Congratulations on your purchase of a Netherlocks valve interlock!

Netherlocks valve interlocks are manufactured with care and are renowned for their high quality. They do not need greasing, neither do parts have to be replaced.

For support please contact support@netherlocks.com or call +31 (0)172 471 339. We will assist you in the best possible way.

The Netherlocks team
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How to use the Quick Fix Guide

Welcome to the Netherlocks Quick Fix Guide, your reference to valve interlocks! With this guide, you will be able to:

> Quickly understand the basic functionality of valve interlocks
> Identify different valve interlock types, their components and related products
> Operate valve interlocks
> Reset valve interlocks
> Quickly solve simple issues related to valve interlocks

The final section of this guide explains how Netherlocks can support you maintaining your valve interlocks, by offering maintenance programs, site services and training.

The Quick Fix Guide offers 4 colour coded sections:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark Green</td>
<td>Basic principles</td>
</tr>
<tr>
<td>Dark Grey</td>
<td>Operate and reset</td>
</tr>
<tr>
<td>Light Grey</td>
<td>Troubleshooting</td>
</tr>
<tr>
<td>Light Green</td>
<td>Support programs</td>
</tr>
</tbody>
</table>

Each section has its own colour for easy navigation. If you need more support, please do not hesitate to contact us. Our dedicated engineers are specialists in the field of valve interlocks and can directly provide advice and support.
How are valve interlocks used?

The main functions of valve interlocks are to:
> Enforce a predefined valve operating sequence
  - Create a safer working environment
  - Save costs and prevent production spill or loss due to incorrect switchovers
> Guide operators safely through strict work procedures

Some common applications for valve interlocks are:

<table>
<thead>
<tr>
<th><strong>Pressure Safety Valves</strong></th>
<th>To guarantee that only one relief valve can be offline/in maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pig launching and receiving</strong></td>
<td>To guarantee the closure door can only be opened when the vessel is depressurized, free from toxic gasses and isolated</td>
</tr>
<tr>
<td><strong>Decoking</strong></td>
<td>To guarantee safe change over from cracking to de-coking of the furnace</td>
</tr>
<tr>
<td><strong>Inert gas systems</strong></td>
<td>To prevent that inlet and outlet of tank are closed at the same time</td>
</tr>
<tr>
<td><strong>Pump startup</strong></td>
<td>To guarantee that during startup suction valve is open</td>
</tr>
</tbody>
</table>
Valve interlocks are permanently mounted to the valve and guide the operator through a predefined sequence with unique keys for each step.

<table>
<thead>
<tr>
<th><strong>Flare lines</strong></th>
<th>To guarantee that there is always an open path to the flare</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boiler blow-down</strong></td>
<td>To prevent that the drain and vent are opened at the same time</td>
</tr>
<tr>
<td><strong>2 out of 3</strong></td>
<td>To guarantee that always two out of three instruments (i.e. pressure gauge, level gauge) are online</td>
</tr>
<tr>
<td><strong>Chemical dosing</strong></td>
<td>To guarantee that the pot is isolated before filling</td>
</tr>
<tr>
<td><strong>Amine absorber</strong></td>
<td>To guarantee that the drain can only be opened when the vessel is isolated</td>
</tr>
</tbody>
</table>
### Basic principles of valve interlocking

<table>
<thead>
<tr>
<th>Key cabinet</th>
<th>Lock A</th>
<th>Lock B</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Operable" /></td>
<td><img src="image" alt="Locked closed" /></td>
<td>Green start key from key cabinet to lock A</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Locked open" /></td>
<td><img src="image" alt="Operable" /></td>
<td>Yellow switch key from lock A to lock B</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Locked open" /></td>
<td><img src="image" alt="Locked open" /></td>
<td>Red end key from lock B to key cabinet</td>
</tr>
</tbody>
</table>
Basic principles

> Green start key is inside the key cabinet in its dedicated position (green = normal operation)
> Yellow keys in locks in the field are trapped and designated to stay in the field
> A key only fits in lock with the same key code
> Insert key to unlock, operate and after operating remove the other key
> After last valve operation, insert end key into dedicated position in the key cabinet.
Valve interlock components

NDL exploded view

1
2
3
4
5
6
7
8
Ninety degree lock, for all types of lever operated valves.

Legend
1. AISI 431 sliding lever for optimum flexibility
2. AISI 316 body
3. AISI 316 Adaptor - purpose machined - with 4 keyways
4. Linear key for operator friendly use
5. Key slots protected with self sealing weather strips
6. Mounting plate to connect bracket to interlock
7. AISI 316 bracket - purpose machined
8. Fixing means
Valve interlock components

NDL GA drawing

Key code & Serial Nr. engraved on AISI 316 tag plate, permanently fitted to locking device
**Dimensions**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>133</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>115</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>107</td>
</tr>
<tr>
<td>Mass of lock (kg)*</td>
<td>2.9</td>
</tr>
<tr>
<td>Lever sizes (mm)</td>
<td>Different lever sizes from 230 to 730</td>
</tr>
</tbody>
</table>

* Without bracket- and adaptor

**Legend**

1. Lever
2. Tube NDL
3. Lock body NDL
4. Operating key
Valve interlock components

MRL exploded view
Multi rotation lock, for all types of handwheel and gear operated valves.

Legend
1. CS powder coated hand wheel / optional AISI 316
2. AISI 316 body
3. Original nut will be used if possible
4. AISI 316 Adaptor - purpose machined - with 4 keyways
5. Easy to set and reset counters behind counter cover plate
6. Linear key
7. Key slots protected with self sealing weather strips
8. Mounting plate to connect bracket to interlock
9. AISI 316 bracket - purpose machined
Valve interlock components

MRL on gearbox exploded view
Legend

1. CS powder coated hand wheel
2. AISI 316 body
3. AISI 316 adaptor - purpose machined - with 4 keyways
4. Easy to set and reset counters behind counter cover plate
5. Linear key
6. Key slots protected with self sealing weather strips
7. Mounting plate to connect bracket to interlock
8. AISI 316 purpose machined bracket
Valve interlock components

MRL GA drawing

Size of hand wheel, see MRL data sheet

Key code & serial number engraved on AISI 316 tag plate, permanently fitted to locking device
### Dimensions MRL-S (small type)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>133</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>115</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>82</td>
</tr>
<tr>
<td>Mass of lock (kg)*</td>
<td>3</td>
</tr>
<tr>
<td>Handwheel sizes</td>
<td>Different sizes between 200 and 700</td>
</tr>
<tr>
<td>Max. valve spindle diameter (mm)</td>
<td>26</td>
</tr>
</tbody>
</table>

* Without bracket, adaptor and hand wheel

### Dimensions MRL-L (Large type)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>152</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>144</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>100</td>
</tr>
<tr>
<td>Mass of lock (kg)*</td>
<td>4.7</td>
</tr>
<tr>
<td>Handwheel sizes</td>
<td>Different sizes between 380 and 700</td>
</tr>
<tr>
<td>Max. valve spindle diameter (mm)</td>
<td>68</td>
</tr>
</tbody>
</table>

* Without bracket, adaptor and hand wheel

### Legend
1. Handwheel
2. Tube
3. Lock body
4. Adjustment cover
5. Tamper proof M6 screw
6. Operating key
Interlock tag plates

1. Key code open key
2. Key code close key
3. System tag number
4. Serial number (netherlocks-year.serialnumber)
Key tag plates

1. Green tag indicates ‘standard or preferred’ situation
2. Red tag indicates ‘in maintenance’ or non-standard situation
3. Yellow tag indicates ‘switching in progress’

Netherlocks strongly recommends the use of red, yellow and green tags, according the ‘traffic light principle’. Still, tag plates can be delivered in alternative colors, following our customers specifications.
Key cabinet tag plates

The tagging in a key cabinet is only visible when keys are out, indicating that the system is being operated.

Notes
> Tag plate texts and colors are specified by the customer
How to operate valve interlocks

1. Make sure that the code on the key is the same as the code on the lock
2. To enter key correctly, see engraving on the side of the lock for correct positioning
3. Fully insert the key in the key slot
   > Fully operate the valve
   > Remove other key

Note
> Single locking devices only have 1 key (open or closed)
How to reset a MRL valve interlock

Resetting is required when the end stops of a valve change, due to wear or pollution inside the valve.

> On both sides of the MRL lock there are slotted holes where the counting mechanism of the lock can be set for any valve or gearbox up to 180 turns

> Above 180 turns a special valve interlock (x-counter) has to be installed which can handle 800 turns by default

> For more than 800 turns, a customized version of the x-counter is available
Reset procedure (open side)

1. Ensure key is fully inserted, and leave it in
   2. Confirm both keys are entered

2. Remove the counter cover on the open side (right)

Notes

> To set the MRL, the valve must be fully operable
> An allen key M3 and a T30 Resistorx key are needed to reset
Slowly turn the valve back towards its closed position until both set screws are visible (on the open side).

If only one or no set screw appears, please contact Netherlocks or your local interlock partner.

Untighten both set screws.

Fully open the valve.

Tighten both set screws.

Re-install the counter cover.

Remove the open key, valve is locked open.
Reset procedure (close side)

1. Ensure key is fully inserted, and leave it in
   > Confirm both keys are entered
2. Remove the counter cover on the close side (left)
> Slowly turn the valve back towards its open position until both set screws are visible (on the closed side)
> If only one or no set screw appears, please contact Netherlocks or your local interlock partner
> Untighten both set screws
> Fully close the valve
> Tighten both set screws

> Re-install the counter cover
> Remove the close key, valve is locked closed
Q-cards - Commissioning keys

Functionality

- Q-cards allow free operation of an interlock for commissioning and installation purposes.
- Q-cards are dedicated commissioning keys that are inserted in an interlock during production.
- They are specifically designed for one time use, to avoid abuse of the Q-cards after removal.
- No need for master keys or spare keys during installation and testing, since these could jeopardize the plant safety in a later stage.
How to remove a Q-card

1. Fully close valve
2. Remove temporary plastic cover on the close side
3. Ensure set screws are aligned and flush
4. Tighten grub screws
> Now remove the Q-Card

> Insert the correct operating key (cross checking lock tag and code on key)

> Place counter cover

> Fully open valve

> Repeat steps 2 to 7 for the open side of the lock
Troubleshooting valve interlocks

Key stuck (key cannot be removed)

1. Check if you are considering (removing) the correct key
   a. Valve open, then right key should be removed
   b. Valve closed, then left key should be removed

2. Check if the valve is fully operated, key is only removed when valve is fully open or closed

3. Check setting; remove setting counter cover from the side where the key is stuck

4. If two set screws are not inline, flush and directly visible, the lock has passed or not reached its setting and needs to be reset (see reset procedure)

5. After reset, remove key
Key does not fit (key cannot be inserted)

1. Check if key is being inserted in the right orientation (not upside down), see key engraving on the side of the lock body for correct positioning

2. Check if you have the correct key, by comparing the engraved key code with the code of the lock key position

   > Check if anything is blocking the key entrance or if key is damaged

   > If two set screws are not inline please contact Netherlocks or your local interlock partner
Key lost

1. Use spare key, master key or group master key to (temporarily) replace the lost key (a group master key is a master key for only part of the plant)
2. Order a replacement key
   - Lookup interlock serial number on lock tag plate
3. Check key code of missing key

Netherlocks keeps track of all lock serial numbers and corresponding key codes. Based on the lock serial number and key code, new keys can be manufactured and shipped.

(support@netherlocks.com, phone: +31 (0)172 471 339)
Valve is replaced

> Check if the new host valve is the same type & size as the previous valve (see ‘valve interlock components’ for an explanation on interlock parts)
> Check whether the topwork dimensions of the valve are the same. Check fill-in sheets on netherlocks.com/support
> If the valve is the same type and size, the lock body can be re-used
> If the valve is another type and/or size, contact Netherlocks or your local interlock partner to determine whether the same lock body can be re-used
> If topwork is equal to the old valve, the bracket and adaptor can be re-used
> If topwork is not equal to the old valve, order a new mounting set, based on the new topwork dimensions

Note

> Lever operated valves require a NDL. Hand wheel and gearbox operated valves require a MRL. When an interlocked, lever operated valve gets equipped with a gearbox, a new interlock is required.
With a various team of service engineers and a global network of certified service partners Netherlocks offers various support programs:

**Installed base support**

a. **Single maintenance programs:**
Advantages: maximization of interlock components and system lifetime, increase process uptime, minimize last minute repairs, compliance in regards to company and/or regulatory safety rules, ensure efficient execution of maintenance.

Output: report including the system status and repair advice.
> Survey
- Visual inspection of locks and cabinets (general condition, missing locks/keys, damage, tagging)
- Every 1-3 years depending on criticality of the system

> Functional check
- Visual inspection of locks and cabinets (see Survey)
- Functionality test of locks and sequences (includes resetting of locks if necessary)
- Every 1-3 years depending on criticality of the system

> Internal inspection
- Removal and opening of locks, inspection and cleaning of lock internals (when locks are exposed for a period of time to severe climates or fouling environments)
- Every 5-10 years depending on environment (normally only 10-20% of the locks is done in order to assess the overall health condition of the system)

b. Emergency call out and standby contracts:
Securing response times for on site interventions.

c. Multi year agreements:
Combination of different maintenance programs (intervals adjustable to requirements) and/or fixed response times for emergencies.
Extra advantages: keep system up to date at all times, full after-care.

d. Troubleshooting:
Resolving technical issues and repairing locks, assuring the best possible solution.
e. Measurement and installation:
Collection of valve topwork details, designing the right solution for an up to date system, installation of new locks.

Project Support

a. Measurement:
Accurate collection of valve topwork details, to ensure optimal fit of valve interlock mounting kits.
b. Installation and commissioning:
Installation of locks at the customers production site, setting and ensuring the sequence is according to the agreed specifications and functionality. A Netherlocks commissioning report per system is issued.
c. Supervision:
A Netherlocks service engineer will work with the customers installation team in order to ensure installation and commissioning at the highest quality levels. A Netherlocks commissioning report per system is issued.

Knowledge Support

Several training programs are offered at an on-site location or at the Netherlocks facilities in the Netherlands.
a. Training program end-user:
   > Maintenance training:
      Learn about basic interlock functionality, installation, setting and troubleshooting.
   > Operations training:
      Learn about Interlock functionality, operation skills (sequences, key operation, etc.) and setting.

b. Training program contractor – Installation:
   Learn about basic interlock functionality, installation and setting.

c. Advanced training program for agents and certified service partners
Support
netherlocks.com/support

Instruction videos
youtube.com/netherlocksproducts

Interlock sequence information
netherlocks.com/sequence-book
Browse through the many sequence designs that we collected in the past 20+ years!

Contact us
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support@netherlocks.com

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