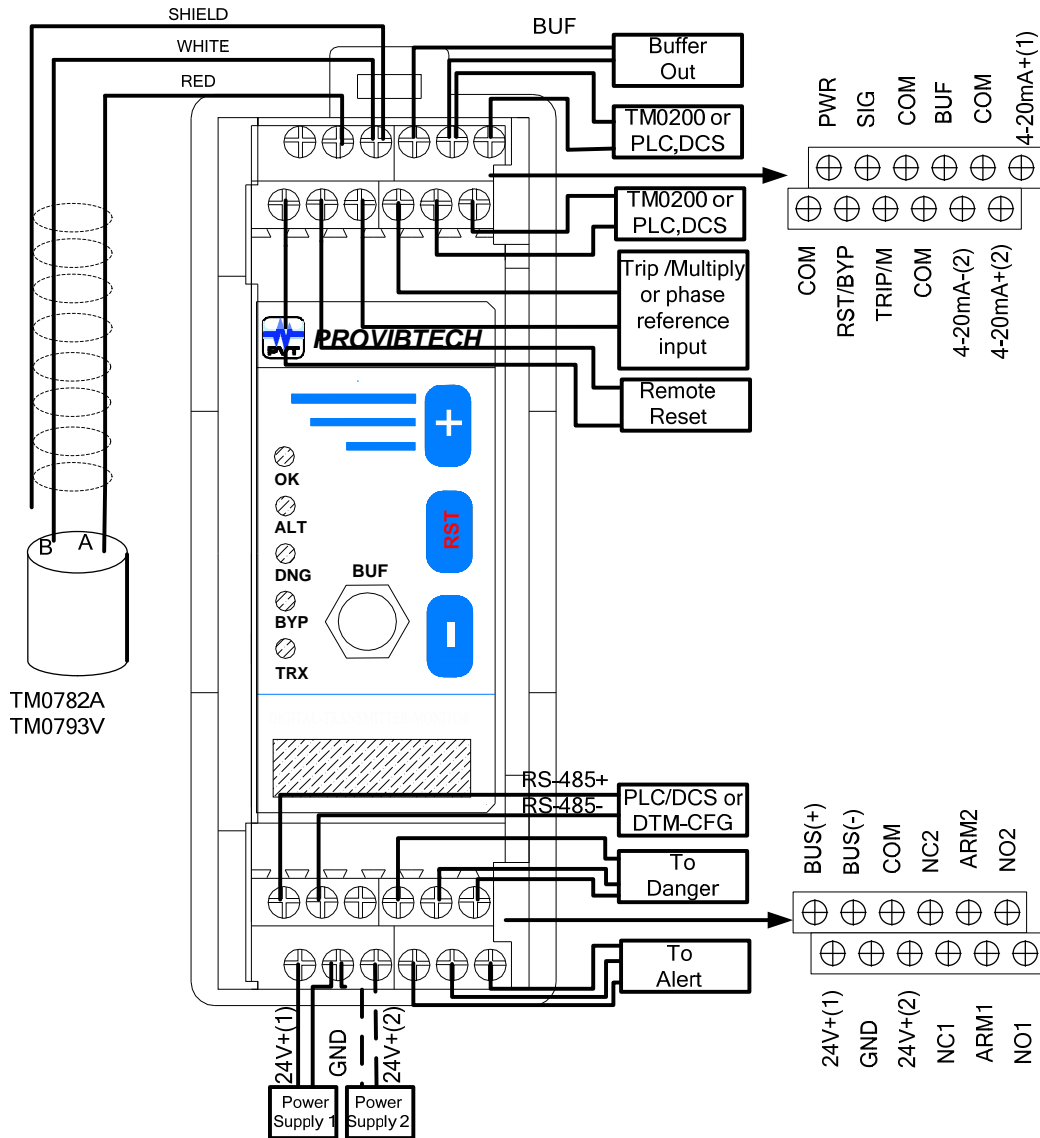
Seismic Sensor Systems

- ✓ **TM0782A-K-M:** Accelerometer kit
- ✓ **TM0783A-K-M:** Accelerometer with cable
- ✓ **TM0793V-K-M:** Velocity sensor kit
- ✓ **TM079VD-V/H-K:** Low frequency sensor

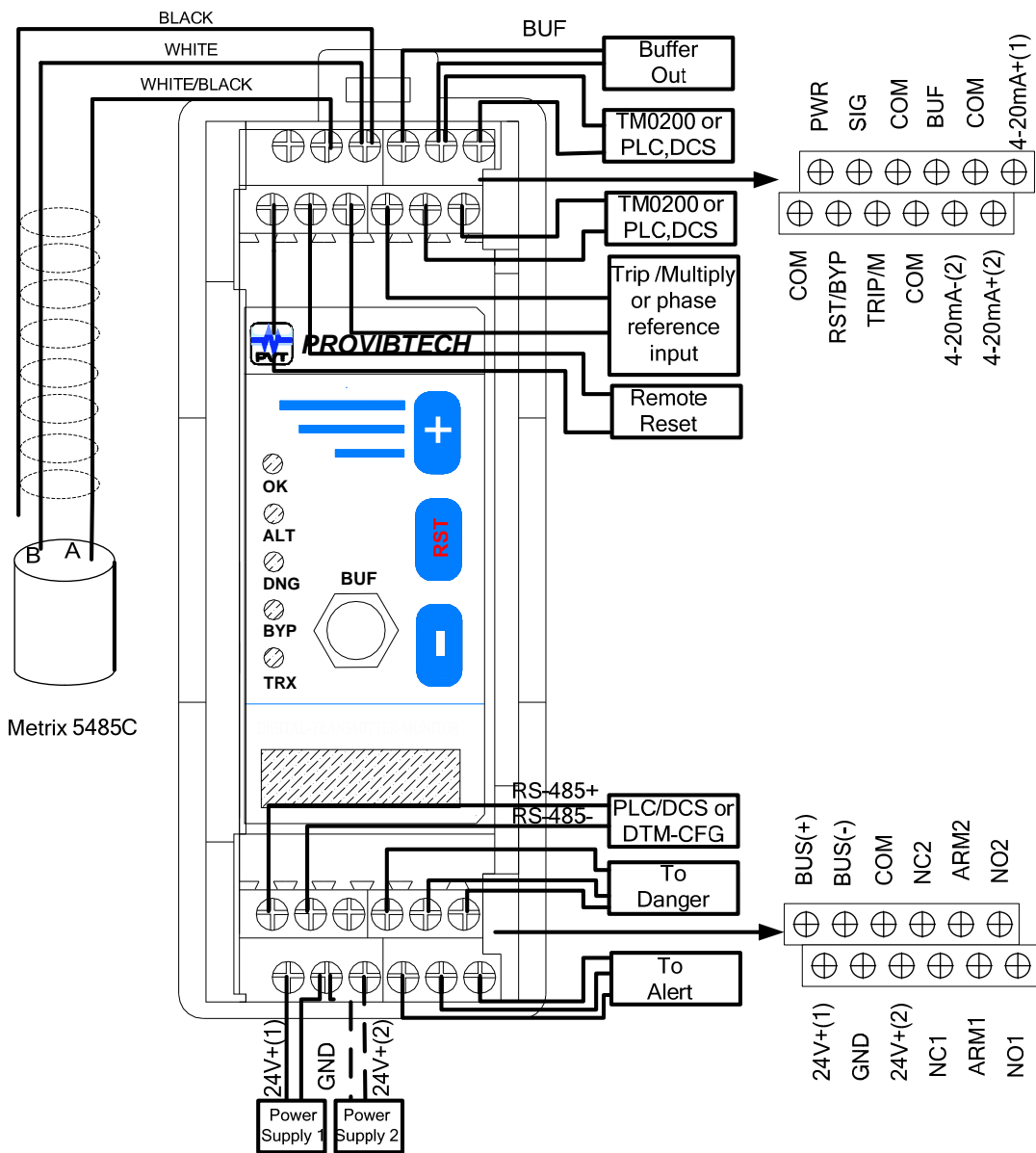## DTM20 System Installation

DTM20 Field-Wiring Diagram

Note:

✓ Power supply 2 and 4-20mA(2) are optional connections 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 DTM20 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Thus, the DTM20 won't provide the Trip Multiply and the Trip Multiply property should be set to "None" in the DTM-CFG software.

✓ When using the signal condition monitoring function the DTM20 works with DTM10-501/502 to provide a phase reference output. In this case connect Trip/Multi of DTM20 with Trip/Multi of DTM10-501/502 and connect COM of DTM20 with COM of DTM10-501/502.

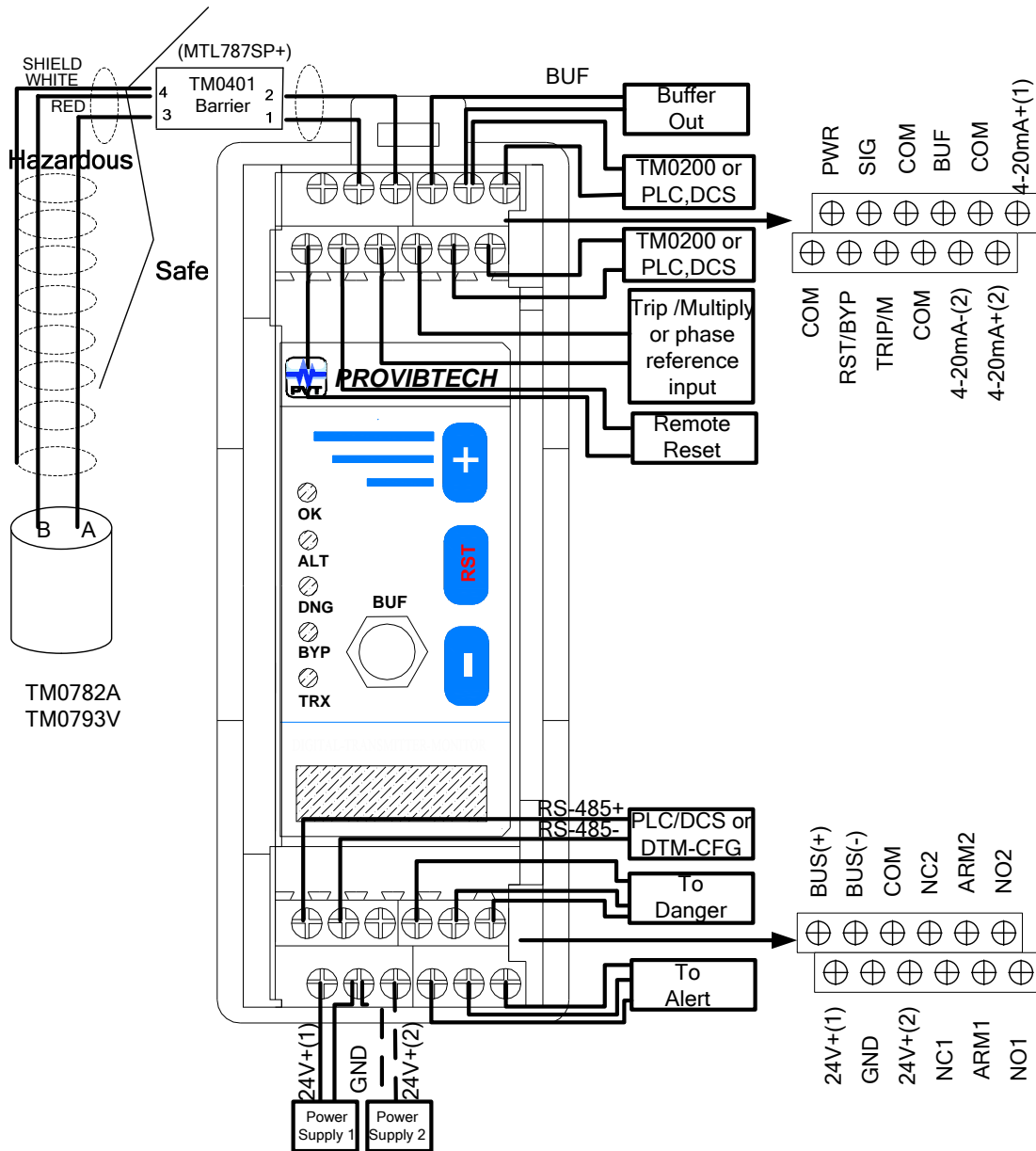## DTM20 Field-Wiring Diagram (Interfacing with 5485C)

Note:

✓ Power supply 2 and 4-20mA(2) are optional connections 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 DTM20 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Thus, the DTM20 won't provide the Trip Multiply and the Trip Multiply property should be set to "None" in the DTM-CFG software.

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DTM20 Hazardous Area Field-Wiring Diagram

Note:

✓ Power supply 2 and 4-20mA(2) are optional connections 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 DTM20 has the digital condition monitoring function, the Trip/Multi and COM pins are used for phase reference input. Thus, the DTM20 won't provide the Trip Multiply and the Trip Multiply property should be set to "None" in the DTM-CFG software.

✓ When using the signal condition monitoring function the DTM20 works with DTM10-501/502 to provide a phase reference output. In this case connect Trip/Multi of DTM20 with Trip/Multi of DTM10-501/502 and connect COM of DTM20 with COM of DTM10-501/502.