

*Accessories for Diesel Injection Pump Test Benches
Trigger and Angle Measuring Device*

TWM 2000



TWM 2000 Trigger and Angle Measuring Device

Trigger and Angle Measuring Device

Special features:

- **Highly precision trigger capability, resolution 0.1° of crank angle**
- **Manual or automatic operation with computer linking**
- **Digital indication of angle e.g. speed**
- **Evaluation and conversion of sensor signals**
- **Simple and easy operation**
- **Compact design**
- **Control unit in 19" rack-mount technology**
- **High reliability**
- **Qualified for use in rough environment**
- **Connection of a X/Y recorder possible**

General

The TWM 2000 is an optimal aid for development and test of new, mainly electronically controlled Diesel Injection Systems such as electronic distributor pumps, control-sleeve pumps, unit pumps (PLD) and unit injectors (PDE) etc..

If you compare new electronic injection systems to conventional ones, you will find it difficult to detect the injection rate since start of injection is controlled electronically.

Knowing everything about the injection rate, however, is an absolute must in the field of development of today's Diesel engines. Special focus lies on the detailed monitoring of the injection process.

In order to trigger the injection system itself, as well as e.g. a transient recording device, a number of signals are needed. TDC and the according number of cylinders must be generated with the aid of signals. When starting up a new engine it can be, that no angle positions are known. These must be determined during the first revolutions. This challenge may perfectly be mastered with the TWM 2000, an intelligent trigger and pulse sequence generation unit with extremely high resolution, made by MOEHWALD.

Functions of the device

Setting the reference pulse

The TWM 2000 makes it possible for the operator to define a reference point at any adjustable position of the drive axle, relative to the encoder zero pulse. At this position, the angle indication will be set to zero.

All absolute trigger signals which the operator defines from this moment will have reference to this point. The resolution of the angle measurement is 0.1 °.

Absolute trigger

Using the TWM 2000, it is also possible to generate absolute trigger signals from signals of the encoder which is attached to the drive axle. These triggers may be set at any position relative to the previously determined reference point.

Pulses per revolution

It is also possible that the TWM 2000 generates symmetric pulse sequences derived from the encoder signal. The number of pulses per revolution may be preset as whole dividers of 1,800 (e.g. 2,3,4,5,6,8,9,10,12,15 etc.).

Indications

On the two-line, background illuminated LC-display of the TWM 2000, the current angle position, relative to the reference point or the speed will be displayed. Switching over from one display (e.g. speed) to another (angle) is done through the operator using the keys. Even if the direction of rotation changes, angle position will always correctly be indicated.

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„Online“ shift function of the absolute triggers

The TWM 2000 provides the special feature to shift an already defined absolute trigger 'online' to another position and save it. E.g., while the drive axle is rotating, the operator may shift the trigger position by using the keys.

CW and CCW direction of rotation of the drive

With the TWM 2000, a function that allows the operator to select the direction of rotation of the drive is available. In set direction of rotation, the angle display counts up and the speed value is positive and vice versa.

Standard analog functions

The TWM 2000 outputs an angle proportional as well as a speed proportional voltage. The range is 0 - 10 VDC. The voltage may be scaled in relation to the maximum speed.

Additionally, the TWM 2000 is equipped with an additional analog input board. Therefore the TWM 2000 has two channels with sample & hold amplifiers as well as one channel for peak value detection. Sample angle as well as angle range for the peak value detection are determined via keyboard and display. The analog input signals must be within the standard range of 0 - 10 VDC.

The analog board incorporates an A/D converter for measuring the voltage and peak values. These may be observed on the display.

EMI - function

(EMI = injection quantity indicator)
Using the keyboard, the TWM 2000 may be switched into a mode which allows for directly controlling an EMI device using two of its outputs. One is used to do the switching of the EMI's solenoid valve, the other delivers speed information to the EMI. The output for the solenoid control may be shifted 'online' across the whole angle range with a resolution of 0.1°.

Setup

The operator may save two complete configuration sets and retrieve them any time. Storage is done in an EEPROM - this ensures that data will be resident for at least 10 years. Advantage: no buffer battery is needed!

Computer linkage

All configurations available to the operator may also be executed by a host computer via RS 232 interface.

Encoder connection

For high precision applications a Heidenhain encoder with differential signals is recommended. (e.g. ROD 426)

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Technical data:

Basic setup:

Output channels	5, configurable as absolute triggers or divider channels
Output voltage	5 VDC or 15 VDC per channel adjustable
Angle resolution of indication	0.1° which is equal to 3,600 increments per revolution
Trigger positioning	freely selectable in steps of 0.1° within 360°
After trigger	0 to 1,800 possible, depending on width
Divider generation	3,600/n pulses/ revolution (n = 2 .. 3,600)
Speed resolution	1 rpm
Angle proportional voltage	0 - 10 VDC (0.1° equals 2.78 mVDC)
Speed proportional voltage	0 - 10 VDC, scalable to end speed
Remanent data sets	2 complete sets of configuration may be stored
EMI control function	enable/ disable via configuration

Extended analog functions

Sample & hold 1	analog signal input	range 0 - 10 VDC
	analog hold output	range 0 - 10 VDC
Sample & hold 2	analog signal input	range 0 - 10 VDC
	analog maximum output	range 0 - 10 VDC

General Data

Housing dimensions (H x L x W)	113 x 483 x 340 mm
Weight	7.5 kg
Housing	19" rack-mount/3HE with front handles integration into rack without modification possible
Protection classification	IP42
Operating temperature	0 - 50° C (32-122° F)
Supply voltage/ frequency	100 - 260 VAC/ 50 Hz
Line connection	plug with instrument fuse in phase and neutral
Earth	via connecting cable separate earth screw provided (not required)
Fuse	instrument fuse 5 x 20 mm / 1.6 A (M)
Line switch	in front panel, 2 line switching, with glow lamp
Power consumption	40 W (including encoder)
Encoder connection 1	12 pin Heidenhain female plug counter plug e.g. Heidenhain 257 524 07
Encoder connection 2	5 pin Binder female plug series 680 (270° type) counter plug e.g. R.E.D. coupling 09-0313-00-05
Outputs (front)	BNC jacks
Display	alpha numeric LC- display with LED illumination 2 lines with each 40 characters
Keyboard	4 x 4 matrix keyboard
Computer interface	RS 232 (plug DB9 acc. IBM/AT standard)

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