# VM Tools

## Signals simulators

**User manual**
**VM Tools – Signals simulators**

*9UMENX524-1200*
*Release: 200528*

# VM Tools – Signals simulators

# 1. VM Tools - Signals simulators

## 1.1. Introduction

VMx5 signals simulators are special Balance Systems devices which allow to test some VM25 (or VM15) components of balancer and touch detection functions.

These special devices are able to generate known electric signals in order to simulate AE, synchronism and vibration signals. VMx5 software (versions released after March 2020) set up system environment to compare measured known signals with defined tolerance or threshold. With this method, simulators downstream components evaluation is possible.

Known signals and proper tolerance or threshold will be display on the screen (panel or HMI).

Table below shows signal simulators brief view:

| Device p/n | Description | Image | Features |
|---|---|---|---|
| 9DUM-AE0xx0000 | AE signal simulator |  | It allows to test all downstream side of rotating part (static part collector, extension cable, TD card) |
| 9DUM-TD0xx0050 | TD card tester |  | It allows to test all downstream side of static part (extension cable and TD card) |
| 9DUM-BN0xx0050 | BN card tester |  | It allows to test all downstream side of static part collector (extension cable and BN card) |

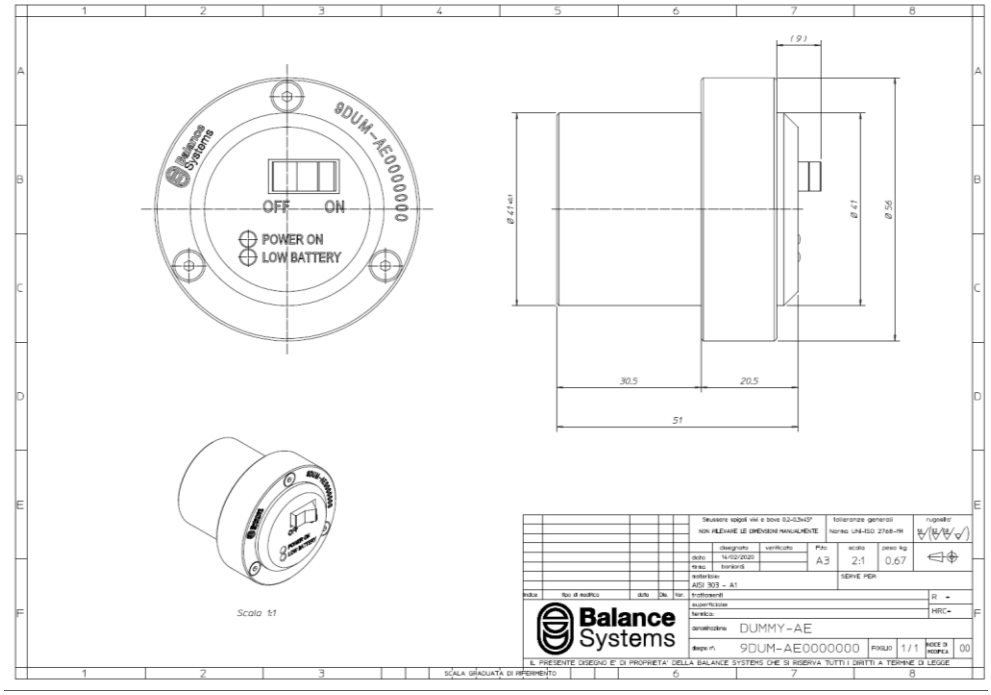
VM Tools kit also includes:

- USB sticker with:
  - Signal simulator documentation
  - VM25 v12 backup file (.bck)
  - VM15 v12 backup file (.bck)
  - VM25 v11 backup file (.bck)
  - VM15 v11 backup file (.bck)

Note: Use of backup files is suggested to set-up environment system to perform the tests on v11 and v12 software version released before March 2020

# 1.2. Signal simulators layout, and technical data

## *1.2.1. AE signal simulator (9DUM-AE0xx0000*)*




| PRODUCT DESCRIPTION | | NOTES |
|---|---|---|
| Function | AE signal simulator for VM25 and VM15 systems. During test phase it replaces the collector rotating part and allows to test all downstream side of rotating part (collector static part, extension cables, TD card) | |
| **ENVIRONMENTAL** | | |
| Temperature Range | 0 ÷ 60 °C | |
| AE sensor signal | Simulated | |
| **ELECTRICAL** | | |
| Power supply | Embedded batteries (x2) (CR 2032) | 800408-0000012 |
| Max power | 90 mW | |
| Type of connection | No Link | |
| **MECHANICAL** | | |
| Size (length x max diameter) | 51 x Ø56 mm | |
| Weight | ~180g | |
| Case Material | AISI 303 - polyamide | |
| Protection grade | IP30 | |
| Mechanical reference drawing | 9DUM-AE0XX0000 | |

(*) “xx” characters are referred to electronic version. Mechanical layout does not change.

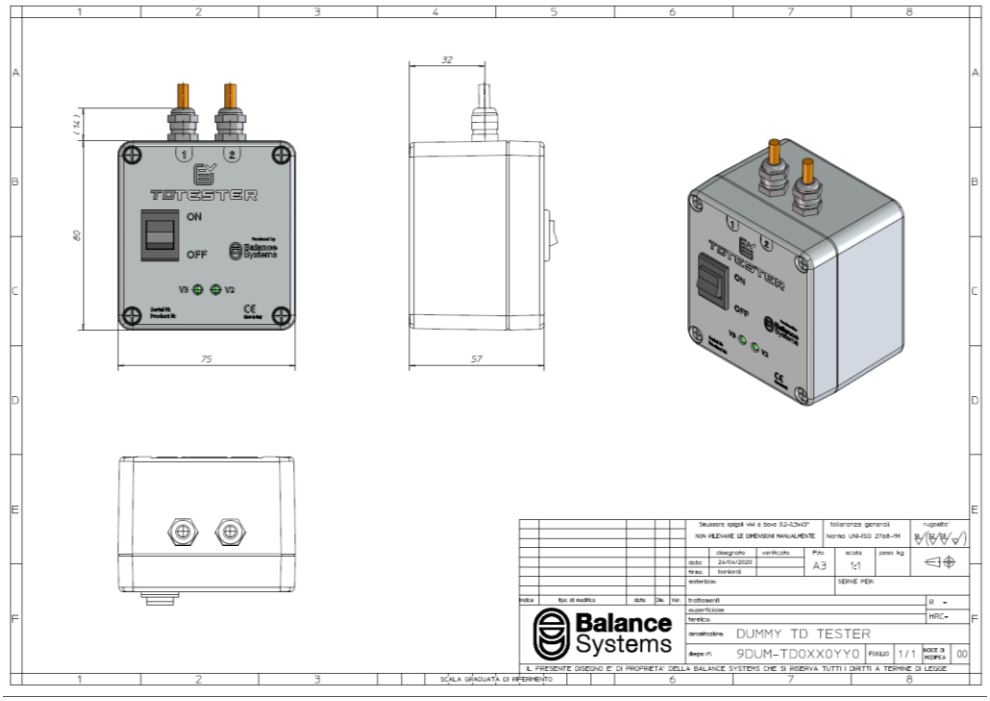
### 1.2.1.1. AE signal simulator batteries replacement

If yellow LED (“LOW BATTERY”) is ON, batteries replacement is required.
In order to replace the batteries, please follow nexts steps:

1. Unscrew three M3 screws
2. Gently remove cover parts. **Pay attention to do not disconnect internal wires**
3. Replace the batteries
4. Close the cover and screw.

Batteries specification are indicated on 9DUM-AE0xx0000 datasheet.

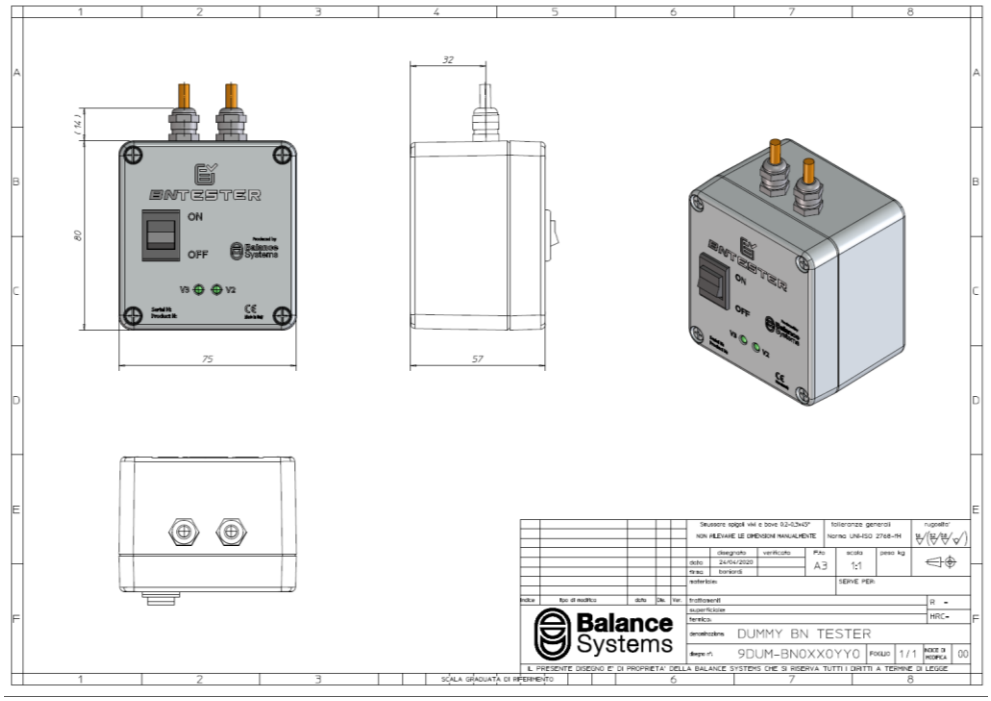
## 1.2.2. TD card tester (9DUM-TD0xx0yy0*)




| PRODUCT DESCRIPTION | | NOTES |
|---|---|---|
| Function | TD card tester (AE signal simulator) for VM25 and VM15 systems. During test phase it replaces the static part and allows to test all downstream side of static part (extension cables, TD card) | |
| **ENVIRONMENTAL** | | |
| Temperature Range | 0 ÷ 70 °C | |
| AE sensor signal | Simulated | |
| **ELECTRICAL** | | |
| Power supply | ±15 V | |
| Max power | 1.2 W | |
| Cables length (yy) | It depends on product p/n | i.e.: yy=05 means 0,5 m |
| Connectors | Binder series 423 4 pole male, IP67 | |
| | Binder series 423 7 pole male, IP67 | |
| Cable type | Total strand with ® Kevlar, tinned copper braided shield coverage 85% min. and "TNT" tape | |
| Cables external diameter | ~5.5 mm | |
| Sheath type | Special Polyurethane compound jacket | |
| Sheath color | Orange RAL 2003 (RAL 2008 alternative) | |
| **MECHANICAL** | | |
| Size (l x h x w) | 75 x 80 x 57 mm | |
| Weight | ~465g | |
| Case Material | Aluminum | |
| Protection grade | IP30 | |
| Mechanical reference drawing | 9DUM-TD0XX0YY0 | |

(*) "xx" characters are referred to electronic version. Mechanical layout does not change.

## 1.2.3. BN card tester (9DUM-BN0xx0yy0*)




| PRODUCT DESCRIPTION | | NOTES |
|---|---|---|
| Function | BN card tester (synchronism and vibration signal simulator) for VM25 and VM15 systems. During test phase it replaces the collector static part and allows to test all downstream side of static part (extension cables, BN card) | |
| **ENVIRONMENTAL** | | |
| Temperature Range | 0 ÷ 70 °C | |
| AE sensor signal | Simulated | |
| **ELECTRICAL** | | |
| Power supply | ±15 V | |
| Max power | 1.2 W | |
| Cables length (yy) | It depends on product p/n | i.e.: yy=05 means 0,5 m |
| Connectors | Binder series 423 4 pole male, IP67 | |
| | Binder series 423 12 pole male, IP67 | |
| Cable type | Total strand with ® Kevlar, tinned copper braided shield coverage 85% min. and "TNT" tape | |
| Cables external diameter | ~5.5 mm | |
| Sheath type | Special Polyurethane compound jacket | |
| Sheath color | Orange RAL 2003 (RAL 2008 alternative) | |
| **MECHANICAL** | | |
| Size (l x h x w) | 75 x 80 x 57 mm | |
| Weight | ~530g | |
| Case Material | Aluminum | |
| Protection grade | IP30 | |
| Mechanical reference drawing | 9DUM-BN0XX0YY0 | |

(*) "xx" characters are referred to electronic version. Mechanical layout does not change.

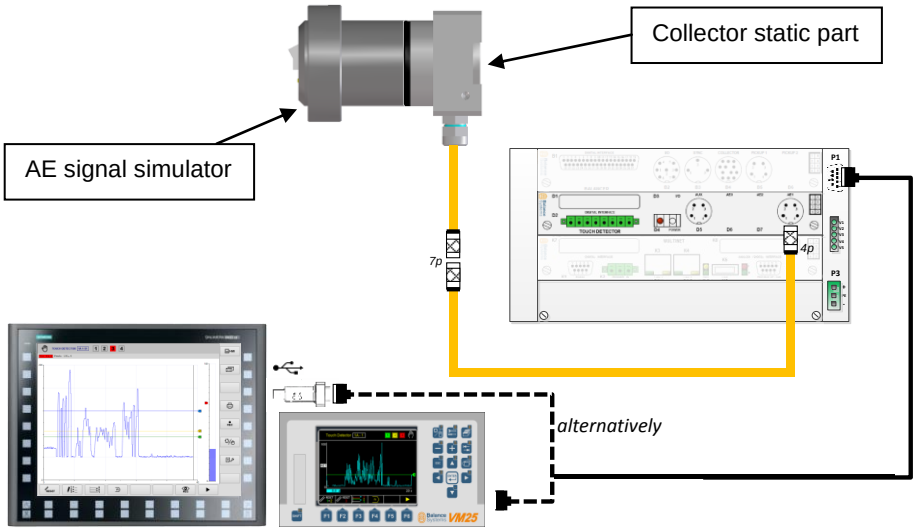
# 2. Connections and configurations (v12 software version released after March 2020)

## 2.1. AE signal simulator (9DUM-AE0xx0000)

During test phase, AE signal simulator replaces the collector rotating part and allows to test all downstream side of rotating part (collector static part, extension cables, TD card).

This device is able to generate known electric signal in order to simulate AE signal to send to collector static part. VMx5 software (versions released after March 2020) set up system environment to compare measured known signals with defined threshold. With this method, simulators downstream components evaluation is possible.

1. Place NoLink AE signal simulator close to collector static part (no distance between the parts is required). Make sure about correct connection between collector static part and TD card as indicated below (static part connection to BN card is not relevant for testing purposes).




Note: TD card channels can be tested one at time and the correspondence with proper variable during test phase are listed in the table on step 4:

Please follow section VM Panel procedure if panel is corrently used. Follow section VM HMI procedure if HMI is corrently used.

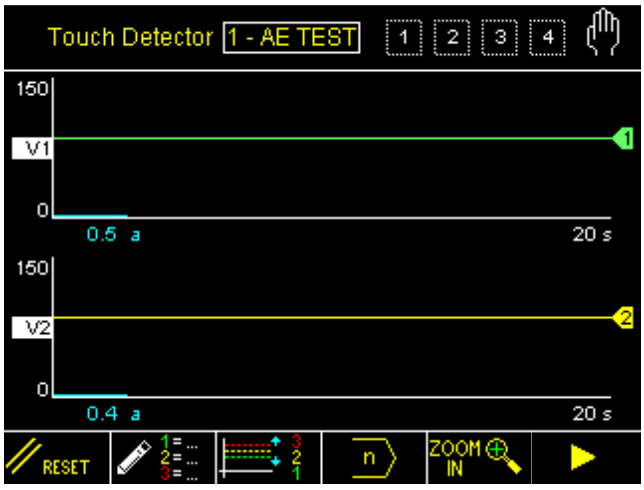
### *2.1.1. VM Panel procedure*

2. To set-up test environment on VM system, starting from Touch Detector main page, access to Setup parameter, pressing  then  (F2), select "**DIAGNOSTIC**" folder and press  (F1).


3. If test environment has been correctly set-up, all limits signaling will be activated and automatic mode signaling will be switched on manual mode.
Further details about activated states are specified on section TD Test phase states (Digital I/O or Profibus/Profinet)

Press  (F6)

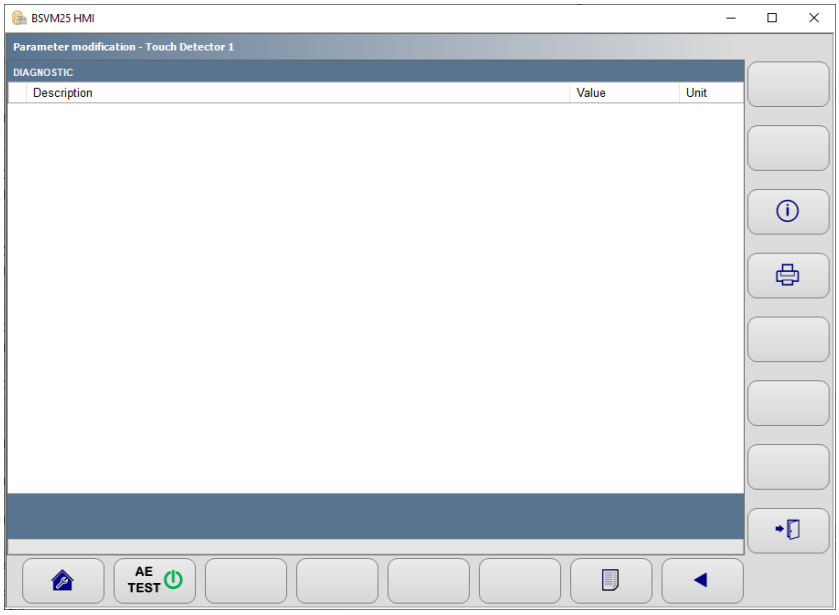
Test display will be shown as below.




Skip on step 4.

### *2.1.2. VM HMI procedure*

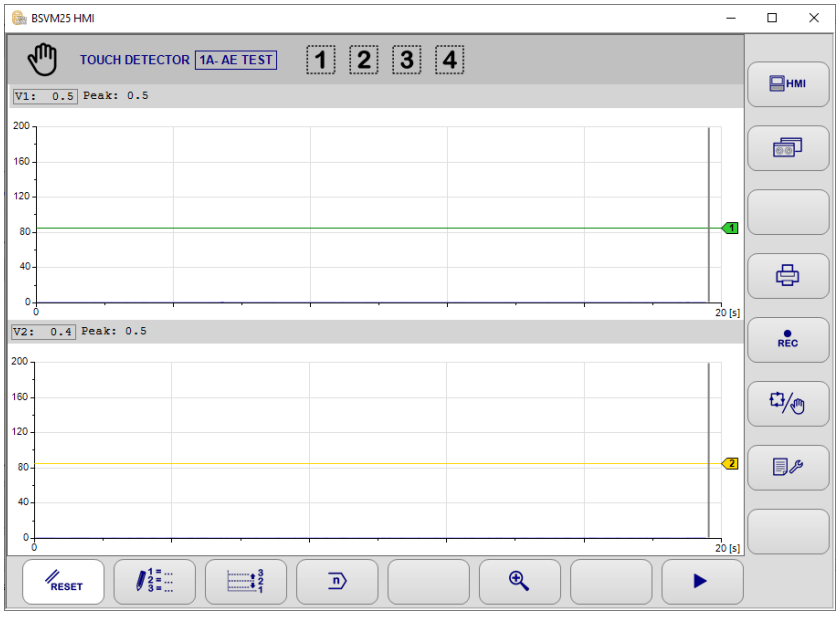
2. To set-up test environment on VM system, starting from Touch Detector main page, access to Setup parameter, pressing  (shif + F7) , select “**SETUP**” folder, then select “**DIAGNOSTIC**” folder and press  (F2).




3. If test environment has been correctly set-up, all limits signaling will be activated and automatic mode signaling will be switched on manual mode.
Further details about activated states are specified on section TD test phase states (Digital I/O or Profibus/Profinet)

Press  (shif + F8).

Test display will be shown as below.



4. Switch on the AE signal simulator and check that “Power ON” LED is ON.
   Dummy AE signal will be shown on the screen (Panel or HMI) in order to be compared with threshold defined by testing environment.
   Check that dummy AE signal exceeds preset threshold.
   Variable to observe is related to the AE channel physically connected to the static part.
   Correspondence with proper variable during test phase are listed in the table below:

| AE channel | Variable |
|---|---|
| *AE1* | V1 |
| *AE2* | V2 |
| *AE3* | V3 |
| *AE4* | V4 |

| Test results | |
|---|---|
| Dummy AE signal exceeds preset threshold | Static part, extension cable and TD card are working correctly. Move the investigation to the rotating part. |
| Dummy AE signal does not exceed preset threshold | Static part or extension cable or TD card are not working correctly. Move the investigation to them. |

5. Once the test has been executed, press “TEST AE OFF” in **Setup → Diagnostic**

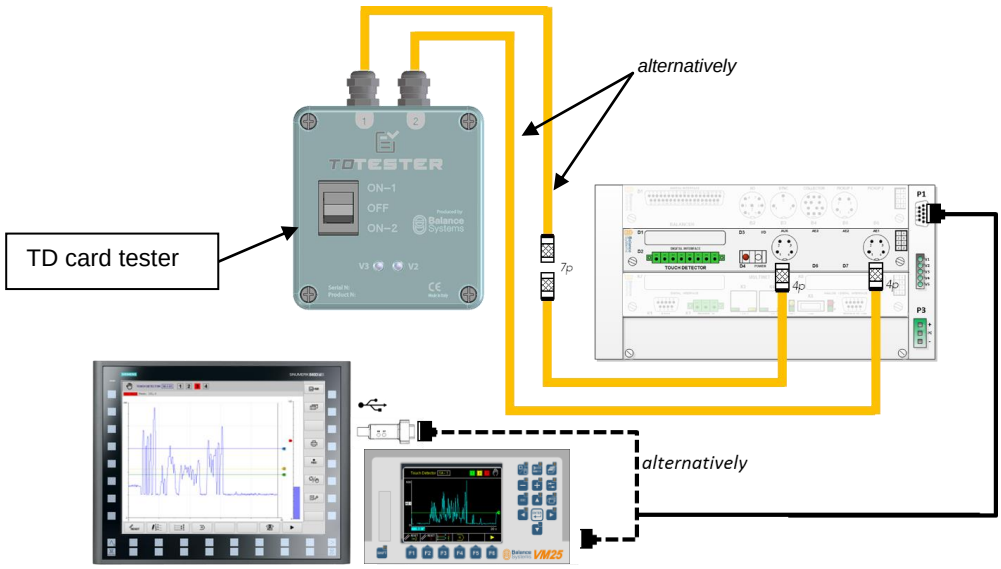
## 2.2. TD card tester (9DUM-TD0xx0yy0)

During test phase, TD card tester replaces the collector static part and allows to test all downstream side of static part (extension cables, TD card).

This device is able to generate known electric signal in order to simulate AE signal. VMx5 software (versions released after March 2020) set up system environment to compare measured known signals with defined threshold. With this method, simulators downstream components evaluation is possible.

1. Replace collector static part with TD card tester. It is possible to chose alternatively to:
   a) test selected AE input channel of TD card only, connecting 4-pole connector to TD card directly (switch pos. ON 2)
   b) test selected AE inpunt channel of TD card with related extension cable (7-4 pole) , connecting 7-pole connector to extension cable (switch pos. ON 1)

   Note: switch-off the system before replacement




Note: TD card channels can be tested one at time and the correspondence with proper variable during test phase are listed in the table on step 4:

Please follow section VM Panel procedure if panel is corrently used. Follow section VM HMI procedure if HMI is corrently used.

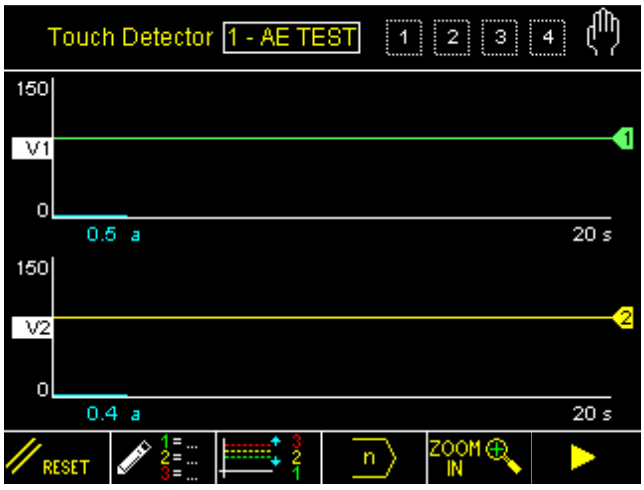
### *2.2.1. VM Panel procedure*

2. To set-up test environment on VM system, starting from Touch Detector main page, access to Setup parameter, pressing  then  (F2), select "**DIAGNOSTIC**" folder and press  (F1).


3. If test environment has been correctly set-up, all limits signaling will be activated and automatic mode signaling will be switched on manual mode.
Further details about activated states are specified on section TD Test phase states (Digital I/O or Profibus/Profinet)

Press  (F6)

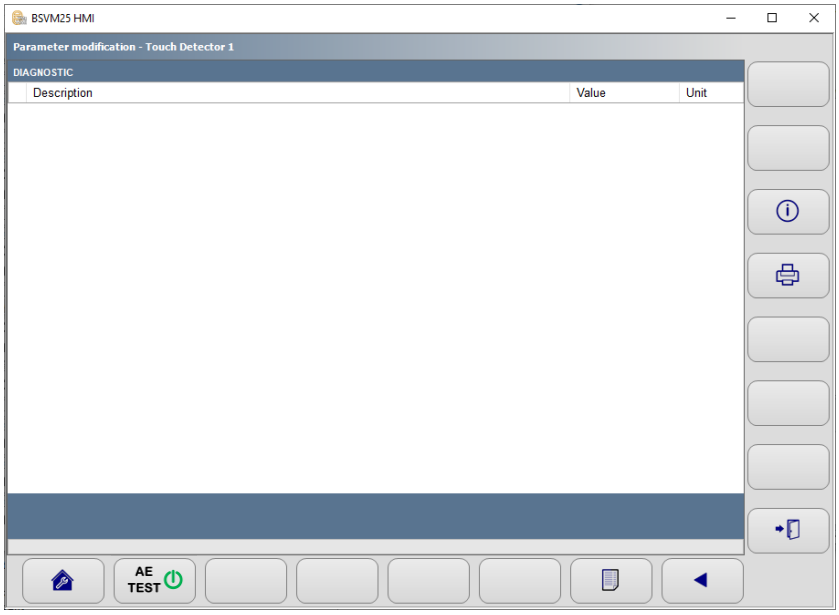
Test display will be shown as below.




Skip on step 4.

### *2.2.2. VM HMI procedure*

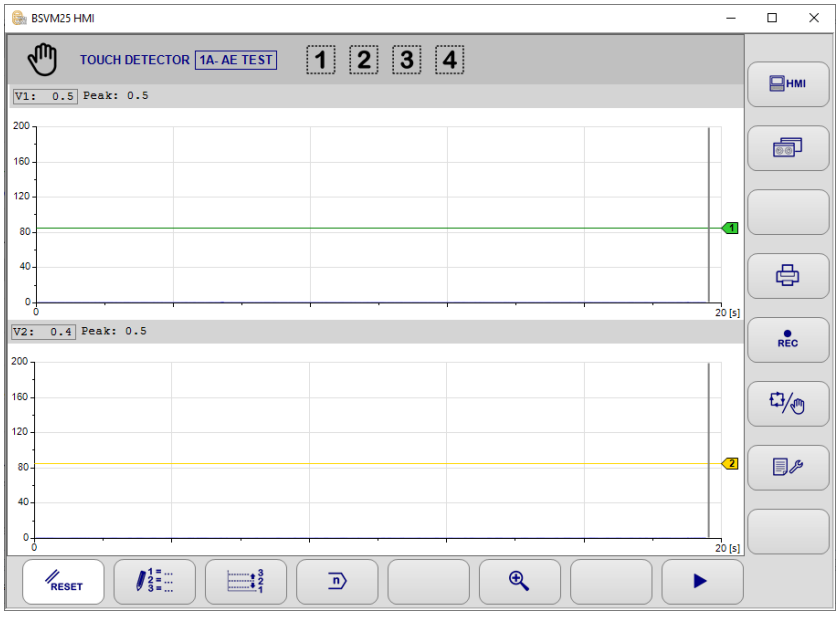
2. To set-up test environment on VM system, starting from Touch Detector main page, access to Setup parameter, pressing  (shif + F7) , select “**SETUP**” folder, then select “**DIAGNOSTIC**” folder and press  (F2).




3. If test environment has been correctly set-up, all limits signaling will be activated and automatic mode signaling will be switched on manual mode.
Further details about activated states are specified on section TD Test phase states (Digital I/O or Profibus/Profinet)

Press  (shif + F8).

Test display will be shown as below.



4. Switch on the TD card tester:
   - Switch pos. ON 2 if TD tester is directly connected to TD card (4-pole connector to TD card). This configuration allows to test AE channel of TD card only
   - Switch pos. ON 1 if TD tester is connected to extension cable (7-4 pole). This configuration allows to test extension cable and AE channel of TD card

   Check that V2 and V3 LED are ON both.
   Dummy AE signal will be shown on the screen (Panel or HMI) in order to be compared with threshold defined by testing environment.
   Check that dummy AE signal exceeds preset threshold.
   Variable to observe is related to the AE channel physically connected to the static part.
   Correspondence with proper variable during test phase are listed in the table below:

| AE channel | Variable |
|---|---|
| *AE1* | V1 |
| *AE2* | V2 |
| *AE3* | V3 |
| *AE4* | V4 |

| **Test results** | | |
|---|---|---|
| | Switch pos. ON 1 | Switch pos. ON 2 |
| Dummy AE signal exceeds preset threshold | Extension cable and TD card are working correctly. Move the investigation to the static part | TD card is working correctly. Move the investigation to extension cable and static part |
| Dummy AE signal does not exceed preset threshold | Extension cable or TD card are not working correctly. Connect TD tester to the function card (Switch pos. ON 2) to exclude card failure. If TD card has already been tested, move the investigation to extension cable and try to replace it with new one. | TD card is not working correctly. Restore original full backup and try again or change the function card |

   Note: for simplicity, it is suggested to start the investigation connecting TD tester to TD card directly (Switch pos. ON 2).

5. Once the test has been executed, press “TEST AE OFF” in **Setup → Diagnostic**
6. Switch-off the system before tester disconnection and static part replacement

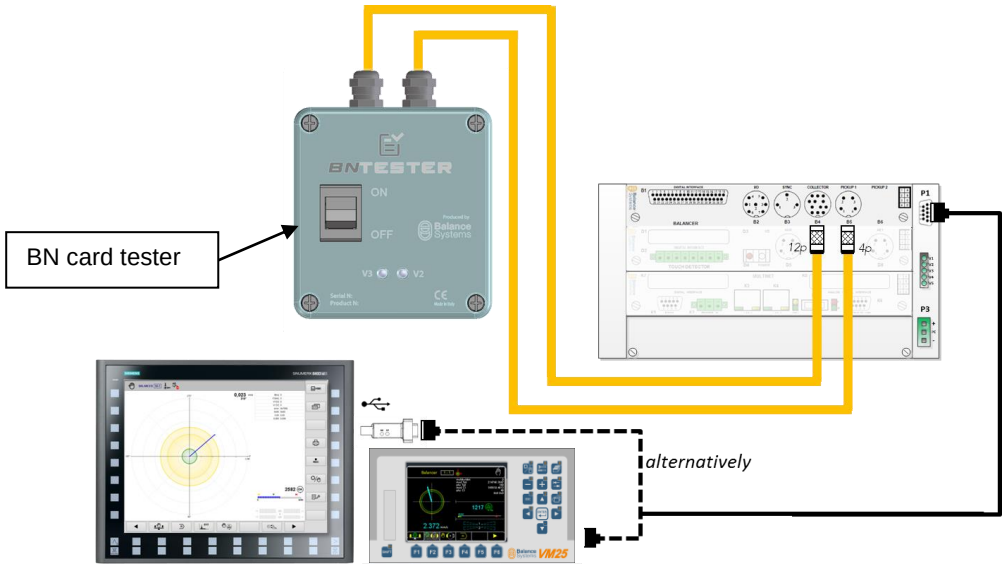
## 2.3. BN card tester (9DUM-BN0xx0yy0)

During test phase, BN card tester replaces the collector static part and allows to test all downstream side of static part (extension cables or BN card directly).

This device is able to generate known electric signal in order to simulate synchronism and vibration signals. VMx5 software (versions released after March 2020) set up system environment to compare measured known signals with defined tolerance. With this method, simulators downstream components evaluation is possible.

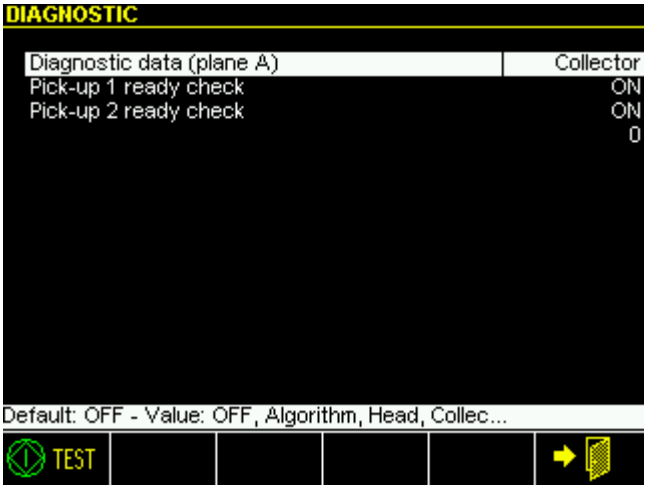
1. Replace collector static part with BN card tester connecting as indicated below:
   - 12-pole connector to BN card (B4)
   - 4-pole connector to BN card (B5 or B6)

   Note: switch-off the system before replacement



### *2.3.1. VM Panel procedure*

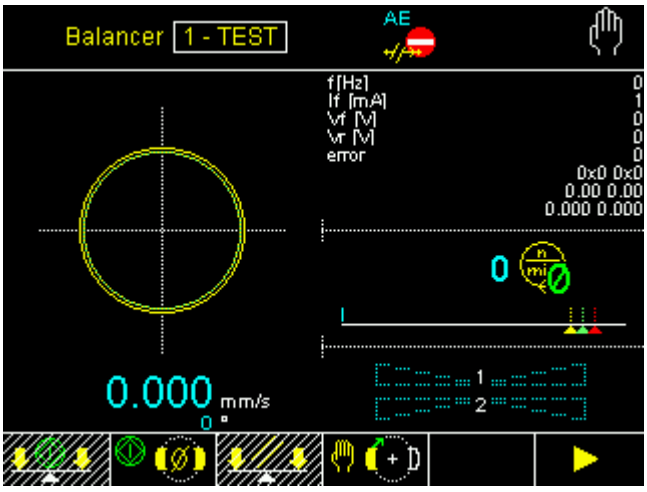
2. To set-up test environment on VM system, starting from Balancer main page, access to Setup parameter, pressing  then  (F2), select "**DIAGNOSTIC**" folder and press  (F1).




3. If test environment has been correctly set-up, automatic mode signaling will be switched on manual mode.
Further details about activated states are specified on section Test phase states (Digital I/O or Profibus/Profinet)

Press  (F6)

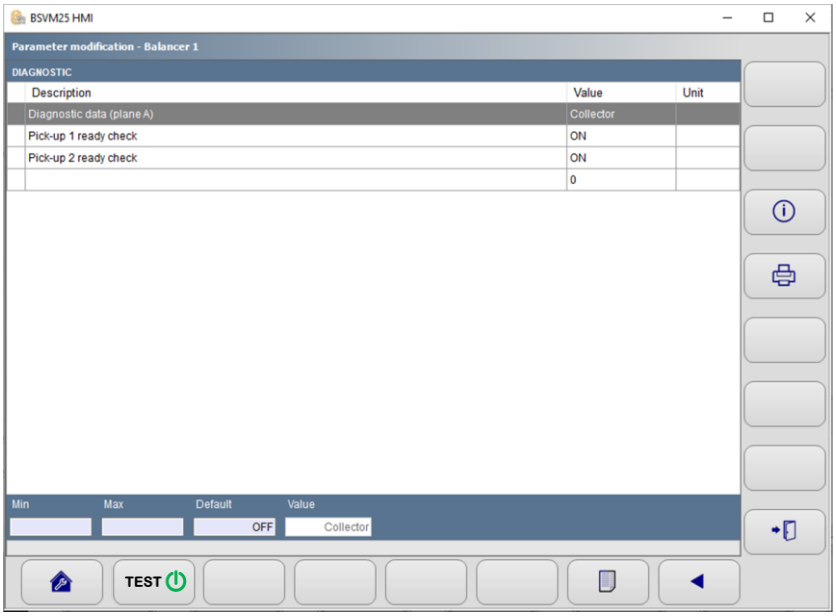
Test display will be shown as below.




Skip on step 4.

### *2.3.2. VM HMI procedure*

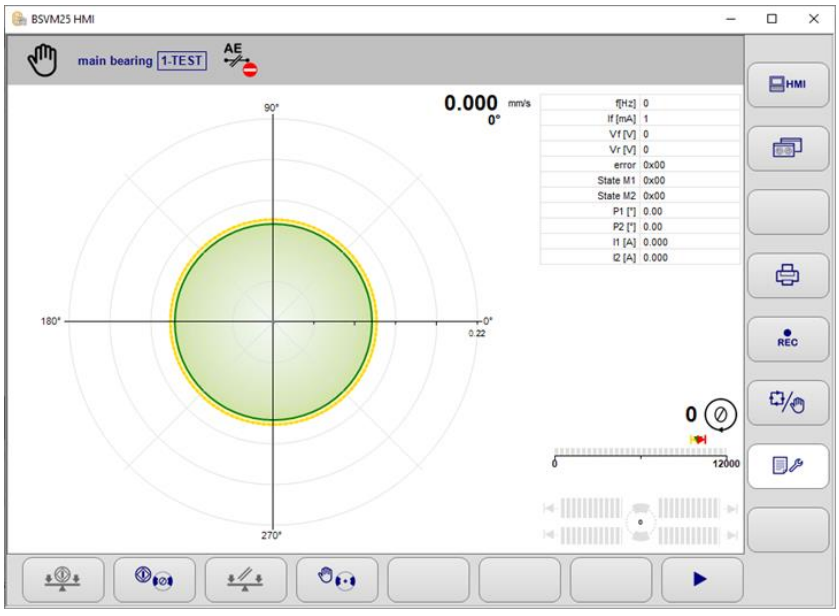
2. To set-up test environment on VM system, starting from Balancer main page, access to Setup parameter, pressing  (shif + F7) , select “**SETUP**” folder, then select “**DIAGNOSTIC**” folder and press  (F2).




3. If test environment has been correctly set-up, automatic mode signaling will be switched on manual mode.
   Further details about activated states are specified on section TD test phase states (Digital I/O or Profibus/Profinet)

   Press  (shif + F8).

   Test display will be shown as below.



4. Switch on the BN card tester.
   Check that V2 and V3 LED are ON both.
   Dummy unbalance vector will be shown on the screen (Panel or HMI) in order to be compared with tolerances defined by testing environment.
   Check that dummy unbalance vector is within preset tolerances.

| **Test results** | | |
|---|---|---|
| | BN tester connected to extension cable | BN tester connected to BN function card |
| Dummy unbalance vector is within preset tolerances | Extension cables and TD card are working correctly. Move the investigation to the collector static part | BN card is working correctly. Move the investigation to extension cable and collector static part |
| Dummy unbalance vector is not within preset tolerances | Extension cables or BN card are not working correctly. Connect BN tester to the function card to exclude card failure. If BN card has already been tested, move the investigation to extension cables and try to replace them with new ones. | BN card is not working correctly. Restore original full backup and try again or change the function card |

   Note: for simplicity, it is suggested to start the investigation connecting BN tester to BN card directly.

5. Once the test has been executed, press “TEST OFF” in **Setup → Diagnostic**
6. Switch-off the system before tester disconnection and static part replacement

# 2.4. Test phase states

## *2.4.1. TD test phase states (Digital I/O or Profibus/Profinet) - valid for AE signal simulator and TD card tester)*

### 2.4.1.1. Digital I/O

Table below shows activated states with digital I/O interface

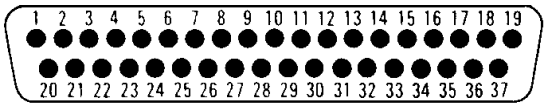
**Connector D2 – Digital I/O**

Type Phoenix 8 pin – MC 1,5/13-GF-3,5 THT


| PIN | Type | Name | Activation (*) | Description |
|---|---|---|---|---|
| 4 | Output | Limit 1 A | LOW | ACTIVE STATUS: Section A Limit 1 signaling |
| 5 | Prog. Output | Limit 2 A | LOW | ACTIVE STATUS: Section A Limit 2 signaling |
| | | Limit 1 B | LOW | ACTIVE STATUS: Section B Limit 1 signaling |
| 6 | Prog. Output | Limit 3 A | LOW | ACTIVE STATUS: Section A Limit 3 signaling |
| | | Limit 1 B | LOW | ACTIVE STATUS: Section B Limit 1 signaling |
| | | Limit 1 C | LOW | ACTIVE STATUS: Section C Limit 1 signaling |
| | | Automatic mode | HIGH | ACTIVE STATUS: signal that the device is operating in automatic mode |
| 7 | Prog. Output | Limit 4 A | LOW | ACTIVE STATUS: Section A Limit 4 signaling |
| | | Limit 2 B | LOW | ACTIVE STATUS: Section B Limit 2 signaling |
| | | Limit 1 D | LOW | ACTIVE STATUS: Section D Limit 1 signaling |
| | | Automatic mode | HIGH | ACTIVE STATUS: signal that the device is operating in automatic mode |

**4 PROCESSES – SECTION A, B, C & D**

**Connector D1 – Digital I/O**




D-Sub 37 pole male

| PIN | Type | Name | Activation (*) | Description |
|---|---|---|---|---|
| 36 | Output | Automatic mode | HIGH | ACTIVE STATUS: signal that the device is operating in automatic mode |
| 26 | Output | Limit 1 A | LOW | ACTIVE STATUS: Section A Limit 1 signaling |
| 9 | Output | Limit 2 A | LOW | ACTIVE STATUS: Section A Limit 2 signaling |
| 27 | Output | Limit 3 A | LOW | ACTIVE STATUS: Section A Limit 3 signaling |
| 10 | Output | Limit 4 A | LOW | ACTIVE STATUS: Section A Limit 4 signaling |
| 28 | Output | Limit 1 B | LOW | ACTIVE STATUS: Section B Limit 1 signaling |
| 11 | Output | Limit 2 B | LOW | ACTIVE STATUS: Section B Limit 2 signaling |
| 29 | Output | Limit 3 B | LOW | ACTIVE STATUS: Section B Limit 3 signaling |
| 18 | Output | Limit 4 B | LOW | ACTIVE STATUS: Section B Limit 4 signaling |
| 30 | Output | Limit 1 C | LOW | ACTIVE STATUS: Section C Limit 1 signaling |
| 32 | Output | Limit 2 C | LOW | ACTIVE STATUS: Section C Limit 2 signaling |
| 25 | Output | Limit 3 C | LOW | ACTIVE STATUS: Section C Limit 3 signaling |
| 14 | Output | Limit 4 C | LOW | ACTIVE STATUS: Section C Limit 4 signaling |
| 13 | Output | Limit 1 D | LOW | ACTIVE STATUS: Section D Limit 1 signaling |
| 15 | Output | Limit 2 D | LOW | ACTIVE STATUS: Section D Limit 2 signaling |
| 33 | Output | Limit 3 D | LOW | ACTIVE STATUS: Section D Limit 3 signaling |
| 16 | Output | Limit 4 D | LOW | ACTIVE STATUS: Section D Limit 4 signaling |

### 2.4.1.2. Profibus / Profinet interface

Tables below show activated states with profibus or profinet interface

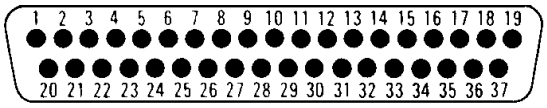
| TOUCH DETECTOR state [TD – sections A+B+C+D] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| byte | | bit | | Description | | | | |
| 0 | | 0 | | Setup Echo Select 0 | | | | |
| 0 | | 1 | | Setup Echo Select 1 | | | | |
| 0 | | 2 | | Setup Echo select data valid | | | | |
| 0 | | 3 | | | | | | |
| 0 | | 4 | | Card polling: 0 = No polling; 1 = Polling | | | | |
| 0 | | 5 | | | | | | |
| 0 | | 6 | | Generic alarm | | | | |
| 0 | | 7 | | Automatic mode | | | | |
| Section A | | Section B | | Section C | | Section D | | Description |
| byte | bit | byte | bit | byte | bit | byte | bit | |
| 1 | 0 | 3 | 0 | 5 | 0 | 7 | 0 | Part program Echo select 0 |
| 1 | 1 | 3 | 1 | 5 | 1 | 7 | 1 | Part program Echo select 1 |
| 1 | 2 | 3 | 2 | 5 | 2 | 7 | 2 | |
| 1 | 3 | 3 | 3 | 5 | 3 | 7 | 3 | |
| 1 | 4 | 3 | 4 | 5 | 4 | 7 | 4 | |
| 1 | 5 | 3 | 5 | 5 | 5 | 7 | 5 | |
| 1 | 6 | 3 | 6 | 5 | 6 | 7 | 6 | |
| 1 | 7 | 3 | 7 | 5 | 7 | 7 | 7 | Part program Echo select data valid |
| 2 | 0 | 4 | 0 | 6 | 0 | 8 | 0 | Limit 1 |
| 2 | 1 | 4 | 1 | 6 | 1 | 8 | 1 | Limit 2 |
| 2 | 2 | 4 | 2 | 6 | 2 | 8 | 2 | Limit 3 |
| 2 | 3 | 4 | 3 | 6 | 3 | 8 | 3 | Limit 4 |
| 2 | 4 | 4 | 4 | 6 | 4 | 8 | 4 | |
| 2 | 5 | 4 | 5 | 6 | 5 | 8 | 5 | |
| 2 | 6 | 4 | 6 | 6 | 6 | 8 | 6 | Reset in progress |
| 2 | 7 | 4 | 7 | 6 | 7 | 8 | 7 | Cycle in progress |

| SYSTEM state [SYS] | | |
|---|---|---|
| byte | bit | Description |
| 0 | 0 | System in automatic mode (*) |
| 0 | 1 | System OK |
| 0 | 2 | All function cards are in automatic mode (**) |
| 0 | 3 | System in test mode |
| 0 | 4 | |
| 0 | 5 | |
| 0 | 6 | |
| 0 | 7 | |
| 1 | 0 | Slot 1 enabled |
| 1 | 1 | Slot 2 enabled |
| 1 | 2 | Slot 3 enabled |
| 1 | 3 | Slot 4 enabled |
| 1 | 4 | Slot 5 enabled |
| 1 | 5 | |
| 1 | 6 | |
| 1 | 7 | |

## *2.4.2. BN test phase states (Digital I/O or Profibus/Profinet) – valid for BN card tester*

### 2.4.2.1. Digital I/O

**Connector B1 D-Sub 37 pole male**




| PIN | Type | Name | Activation (*) | Description |
|---|---|---|---|---|
| 31 | Output | Automatic mode | LOW | ACTIVE STATUS: signal that the device is operating in automatic mode |

### 2.4.2.2. Profibus / Profinet interface

| SYSTEM state [SYS] | | |
|---|---|---|
| **byte** | **bit** | **Description** |
| 0 | 0 | System in automatic mode (*) |
| 0 | 1 | System OK |
| 0 | 2 | All function cards are in automatic mode (**) |
| 0 | 3 | System in test mode |
| 0 | 4 | |
| 0 | 5 | |
| 0 | 6 | |
| 0 | 7 | |
| 1 | 0 | Slot 1 enabled |
| 1 | 1 | Slot 2 enabled |
| 1 | 2 | Slot 3 enabled |
| 1 | 3 | Slot 4 enabled |
| 1 | 4 | Slot 5 enabled |
| 1 | 5 | |
| 1 | 6 | |
| 1 | 7 | |

# 3. Connections and configurations (v11 and v12 software version released before March 2020)

On v11 and v12 software version released before March 2020 is possible to manually set-up environment system to perform the tests.
**Note:** make sure to perform a full VMx5 system backup before the test in order to be sure to correctly restore all the parameter

## 3.1. AE signal simulator (9DUM-AE0xx0000)

During test phase, AE signal simulator replaces the collector rotating part and allows to test all downstream side of rotating part (collector static part, extension cables, TD card).

This device is able to generate known electric signal in order to simulate AE signal to send to collector static part. On VMx5 software (versions released before March 2020) is necessary to manually set-up the system environment to compare measured known signals with defined threshold. With this method, simulators downstream components evaluation is possible.

Note: TD card channels can be tested one at time.
**Note:** Make sure to disable all automatic commands to the system and ignore all systems signalation during test phase or disconnect I/O connection from TD card (D1) or Profibus connection from MN card (K6) or Profinet connection from MN card (K3 and K4).

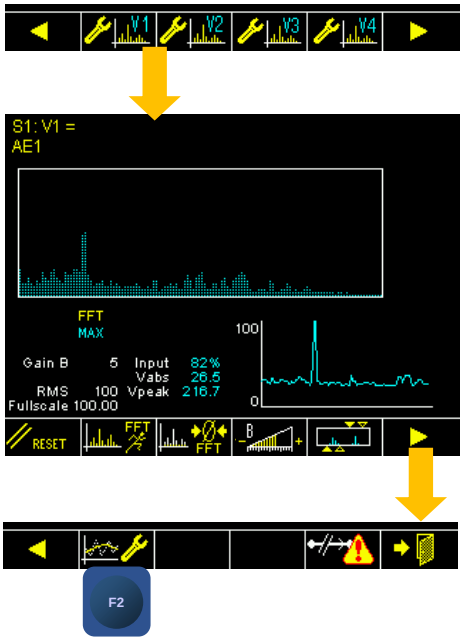
1. Perform full VMx5 system backup procedure as indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual* and save the file (.bck).
2. Set-up the test environment chosing alternatively:

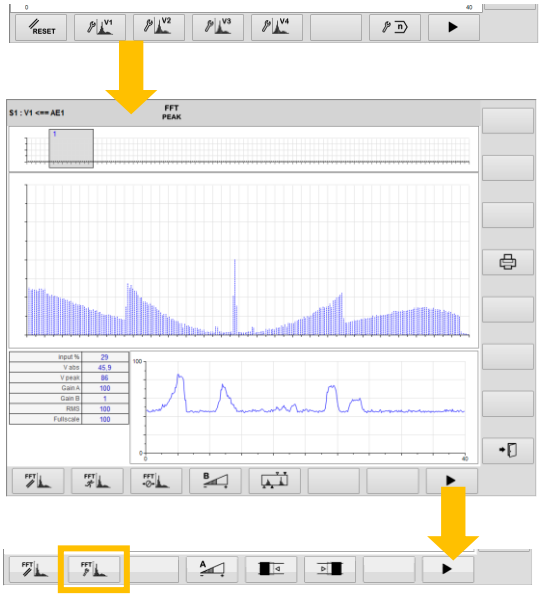
   a) Perform TD card restore procedure (work and setup parameters) as indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual* uploading proper .bck file stored on supplied USB sticker (make sure to correct restore VM25 or VM15, v11 or v12 .bck file). Then reboot the system.
   Correspondence with proper variable during test phase are listed in the table below:

| AE channel | Variable |
|---|---|
| *AE1* | V1 |
| *AE2* | V4 |
| *AE3* | V3 |
| *AE4* | V2 |

   Note: test environment has been created on part program 1, setup 1(if available).

   b) Manually set the parameters of current setup and current part-program .
   Access as “Installer” login level and follow the indications below to reach the parameter to set.
   Choose available variable (V1, V2, V3, V4) according with current part-program.



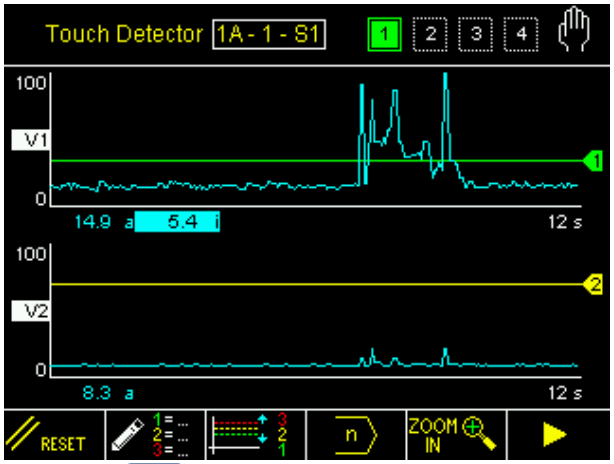



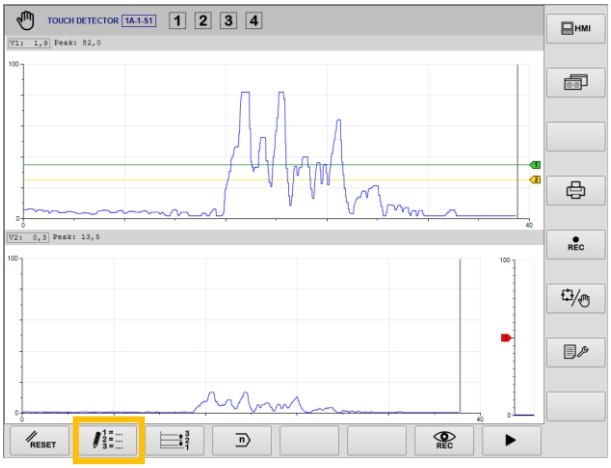

Parameters to set with relative values are listed in the table below

| Parameter | Value |
|---|---|
| **Source** | It depends on AE channel to test |
| **Full-scale** | **[100]** |
| **RMS Filter** | **[0]** |
| **Analog filter bypass** | **[OFF]** |
| **No. of samples for HW RMS** | **[0]** |
| **Gain B** | **[3]** |
| **Window** | **[0]** |
| **Gain A** | **[8]** |
| **Digital Band Pass filter 1** | **[OFF]** |
| **Digital Band Pass filter 2** | **[OFF]** |

| Parameter (Enhanched) | Value |
|---|---|
| **Analog High Pass filter** | **[ON]** |
| **Analog High Pass filter – cut-off freq.** | **[1]** |
| **Analog Band Pass filter** | **[OFF]** |
| **Analog Band Stop filter** | **[ON]** |
| **Analog Band Stop filter – lower freq.** | **[100]** |
| **Analog Band Stop filter – upper freq** | **[952]** |

It is also necessary to correctly set the formula of current part program as follow:



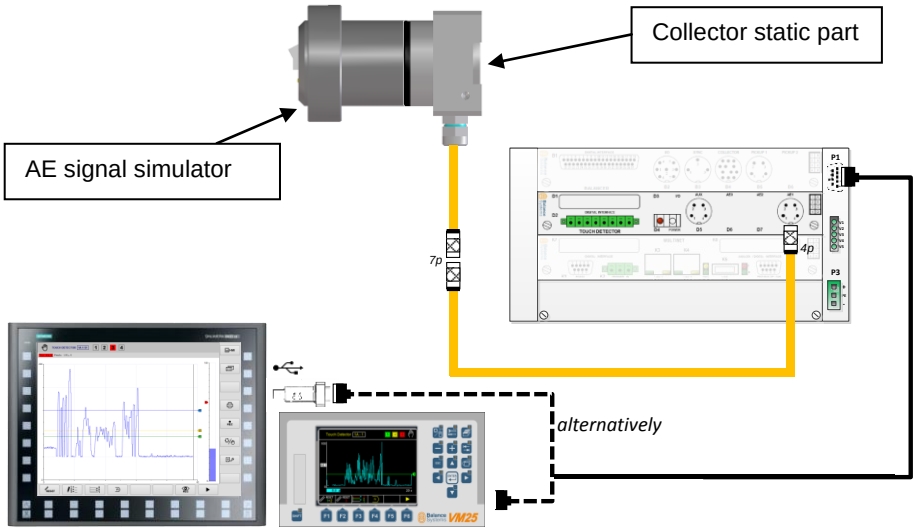




F2

L1 = N a Vx > 30

Make sure that variable associated to L1 is the same associated to the source AE channel to test

3. Place NoLink AE signal simulator close to collector static part (no distance between the parts is required). Make sure about correct connection between collector static part and TD card as indicated below (static part connection to BN card is irrelevant for testing purposes).




Note: TD card channels can be tested one at time.

4. Switch on the AE signal simulator and check that “Power ON” LED is ON.
   Dummy AE signal will be shown on the screen (Panel or HMI) in order to be compared with defined threshold.
   Check that dummy AE signal exceeds defined threshold.

| Test results | |
|---|---|
| Dummy AE signal exceeds preset threshold | Static part, extension cable and TD card are working correctly. Move the investigation to the rotating part. |
| Dummy AE signal does not exceed preset threshold | Static part or extension cable or TD card are not working correctly. Move the investigation to them. |

5. Once the test has been executed, restore saved backup (.bck) file indicated on step 1 (including “Work” and “Setup” parameters). Furthere information about restore operations are indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual.*
6. Make sure to enable again all automatic commands and signalling or connect again I/O connection to TD card (D1) or Profibus connection to MN card (K6) or Profinet connection to MN card (K3 and K4).

## 3.2. TD card tester (9DUM-TD0xx0yy0)

During test phase, TD card tester replaces the collector static part and allows to test all downstream side of static part (extension cables, TD card).

This device is able to generate known electric signal in order to simulate AE signal. On VMx5 software (versions released before March 2020) is necessary to manually set-up the system environment to compare measured known signals with defined threshold. With this method, simulators downstream components evaluation is possible.

Note: TD card channels can be tested one at time.
**Note:** Make sure to disable all automatic commands to the system and ignore all systems signalation during test phase or disconnect I/O connection from TD card (D1) or Profibus connection from MN card (K6) or Profinet connection from MN card (K3 and K4).

1. Perform full VMx5 system backup procedure as indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual* and save the file (.bck).

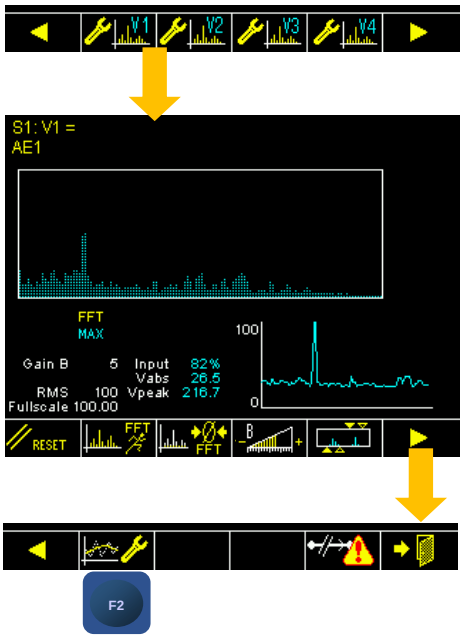
2. Set-up the test environment chosing alternatively:

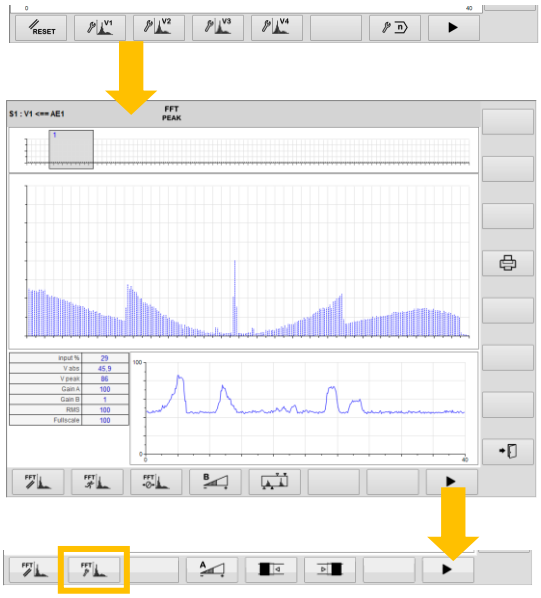
   a) Perform TD card restore procedure (work and setup parameters) as indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual* uploading proper .bck file stored on supplied USB sticker (make sure to correct restore VM25 or VM15, v11 or v12 .bck file). Then reboot the system.
   Correspondence with proper variable during test phase are listed in the table below:

| AE channel | Variable |
|---|---|
| *AE1* | V1 |
| *AE2* | V4 |
| *AE3* | V3 |
| *AE4* | V2 |

   Note: test environment has been created on part program 1, setup 1(if available).

   b) Manually set the parameters of current setup and current part-program .
   Access as “Installer” login level and follow the indications below to reach the parameter to set.
   Choose available variable (V1, V2, V3, V4) according with current part-program.



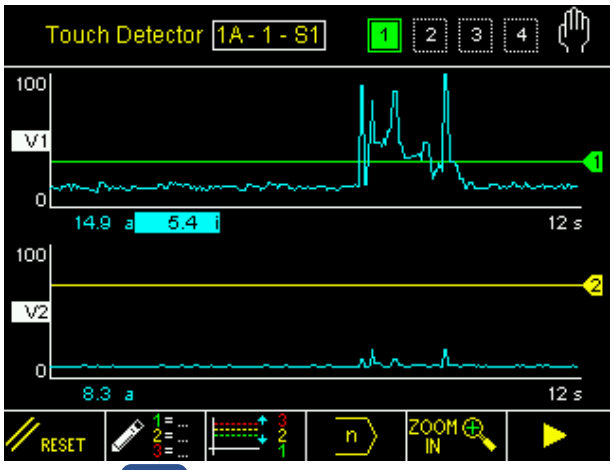



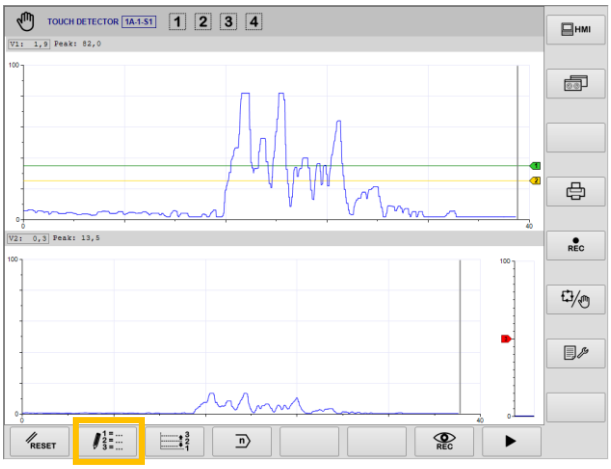
Parameters to set with relative values are listed in the table below:

| Parameter | Value |
|---|---|
| **Source** | It depends on AE channel to test |
| **Full-scale** | [100] |
| **RMS Filter** | [0] |
| **Analog filter bypass** | [OFF] |
| **No. of samples for HW RMS** | [0] |
| **Gain B** | [3] |
| **Window** | [0] |
| **Gain A** | [8] |
| **Digital Band Pass filter 1** | [OFF] |
| **Digital Band Pass filter 2** | [OFF] |

| Parameter | Value |
|---|---|
| **Analog High Pass filter** | [ON] |
| **Analog High Pass filter – cut-off freq.** | [1] |
| **Analog Band Pass filter** | [OFF] |
| **Analog Band Stop filter** | [ON] |
| **Analog Band Stop filter – lower freq.** | [100] |
| **Analog Band Stop filter – upper freq** | [952] |

It is also necessary to correctly set the formula of current part program as follow:



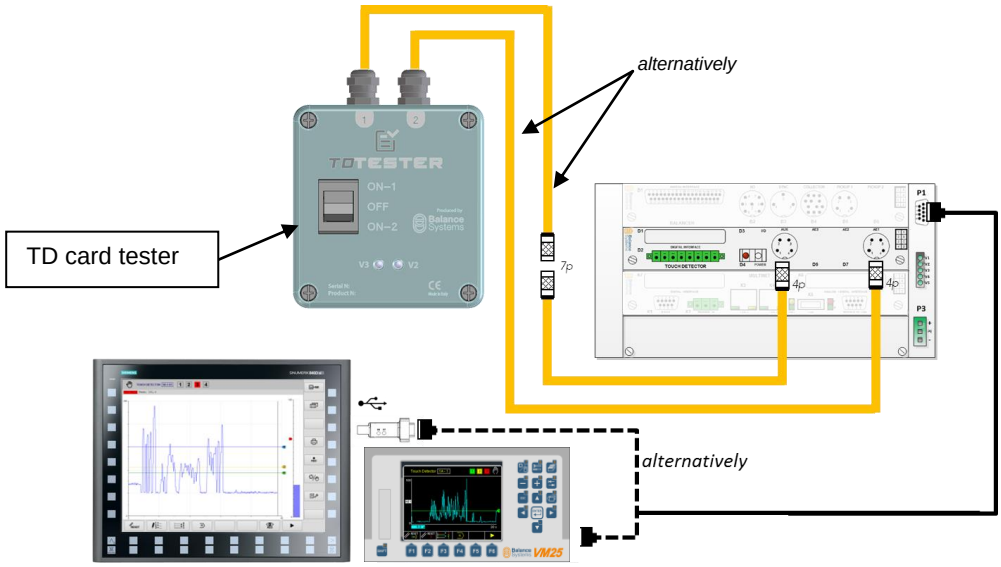



L1 = N a Vx > 30

Make sure that variable associated to L1 is the same associated to the source AE channel to test

3. Replace collector static part with TD card tester. It is possible to chose alternatively to:
   a) test selected AE input channel of TD card only, connecting 4-pole connector to TD card directly (switch pos. ON 2)
   b) test selected AE inpunt channel of TD card with related extension cable (7-4 pole) , connecting 7-pole connector to extension cable (switch pos. ON 1)

Note: switch-off the system before replacement




Note: TD card channels can be tested one at time.

4. Switch on the TD card tester:
   - Switch pos. ON 2 if TD card is directly connected to TD card (4-pole connector to TD card). This configuration allows to test AE channel of TD card only
   - Switch pos. ON 1 if TD card is connected to extension cable (7-4 pole). This configuration allows to test extension cable and AE channel of TD card

   Check that V2 and V3 LED are ON both.
   Dummy AE signal will be shown on the screen (Panel or HMI) in order to be compared with defined threshold.
   Check that dummy AE signal exceeds defined threshold.

| Test results | | |
|---|---|---|
| | Switch pos. ON 1 | Switch pos. ON 2 |
| Dummy AE signal exceeds preset threshold | Extension cable and TD card are working correctly. Move the investigation to the static part | TD card is working correctly. Move the investigation to extension cable and static part |
| Dummy AE signal does not exceed preset threshold | Extension cable or TD card are not working correctly. Connect TD tester to the function card (Switch pos. ON 2) to exclude card failure. If TD card has already been tested, move the investigation to extension cable and try to replace it with new one. | TD card is not working correctly. Restore original full backup and try again or change the function card |

Note: for simplicity, it is suggested to start the investigation connecting TD tester to TD card directly (Switch pos. ON 2).

5. Once the test has been executed, restore saved backup (.bck) file indicated on step 1 (including “Work” and “Setup” parameters). Furthere information about restore operations are indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual.*
6. Switch-off the system before tester disconnection and static part replacement
7. Make sure to enable again all automatic commands and signalling or connect again I/O connection to TD card (D1) or Profibus connection to MN card (K6) or Profinet connection to MN card (K3 and K4).

## 3.3. BN card tester (9DUM-BN0xx0yy0)

During test phase, BN card tester replaces the collector static part and allows to test all downstream side of static part (extension cables or BN card directly).

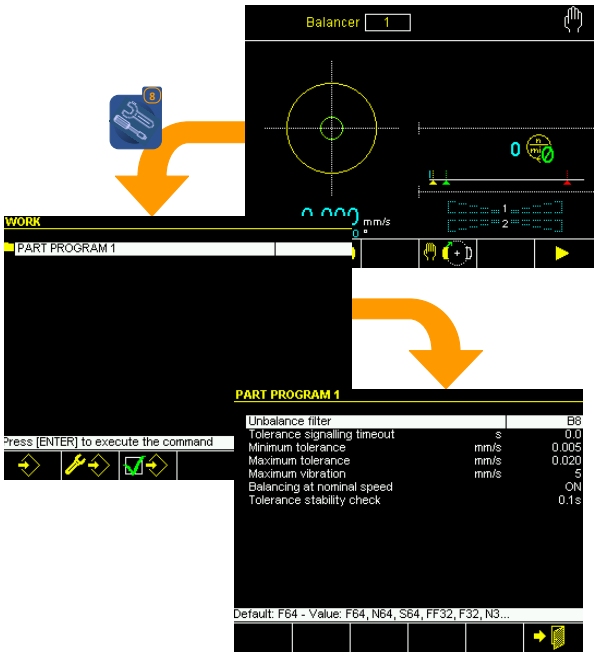
This device is able to generate known electric signal in order to simulate synchronism and vibration signals. On VMx5 software (versions released before March 2020) is necessary to manually set-up the system environment to compare measured known unbalance vector with defined tolerances. With this method, simulators downstream components evaluation is possible.

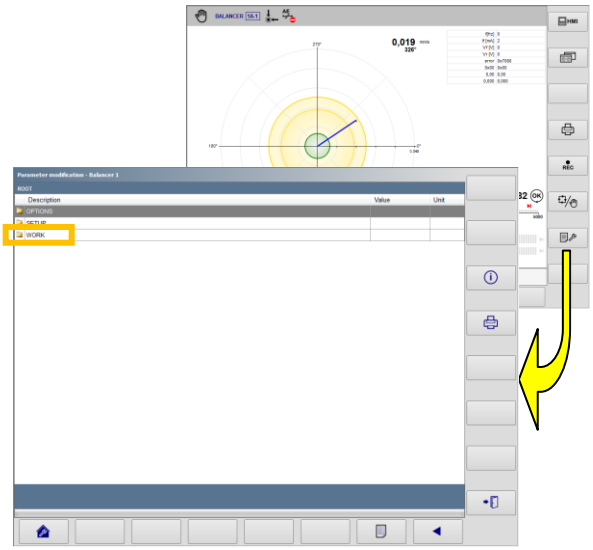
**Note:** Make sure to disable all automatic commands to the system and ignore all systems signalation during test phase or disconnect I/O connection from BN card (B1) or Profibus connection from MN card (K6) or Profinet connection from MN card (K3 and K4).

1. Perform full VMx5 system backup procedure as indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual* and save the file (.bck).
2. Set-up the test environment chosing alternatively:

   a) Perform BN card restore procedure (work and setup parameters) as indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual* uploading proper .bck file stored on supplied USB sticker (make sure to correct restore VM25 or VM15, v11 or v12 .bck file). Then reboot the system.
   Note: test environment has been created on part program 1 (if available).

   b) Manually set **WORK** parameters of current part-program .
   Access as “Installer” login level and follow the indications below to reach the parameter to set.



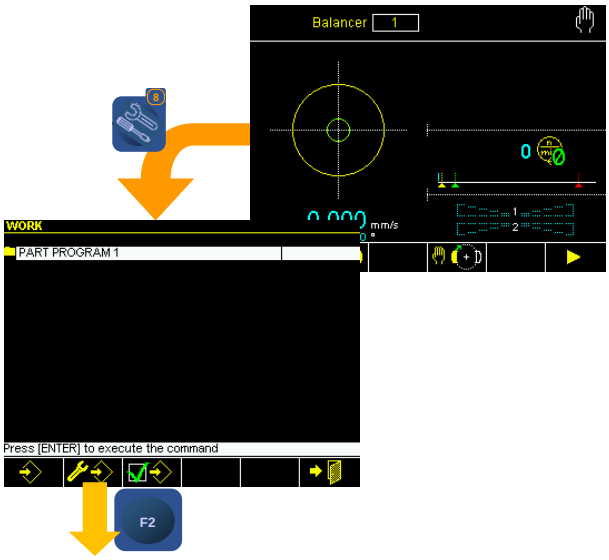



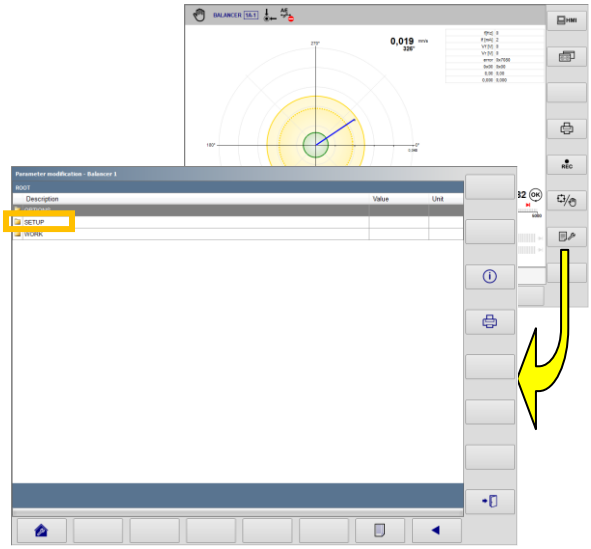
For each plane, parameters to set with relative values are listed in the table below

| Parameter | Value |
|---|---|
| **Unbalance filter** | **[F64]** |
| **Minimum tolerance [mm/s]** | **[7.0]** |
| **Maximum tolerance [mm/s]** | **[8.5]** |
| **Maximum vibration [mm/s]** | **[10]** |
| **Balancing at nominal speed** | **[OFF]** |
| **Pick-up 1 (B5) [%] *** | **[100] or [0]** |
| **Pick-up 2 (B6) [%] *** | **[100] or [0]** |

(*) these parameters are available if pick-up mixing has been activated only. Set “100” to Pick-up 1 (Pick-up 2) if BN tester 4-pole connector is physically connected to B5 (B6) and set “0” to Pick-up 2 (Pick-up 1).

It is also necessary to correctly set following **SETUP** parameters:



Inside “**Pick-up**” subfolder, according to BN card tester physical connection to B5 or B6 (Pick-up 1 or Pick-up 2) on BN card, please set:

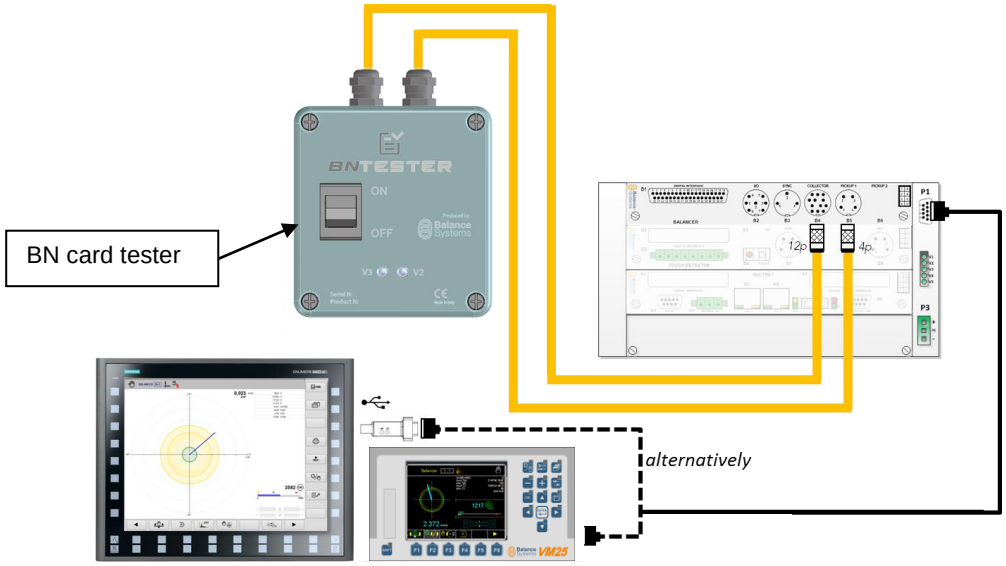
| Parameter | Value |
|---|---|
| **Sensitivity [mV/g]** | **[100]** |
| **Power supply source** | **[ICP]** |

Furthermore  Inside “**Rotation speed control**” subfolder, please set:

| Parameter | Value |
|---|---|
| **Synchronism source** | **[INTERNAL]** |
| **Syncronism limit for diagnostic [rpm]** | **[100]** |
| **Min rotation speed [rpm]** | **[9500]** |
| **Max rotation speed [rpm]** | **[10800]** |
| **Nominal rotation speed [rpm]** | **[9600]** |
| **RMS Filter** | **[0]** |

3. Replace collector static part with BN card tester connecting as indicated below:
   - 12-pole connector to BN card (B4)
   - 4-pole connector to BN card (B5 or B6)

   Note: switch-off the system before replacement




4. Switch on the BN card tester.
   Check that V2 and V3 LED are ON both.
   Dummy unbalance vector will be shown on the screen (Panel or HMI) in order to be compared with defined tolerances.
   Check that dummy unbalance vector is within defined tolerances.

| Test results | | |
|---|---|---|
| | BN tester connected to extension cable | BN tester connected to BN function card |
| Dummy unbalance vector is within preset tolerances | Extension cables and BN card are working correctly. Move the investigation to the collector static part | BN card is working correctly. Move the investigation to extension cable and collector static part |
| Dummy unbalance vector is not within preset tolerances | Extension cables or BN card are not working correctly. Connect BN tester to the function card to exclude card failure. If BN card has already been tested, move the investigation to extension cables and try to replace them with new ones. | BN card is not working correctly. Restore original full backup and try again or change the function card |

Note: for simplicity, it is suggested to start the investigation connecting BN tester to BN card directly.

5. Once the test has been executed, restore saved backup (.bck) file indicated on step 1 (including "Work" and "Setup" parameters). Furthere information about restore operations are indicated on *9UMxxX512-1200 yymmdd VMx5 Service manual.*
6. Switch-off the system before tester disconnection and static part replacement
7. Make sure to enable again all automatic commands and signalling or connect again I/O connection to BN card (B1) or Profibus connection to MN card (K6) or Profinet connection to MN card (K3 and K4).

# 4. Appendix

| Documents referred to in the text | | |
|---|---|---|
| **Name document** | **Paragraphs** | **Link** |
| Service | 3.1, 3.2, 3.3 | 9UMxxX512-1200 yymmdd VMx5 Service manual.pdf |

# NOTE

# NOTE

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