1. Amendment Record

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author</th>
<th>Amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>18/10/2019</td>
<td>P Rollings</td>
<td>Initial Issue</td>
</tr>
</tbody>
</table>

2. Introduction

A large transformer is usually immersed in a liquid dielectric that expands and contracts with changes of temperature under load. To maintain constant pressure in the tank, air is allowed to flow in and out of the conservator through a breather that removes moisture. The on-load tap changer is housed in a separate compartment with its own header tank and breather.

Breathers commonly use silica gel granules that can adsorb up to a third of their weight in water. The time to saturate will depend on the ambient humidity and temperature, the amount of desiccant relative to the total volume of insulating fluid and the depth of the load cycle. Hydrated silica gel can be regenerated by heating above 100°C for several hours.

To reduce maintenance costs, and to minimise the risk of saturated breathers allowing moisture to infiltrate the conservator, Energy Queensland Asset Lifecycle Management is retro-fitting MESSKO® MTraB® self-regenerating silica gel breathers to selected transformers and tap-changers. This “regen breather” has a moisture sensor and an intelligent controller that activates a heating element as required. When the breather is heated, water vapour is driven from the silica gel, condenses on the cool bottom element and drips out.

DANGER | Self-regenerating breathers are powered by 240V AC
An adhesive label shall be placed next to the unit signifying “DANGER 240V AC”.

CAUTION | The device gets very hot when it is regenerating the silica gel
There is a prominent hot surface warning symbol and message on the controller box: “ATTENTION Device is hot during heating process”

The regen breather is intended to be maintenance free. If the device malfunctions or loses supply, a normally-closed relay contact will raise a “REGEN BREATHER FAULTY” alarm in the SCADA system. A SCADA build is required to introduce this alarm when a regen breather is retrofitted.

NOTES | 1. The silica gel in the MTraB® is colourless irrespective of moisture content.
2. The MTraB® does not have an oil seal.

In conventional breathers, the gel is dosed with a chemical that changes colour when it becomes hydrated. The usual indicator chemicals have health and environmental risks. Conventional breathers also have an oil seal to shut out humidity when there is no air flow. The oil can contaminate the gel. A regen breather has a moisture sensor rather than a chemical indicator and does not need an oil seal because the cost of regenerating is so low.
3. Application

3.1. Controllers

<table>
<thead>
<tr>
<th>Controller</th>
<th>Logic</th>
<th>Recommended application</th>
</tr>
</thead>
<tbody>
<tr>
<td>α (alpha)</td>
<td>Heats when the desiccant is hydrated</td>
<td>On-load tap-changers</td>
</tr>
<tr>
<td>β (beta)</td>
<td>The controller learns the time windows when the transformer is exhaling. When the desiccant becomes hydrated, the heating cycle is initiated during one of these time windows.</td>
<td>Transformers with predictable cyclic loads</td>
</tr>
<tr>
<td>γ (gamma)</td>
<td>Applied only with the DB200G model, which has two silica gel canisters and an electric ball valve in the bifurcation. The controller blocks the air flow through each canister in turn while that canister is heated.</td>
<td>Transformers with unpredictable breathing behaviour, such as generator step-up transformers</td>
</tr>
</tbody>
</table>

3.2. Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Controller</th>
<th>Recommended application</th>
<th>Gel (kg)</th>
<th>Stock Code &amp; Class¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB100</td>
<td>α (alpha)</td>
<td>On-load tap-changers</td>
<td>1.1</td>
<td>22881 C</td>
</tr>
<tr>
<td>DB100T</td>
<td>β (beta)</td>
<td>Network Transformers ≤ 40MVA</td>
<td>1.1</td>
<td>22880 C</td>
</tr>
<tr>
<td>DB200T</td>
<td>β (beta)</td>
<td>Network Transformers 40 to 200MVA</td>
<td>2.2</td>
<td>24288 P</td>
</tr>
<tr>
<td>DB200D-T</td>
<td>β (beta)</td>
<td>Network Transformers &gt; 200MVA</td>
<td>2 x 2.2</td>
<td></td>
</tr>
<tr>
<td>DB200G</td>
<td>γ (gamma)</td>
<td>Generator Step-Up Transformers</td>
<td>2 x 2.2</td>
<td></td>
</tr>
</tbody>
</table>

3.3. Ordering Specifications for Energex

MESSKO® MTraB® version – see Models above.
Supply voltage
1. 230V ± 10%
2. Additional Overvoltage protection
The colour of the terminal box is RAL 7033 standard cement grey.
Cable glands are 3x M20x1.5
Analog Output is 4 – 20 mA
“Options” are
1. Data logger card, software application (CD) and USB cable
2. Test button

Earlier deliveries, with the standard control box, were found to be susceptible to overvoltage damage in EQL substations. The optional additional overvoltage protection is fitted to current orders. A kit (Stock Code 21899) is available to upgrade older units using the procedure Retrofitting the Overvoltage Protection Upgrade Kit, found later in this document.

The test button initiates a device self-test and checks the desiccant heating system.

¹ Stock Classes: C = Current, P = Purchase as required
Dehydrating Breather MESSKO® MTraB®

Dimensions for flange connection with DIN flange, RM flange or circular flange for 1/2” screws

1. Ø 100 / 3.94”
   - 19 / 0.75”
   - Ø 65 / 2.56”
   - Ø 150 / 5.91”
   - Ø 81 / 3.19”
   - Ø 25 / 0.894”

2. 45 / 1.77”
   - 8 / 0.31”
   - 2 x Ø 11 / 0.43”
   - R 22.5 / 0.89”

3. Ø 105 / 4.13”
   - Ø 75 / 2.95”
   - 4 x Ø 13.5 / 0.53”
   - Ø 8 / 0.31”

Figure 2: MTraB flange connections (customer-specific flanges by request)

1. DIN flange similar to DIN 42 962-3
2. RM flange in accordance with DIN 2558
3. Circular flange for 1/2” screws
4. Indications

These images show DB100 models. The DB200 is 50% longer.

The status LED lamps are on the left side of the controller box, and the test button is on the right side. The left hand image shows the optional cable protection. (The lower cable is for anti-icing, which is not required in Queensland conditions.)

The status LEDs, from top to bottom, indicate

- Operating (green)
- Regeneration heater on (yellow)
- Device error (red)

Signals available for remote indications are a changeover contact for indicating that regeneration is in progress, the normally-closed contact for device error, and an analogue signal for temperature in the pipe nozzle, -40...+80°C. EQL will wire only the device error signal into the SCADA system.
5. Dimensions

![MTraB DB100/DB200 dimensions with additional fastening points (optional)](image)

**MTraB DB100/DB200 dimensions with additional fastening points (optional)**

**Figure 3: MTraB DB100/DB200 with additional fastening points on the side**

1. Additional fastening points on the side (optional)
2. M8x20 DIN 933 hex head bolt

<table>
<thead>
<tr>
<th>MTraB dimensions with flange</th>
<th>Model type DB100</th>
<th>Model type DB200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L (mm / 0.05”)</td>
<td>H* (mm / 0.05”)</td>
</tr>
<tr>
<td>DIN flange</td>
<td>459 / 18.06”</td>
<td>634 / 24.96”</td>
</tr>
<tr>
<td>RM flange</td>
<td>463 / 18.22”</td>
<td>638 / 25.12”</td>
</tr>
<tr>
<td>1/2” screws</td>
<td>459 / 18.06”</td>
<td>634 / 24.96”</td>
</tr>
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MESSKO® MTraB®

TDS787543-00 EN

Messko GmbH 2018

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6. Controller box

Figure 1: MTraB connection box

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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regeneration signaling relay (contacts 6, 7, 8)</td>
<td>2</td>
<td>Device error signaling relay (fail safe; contacts 4, 5)</td>
<td>3</td>
<td>Supply voltage connection (contacts 1, 2, 3, 2a only for optional over-voltage protection)</td>
<td>4</td>
<td>Microfuse for control electronics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spare fuse (250 V/1 A/Sx20/fast acting)</td>
<td>6</td>
<td>Device error – red LED (outdoors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Regeneration heater – yellow LED (indoors)</td>
<td>8</td>
<td>Operating status – green LED (outdoors)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Connection box anti-condensation heater – yellow LED (indoors)</td>
<td>10</td>
<td>Filter heater – yellow LED (indoors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Data interface USB jack, type B (for data loggers)</td>
<td>12</td>
<td>Test button (optional; only for AC variant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Data logger (optional)</td>
<td>14</td>
<td>Analog output (contacts 9+, 10−) and shield (contact 11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>15</td>
<td>Grounding connection between housing and cover</td>
<td>16</td>
<td>Cable screw connection for M20x1.5 or 1/2&quot;-14NPT supply lines</td>
<td></td>
<td></td>
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TD198 - Self-regenerating silica gel breathers

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7. Retrofitting the Overvoltage Protection Upgrade Kit

<table>
<thead>
<tr>
<th>DANGER</th>
<th>1. Isolate the MTraB from the power before opening the controller box.</th>
</tr>
</thead>
</table>

2. Open the controller box, disconnect the green/yellow earth cable from the cover, and remove the cover.
3. Disconnect the power terminals (1, 2 and 3), loosen the sleeve nut, pull the power cable out and close off the cable gland with the supplied plug. Leave the indication cable as found.
4. Unscrew the sleeve nut on the supplied replacement housing cover, insert and terminate the power cable to the N,L,PE terminal block: neutral, active, and earth respectively.
5. Terminate the green/yellow earth cable to the earthing screw in the lower left of the new cover.
6. Remove the terminal cover from the L’ (2a) terminal in the controller box.
7. Terminate the connection cable from the new cover to the terminals numbered 1, 2, 2a and 3 PE to PE (1), L to L (2), L’ to L’ (2a), N to N (3)

<table>
<thead>
<tr>
<th>NOTE</th>
<th>Be careful not to reverse L and L’</th>
</tr>
</thead>
</table>

8. Remove the 1A Fast-acting Microfuse from above the power terminals and cover the fuse holder with the supplied cap, labelled “Not Active”
9. Screw the new cover to the controller box.
10. Restore the power supply. Check the LED status indicators are

- Green
- Off, or yellow if the regenerating heater is on
- Off
8. Sources of further Information

For further information:

- Search the Maschinenfabrik Reinhausen website www.reinhausen.com for MTraB
- Please contact Peter Rollings, (07) 3664 7432, email peter.rollings@energyq.com.au