Logitech Electronics Limited

2000 MKII SERIES™

Timers

Model 2000S

User Guide

Contents

Specification

Display	6 decade and sign 7-segment red LED, 10mm high
Decimal point	Programmable from front panel
Control inputs	Start, Stop and Reset
	Requires sink to 0V of 220Ω maximum
	Minimum duration of control signal is 0.3ms
Control Outputs	Alarm 1 and Alarm 2 (Model 2000AS only)
	Open Collector 200mA 60V maximum
	DC Voltage 10V to 12V nominal unregulated @100mA
Scaling and Offset	(+/-) 0.00001 to 999999, programmable via front panel, retained in non-volatile memory
Connections	Screw terminals on rear panel.

Power requirement

AC	Factory set to 115V or 230V a.c. 50/60 Hz, loading 3VA.
DC	Mains Timers can also be powered by providing 10V to 15V DC @ 300mA max via the 10V terminal (refer to **WARNING** on page 11)
	Alternatively, if specified at time of order, they can be configured to operate from 24V DC only.

Temperature range

Operating	0°C to +50°C
Storage	-20°C to +80°C
Dimensions	96 x 48 x 113mm (panel cut-out 92 x 43mm).
Weight	500g (standard mains supply version)

General Description

The 2000S and 2000AS MKII SERIES™ Timers are versatile six decade (plus sign), fully programmable digital timers with a large 10mm led display and based on the industry standard 80C51 series architecture microprocessor.

They are built into half DIN (96 mm x 48 mm) panel mounting housings and can be supplied to operate on 115V or 230V AC, or 24V DC power supplies (see Transformer connections on page 5).

The circuitry is protected against mains-borne interference offering excellent noise immunity for maximum reliability.

The integral scaling factor allows conversion of the time period to engineering units such as mm or litres.

Independent positioning of the decimal point in the resultant display gives maximum flexibility.

The 2000AS has the additionally facility of two independent alarm output settings.

2000 MKII SERIES™ Timers are available with several factory fitted options which must be specified when ordering - see Specification section for details.

Additionally, **Logitech** will customise the programmed operating modes of these Timers to suit specialised applications.

Many variations on the standard software have been developed - please contact the Sales Office if this service is required.

Note:

Two versions of 2000 MKII SERIES™ instruments are available - either with a **full** switch set accessible externally on the front panel, or with only a **single** function switch (**FUNC**) accessible unless the bezel and front panel are temporarily removed.

The following setting up instructions assume the front panel has been removed if using a **single** switch version.

Safety Information for EU Users

WARNING This instrument must be earthed when powered from a mains supply (see also Mains Earth on page 8). Refer to the rating label for the pre-set voltage and ensure that the instrument voltage corresponds to the intended supply voltage.

Important: The wires in the power lead fitted to mains instruments are coloured in accordance with the following code:

<div align="center">

Green and Yellow . . . . Earth

Blue . . . . Neutral

Brown . . . . Live

</div>

As the colours of the supply lead fitted to mains supply instruments may not correspond with the coloured markings identifying the terminals in your plug, connections should be made as follows:

- Connect the green and yellow wire to the terminal marked with the letter E or identified with the ⏚ (earth) symbol.
- Connect the blue wire to the terminal marked with the letter N or coloured black.
- Connect the brown wire to the terminal marked with the letter L or coloured red.

The mains supply to this instrument must be protected with a 1 Amp fuse.

Transformer Connections

2000 MKII SERIES™ instruments for use on mains power can operate on either a 230V or 115V 50/60Hz AC supply.

Instruments are factory pre-set to operate from the mains voltage specified at time of ordering.

If, for any reason, the user needs to change the mains operating voltage the following procedure must be adhered to:

1. Disconnect the Mains Supply.

2. Gently prise off the front panel bezel surround and allow the front panel to fall forward and out.

3. Remove the two nuts at the rear of the case, then push the instrument out through the case front.

4. Pads which select the operating voltage are located on the underside of the printed circuit board. The existing link(s) should be removed and new link(s) should be soldered across the appropriate pads, and the instrument reassembled (one link is used for 230V AC, two links are needed for 115V AC).
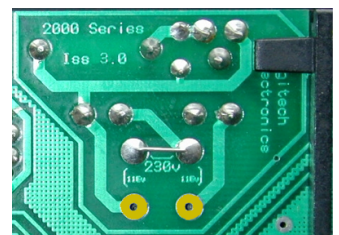
Switches and Connections

RUN/SET Switch

This switch is located in the top right hand corner of the Front Panel.

When the instrument is in **RUN** mode the Timer will display the measured signal.

Pressing this switch once changes the Timer to the **SET** mode and activates the **DP**, **0–9** and the **±** (polarity) switches (see the section Setting a Scaling Factor on page 8).

FUNCTION (FUNC) Switch

This is located directly below the **RUN/SET** switch and is used when it is required to observe or set the programmable parameters (see Setting a Scaling Factor on page 8). Pressing the **FUNC** switch steps through the parameters in the following sequence:

1.	**SCALE**	Scaling Factor	
2.	**OFFSET**		
3.	**AL 1**	Low Alarm	**Model 2000AS** only
4.	**AL 2**	High Alarm	**Model 2000AS** only

If the **RUN/SET** switch is in the **RUN** mode, and the instrument is displaying a measured value, a single depression of the **FUNC** switch will step the display automatically through all the programmed parameters at a pre-determined rate of approximately one per second. On completion of this cycle the display will return to showing the measured value.

DP (Decimal Point) Switch

This is located under the **FUNC** switch and is used to set the position of the decimal point as required. A single depression of the switch will move the decimal point one decade. Holding the switch depressed will cause the point to move in decade steps from right to left at a pre-determined rate.

This switch is only active when setting either the Scaling Factor or the Offset (the DP position in the normal display)

0–9 Switch

Located under each decade, these switches are used to set the value of all programmable parameters. Each depression increments the display one digit. Holding the switch depressed steps the display through **0** to **9** at a pre-determined rate.

+/- Switch

Located at the lower left hand corner of the front panel, this switch selects negative values when required by displaying a negative sign. No sign is displayed for + (positive) values.

Rear Panel Terminals

1	AL1	LOW Alarm (Open Collector 200mA 60V max.) Model 2000AS only
2	AL2	HIGH Alarm (Open Collector 200mA 60V max.) Model 2000AS only
3	0V	Common
4	⏚	Mains Earth
5	10V	+10V d.c. (unregulated) @ 80mA
6	RST	Reset Alarm (if Latching Alarm is specified)
7	STP	Stop
8	GO	Start
9	0V	Common
10		Not used
11	0V	Common
12		Not used

Alarm Outputs

The LOW alarm (AL1) will be activated when the value shown on the display is equal to, or lower than, the value programmed into memory. The HIGH alarm (AL2) operates on a value equal to, or higher than, the programmed value.

The alarm outputs automatically reset when the value shown on the display returns to a "no alarm" value.

The 2000AS can be supplied with a latching facility for the alarm outputs (factory fitted option that must be requested at time of ordering). Resetting the outputs is then performed by grounding terminal 6 (RST) on the Rear Panel.

Mains Earth

2000 MKII SERIES™ Timers are supplied with a three core mains cable. The earth lead from this cable is connected to terminal 4 on the Rear Panel terminal block. For most applications this Earth terminal should be linked to COMMON terminal 3 (0V) - see also Safety Information for EU Users on page 5 and Electromagnetic Precautions on page 13.

Exceptions to this are if the COMMON is connected to Earth elsewhere in the system (care must be taken to avoid Earth loops); or it is found that the mains earth is of poor quality; or when it is essential that the signal input or the analogue output of the instrument is floating.

Programming the Instrument

Calculating a Scaling Factor

The scaling factor in the 2000S or 2000AS is set as the number of milliseconds per displayed unit - ignoring the decimal point in the display.

For example, if for each fifteen (15) milliseconds of time you want the display to increment once, the scaling factor should be set to fifteen (15). Normally the scaling factor will be set to 1 to display milliseconds, 1000 to display seconds, 60,000 to display minutes or 360,000 to display tenths of hours.

The function is   where **D** is the displayed value, **x** is the total number of milliseconds and **s** is the scaling factor. $D = x/s$

Programming a New Instrument

Setting a Scaling Factor

Unless requested otherwise, instruments are normally supplied from the factory with all settings programmed to zero. Since operation of the unit without a preset scaling factor is not possible, on power up for the first time the display will show **SET .... SCALE ....0** (**....**signifies a one second delay before the display changes).

The digits can be changed by pressing the buttons beneath each decade. The position of the decimal point is changed by pressing the bottom right hand button to step to the position required.

A *negative* scaling factor, which causes the display to count down — as used for timeout applications — can be set by pressing the leftmost switch (+/-). When the required values have been programmed in, the instrument is put into the **RUN** mode by pressing the **RUN/SET** switch once.

After a scaling factor has been set, *and* the instrument has been put into **RUN** mode, the settings are retained in memory upon power down.   When power is reinstated the instrument will immediately be ready for operation without need for a reset command.

Using the OFFSET facility (setting the decimal point in the display)

After setting the scaling factor, if the function button **FUNC** is pressed the display will show **OFFSET** for 1 second followed by the value contained in memory.

The digits and decimal point position are altered as above and the position set for the decimal point is the position of the decimal point in the final display. If a non-zero offset value is entered then this value will be loaded into the display before timing commences.

This feature is most useful for timeout applications when a negative scaling factor is entered which causes the display to count down. It may also be used whenever it is required to add or

subtract a constant from the timed interval to account for mechanical delays in other parts of the system.

Setting the ALARMS - Model 2000AS only

After setting the **OFFSET,** if the function button **FUNC** is pressed once again the display will show **AL 1** for 1 second followed by the **ALARM 1** value contained in memory. The digits are set as before.

Pressing the **FUNC** button once again causes the display to change to **AL 2** for 1 second and then show the **ALARM 2** value contained in memory.

In operation, when the Timer display reaches the set values then the corresponding output **AL1** or **AL2** on the rear terminal block will become active.

Reprogramming an Instrument

To access the **SET** mode from the **RUN** mode when a scaling factor has already been set press the **RUN/SET** button once.   The display will show **SET .… SCALE .…** and then show the scaling factor which is currently contained in memory. The digits can then be changed by pressing the buttons beneath each decade as for an un-programmed instrument.

Operation

(If the unit is in **SET** mode, the **RUN/SET** button should be pressed once to toggle to the **RUN** mode).

The display will indicate **RUN** for 1 second and will then show zero until the count starts.

<div align="center">NOTE: Entering the SET mode causes the time period to be reset.</div>

The display will be incremented or decremented whenever the number of milliseconds, as set for the scaling factor, are counted.

The display can be reset to zero (**0**), or to the value as entered for **OFFSET**, at any time by connecting the **RESET** (**RST**) input on the back panel to 0V (see Fig. 2). Alternatively, if the **RESET** input is permanently linked to 0v then the **FUNC** button on the front panel can be used as a reset.

The instrument will increment or decrement the displayed time until it has filled all the decades. After displaying **999999** or **-999999** the next time interval will cause the display to read **High**. If this situation arises the Timer must be reset before operation can continue.

Reset/Start/Stop

Timing is enabled upon switch-on or after a **RESET** (**RST**) signal has been applied. The Timer can be halted by connecting the **STOP** (**STP**) input to 0V and restarted by momentarily connecting the **START** (**GO**) input to 0V.

Output options

DC Analogue: 0–5V*, 0–20mA, and 4–20mA outputs

When Timers are fitted with any of these options the output is available via a Red (+ve) and a Black (-ve) socket on the Rear Panel.

The outputs are *proportional to the display reading and not the input signal.*

With the Timer in the **SET** mode, each depression of the **FUNC** switch will step through the parameters in the following sequence:

1.	**SCALE**				
2.	**OFFSET**				
3.	**AL 1**	(Low Alarm)			
4.	**AL 2**	(High Alarm)			
5.	**REF**	(0V)	(0V)	(0mA)	(4mA)
6.	**F.S.**	(1V)	(5V)	(20mA)	(20mA)

When using the outputs, values should be set in parameters 5 and 6 as appropriate.

The **REF** will probably be zero but it can be set to the lowest value normally expected.

The **Full Scale** (**FS**) value will depend on the Analogue Output Module specified when the instrument is ordered, the application and the range of display readings expected.

Note: The outputs are not affected when the Tachometer is in the **RUN** mode and the Function (**FUNC**) switch is used to observe the parameters 1 to 6.

* The maximum DC output voltage available with this option is +5V.

WARNING

2000 MKII SERIES™ instruments cannot normally be operated on an external DC supply when an optional Analogue Output Module is fitted. If it is necessary that an external DC supply is used, then the facility to do so should be requested when discussing the specification of the instrument with our Sales Office and it *must* be specified on the purchase order.
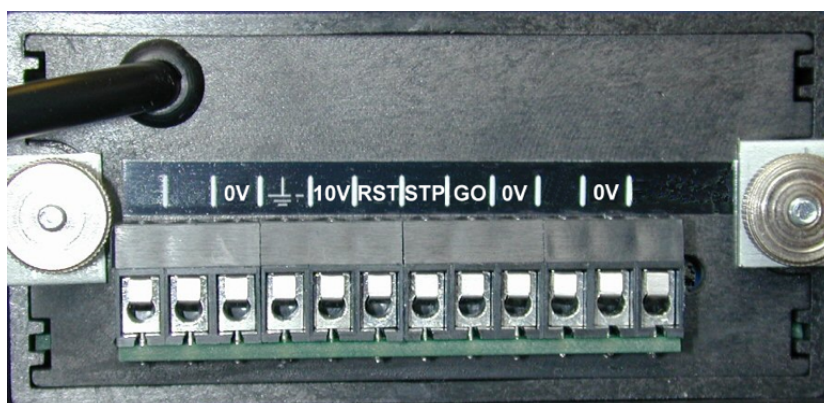
Diagrams

Front Panel Layout
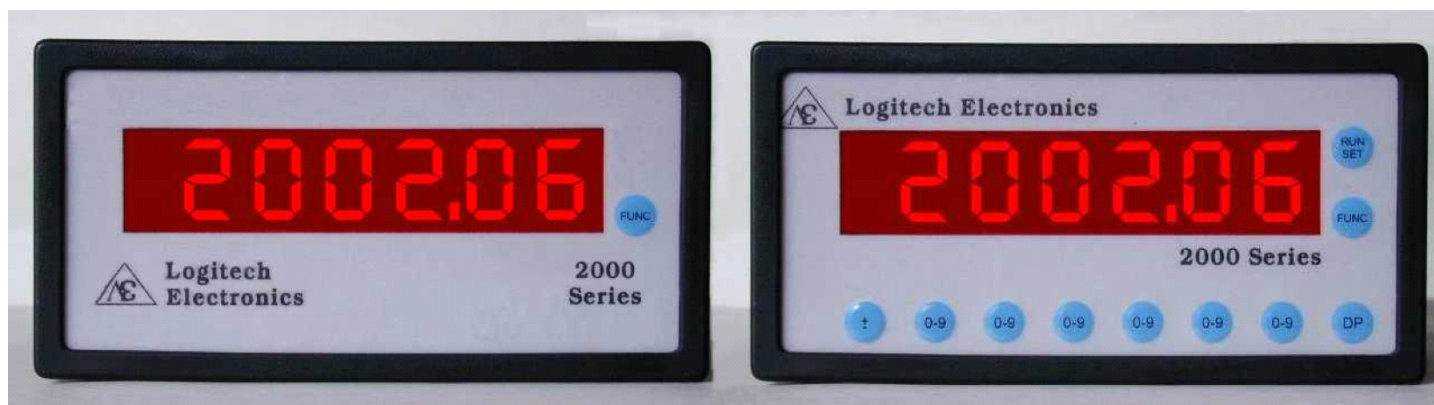
Note: On instruments with the SINGLE switch set option
only the FUNC switch is accessible unless the bezel and front panel are removed
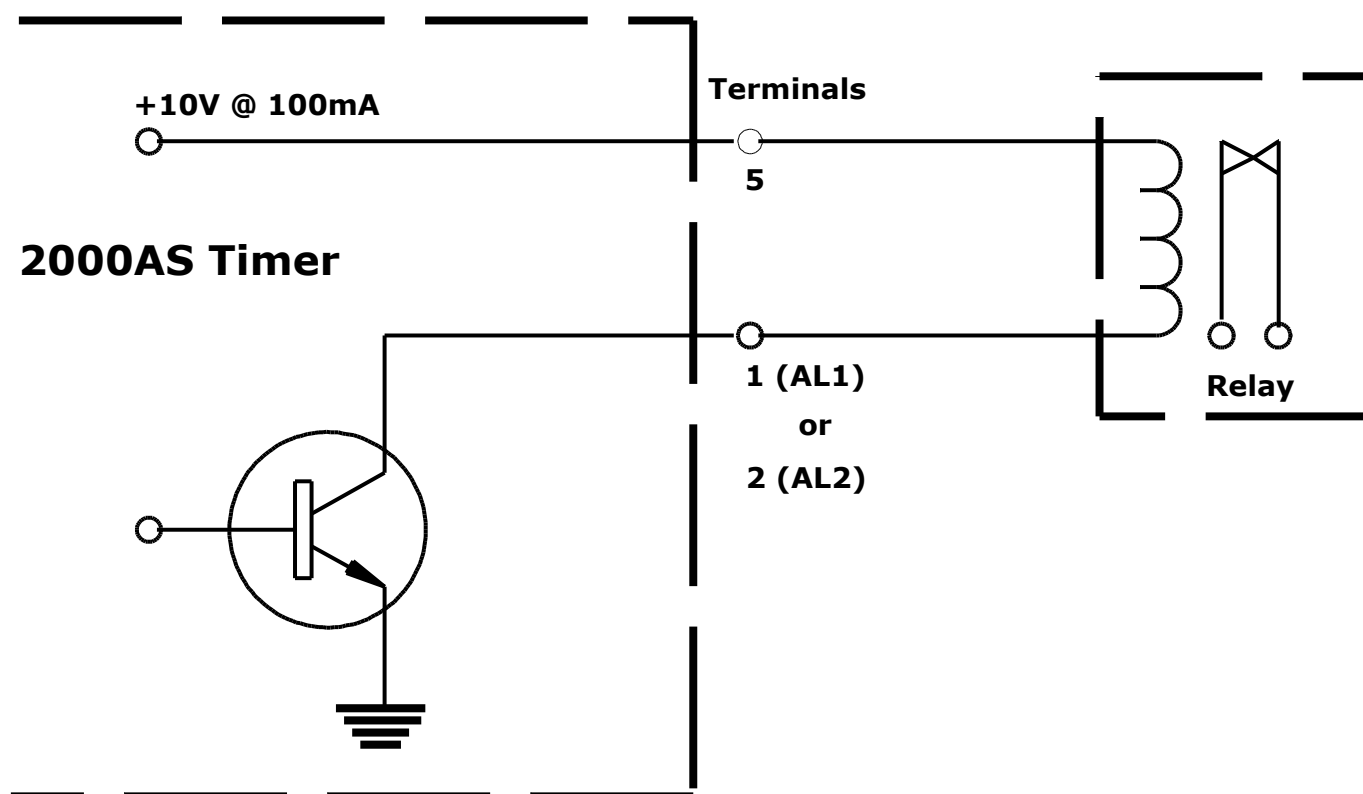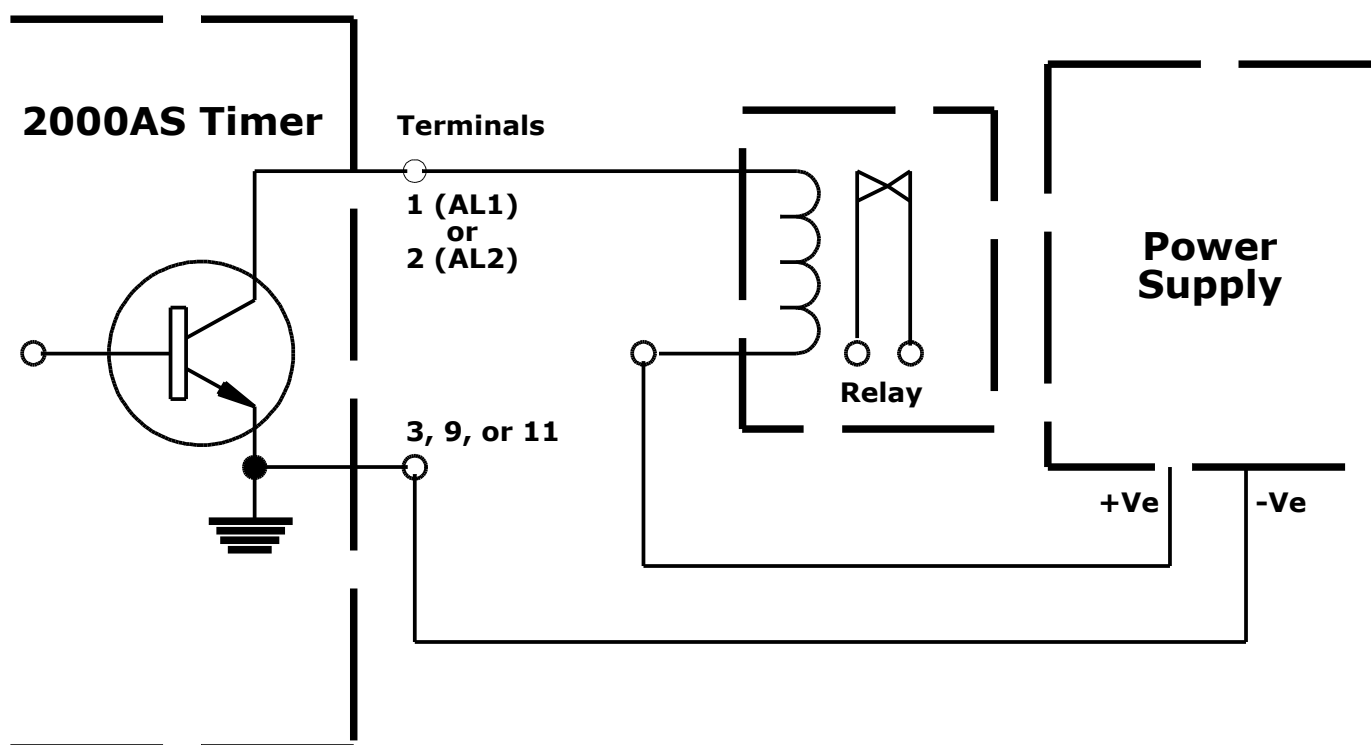
Rear panel layout

2000S MKII

2000AS MKII

Alarm Output Connections - Model 2000AS Only

+10V @ 100mA

Terminals

5

2000AS Timer

1 (AL1)

or

2 (AL2)

Relay

Alarm Connections with External Power Supply - Model 2000AS Only

2000AS Timer

Terminals

**1 (AL1)
or
2 (AL2)**

Relay

**Power
Supply**

3, 9, or 11

+Ve

-Ve

Additional Information

Electromagnetic Precautions

Logitech have designed in a great deal of noise immunity into the product in accordance with EN5001-2 and EN5002-2 (radiated emissions, conducted emissions, ESD, radiated susceptibility and fast burst transient testing)

However it is still vital to use good EMC (Electromagnetic Compatibility) techniques on installation of both this and other associated electronic equipment and sensors in order to ensure reliable operation.

It is important to note that if used with systems that radiate high levels of harmonic noise such as DC Drives, AC Inverters and Servo Drives then the levels of imposed interference can greatly exceed that of the European Standards.

In such cases it is important to ensure that mains leads are routed as far as possible from all cables carrying power to such equipment and that the supply should, if viable, be taken from a clean source.

Where this is not possible, it is advisable to use a good quality mains filter mounted as close to the instrument as possible, ensuring that the cable between the filter and the instrument is kept separate from any cables carrying high levels of current or any fast switching transients.

All signal connections to the instrument should be made using screened lead with the screen connected to mains earth at one end only.

Wherever possible, it is advisable to connect the 0V terminal to mains earth, unless it is found that the mains earth is of poor quality or when it is essential that the signal input is floating — see Mains Earth on page 8.

Low Voltage Directive

It is essential that the mains supply to the instrument is fused externally to no more than 1A and that the cabling supplying power to the instrument is rated for at least 3A.

Low voltage signal cables should not be run in the same conduit or twisted or tied to cables carrying voltages in excess of 50V (AC or DC).

If the instrument is not installed fully in accordance with the instructions in this User Guide it may not comply with the requirements of the Low Voltage Directive.

Warranty

2000S MKII SERIES™ Timers carry a two year warranty that is only valid where there is no damage caused by accident, negligence, misapplication, or repairs/modifications attempted by unauthorised personnel. The warranty only extends to the original user.

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Document No: 2000S-**MKII**_hb v3.0 August 2017

CE ⚠ (WEEE symbol)
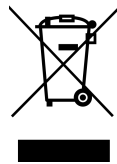
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