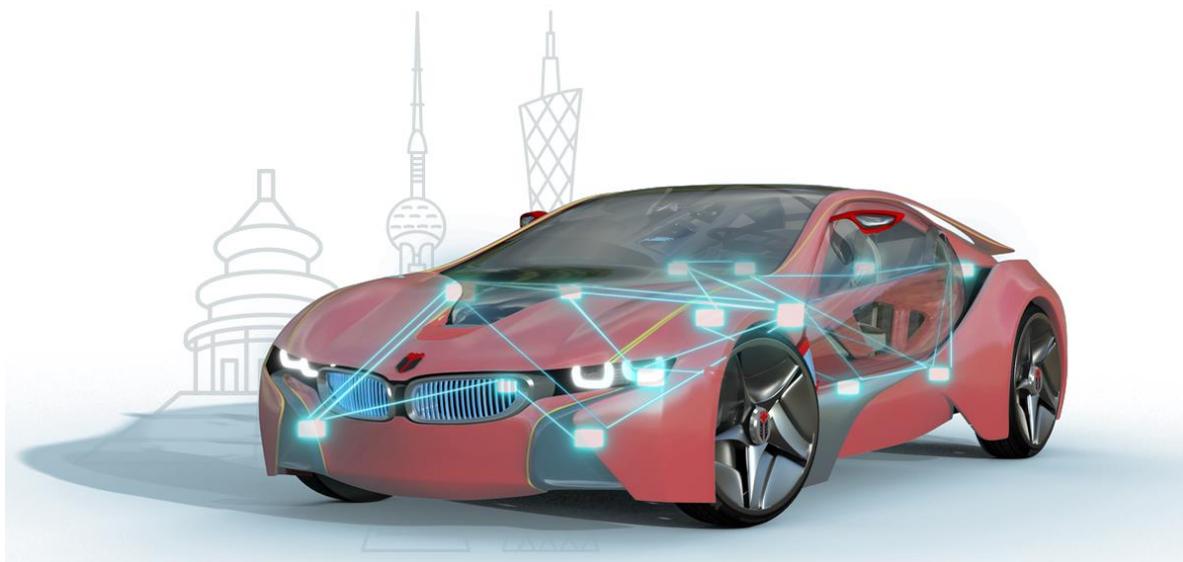




知从玄武 XCP 标定上位机产品手册  
ZC.XUANWU XCP CALIBRATION UPPER  
COMPUTER PRODUCT MANUAL

知从玄武工具  
ZC.XuanWu Tool



# 知从玄武 XCP 标定上位机产品手册

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知从玄武工具

ZC.XuanWu Tool

### 1 功能概述 FUNCTIONAL OVERVIEW

知从玄武标定上位机工具是一种基于 ASAM 标准的通用测量与标定协议工具，支持多通信协议（如 CAN、CANFD、Eth 等），专为汽车电子控制单元（ECU）的在线标定、数据采集和调试设计。其核心功能包括：

**实时数据采集：**支持 Polling（轮询）和 DAQ（数据采集）两种模式。在线参数标定：动态调整 ECU 参数并实时生效，支持块标定、二维数组标定。Flash 编程：将标定后的参数生成 hex 文件，可烧录存储至 ECU 的 Flash 中，确保持久化生效。多协议兼容：支持 XCP-on-CAN、XCP-on-CANFD，XCP-on-Ethernet 等多种传输层，适配不同车载网络环境。

The ZC.XuanWu Calibration Tool is a general-purpose measurement and calibration protocol tool based on ASAM standards, supporting multiple communication protocols (such as CAN, CANFD, Ethernet, etc.). It is specifically designed for online calibration, data collection, and debugging of automotive electronic control units (ECUs). Its core functions include:

**Real-time Data Collection:** Supports both Polling (cyclic query) and DAQ (data acquisition) modes. **Online Parameter Calibration:** Dynamically adjusts ECU parameters that take effect in real-time, supporting block calibration and 2D array calibration. **Flash Programming:** Generates hex files from calibrated parameters, which can be programmed and stored into the ECU's Flash memory to ensure persistent effectiveness. **Multi-Protocol Compatibility:** Supports transport layers such as XCP-on-CAN, XCP-on-CANFD, and XCP-on-Ethernet, adapting to different vehicle network environments.

## 2 应用领域 APPLICATION FIELD

知从玄武标定上位机工具可应用于 OEM 和 Tier1 多种应用场景下。用户可以方便的在实验室，试验车辆以及实车上方便的进行程序标定工作。

ZC.XuanWu program refresh and diagnostic testing tools can be applied in various application scenarios for OEMs and Tier 1 suppliers. Users can conveniently perform program calibrating work in laboratories, test vehicles, and actual vehicles.

玄武上位机软件目前应用于各类电子控制器的程序标定：

ZC.XuanWu upper computer software is currently used for program calibration of various electronic controllers:

- 车身控制器 Body Control Module (BCM)
- 空调控制器 Air Conditioning Controller
- DC/DC 控制器 DC/DC Converter
- 电子助力转向控制器 Electric Power Steering Controller
- 发动机控制器 Engine Management System (EMS)
- 变速箱控制器 Transmission Control Module (TCM)
- 电池管理系统 Battery Management System (BMS)
- 整车控制器 Vehicle Control Unit (VCU)
- 电机控制器 Motor Control Unit (MCU)
- 电动助力转向系统 Electric Power Steering System (EPS)
- 防抱死制动系统 Anti-lock Braking System (ABS)
- 电子稳定性控制程序 Electronic Stability Program (ESP)
- 主动防撞系统 Active Collision Avoidance System (ACC)
- 牵引力控制系统 Traction Control System (TCS)
- ADAS 控制器 Advanced Driver Assistance Systems Controller

### 3 配置环境 CONFIGURATION ENVIRONMENT

配置环境 Configuration Environment	
Hardware	PCAN 、 Mongoose 、 Kvaser 、 USBCAN ( ZLG ) 、 VN1640 、 TC1016、 OBD-RJ45
Configuration Environment	Win7/10 64bit



PCAN ↵



Mongoose ↵



USBCAN (ZLG) ↵



Kvaser ↵



VN1640 ↵



OBD-RJ45



TC1016

## 4 开发背景 DEVELOPMENT BACKGROUND

随着汽车电子化与智能化进程加速，电子控制单元（ECU）的功能复杂度呈指数级增长。21 世纪初，传统汽车行业的标定逐渐暴露以下局限性：

**带宽瓶颈：**仅支持 CAN 总线，最大理论带宽 1 Mbps，无法满足高频率数据采集（如电机转速、电池单体电压）需求。

**协议僵化：**无法适配 CANFD、Ethernet 等新型车载网络，制约了多域控制器（如域控、中央计算平台）的发展。

**资源占用高：**需在 ECU 中预分配固定内存块（Daq List），导致内存利用率低，尤其在小内存 MCU 中矛盾突出。

**功能单一：**缺乏动态标定、安全访问等高级功能，难以应对 ISO 26262 功能安全与信息安全要求。

知从玄武标定工具适配多种总线类型，支持市场主流硬件设备，支持多种类型的测量与标定，图形化界面，操作简便，满足客户需求。

With the acceleration of automotive electrification and intelligentization, the functional complexity of Electronic Control Units (ECUs) has grown exponentially. In the early 21st century, traditional automotive calibration gradually revealed the following limitations:

**Bandwidth Bottleneck:** Supported only CAN bus with a maximum theoretical bandwidth of 1 Mbps, failing to meet high-frequency data acquisition requirements (e.g., motor speed, battery cell voltage).

**Protocol Rigidity:** Incompatible with emerging in-vehicle networks like CAN FD and Ethernet, constraining the development of multi-domain controllers (e.g., domain controllers, central computing platforms).

**High Resource Consumption:** Required pre-allocated fixed memory blocks (DAQ List) in ECUs, resulting in low memory utilization, particularly problematic for small-memory MCUs.

**Limited Functionality:** Lacked advanced features such as dynamic calibration and secure access, making it difficult to comply with ISO 26262 functional safety and cybersecurity requirements.

ZC.XuanWu Calibration Tool addresses these challenges by: Multi-bus compatibility: Adapting to various bus types (CAN/CAN FD/Ethernet). Mainstream hardware support: Seamless

integration with industry-standard devices. Comprehensive measurement & calibration:  
Supporting diverse calibration types. User-friendly GUI: Featuring intuitive graphical interfaces for  
simplified operations. Customized solutions: Fully meeting customer requirements across  
scenarios.

## 5 功能描述 FUNCTIONAL DESCRIPTION

### 5.1 测量标定界面 Measurement calibration View

点击右上角添加视图并选择测量标定。

Click on the top right corner to add a view and select Measurement Calibration.

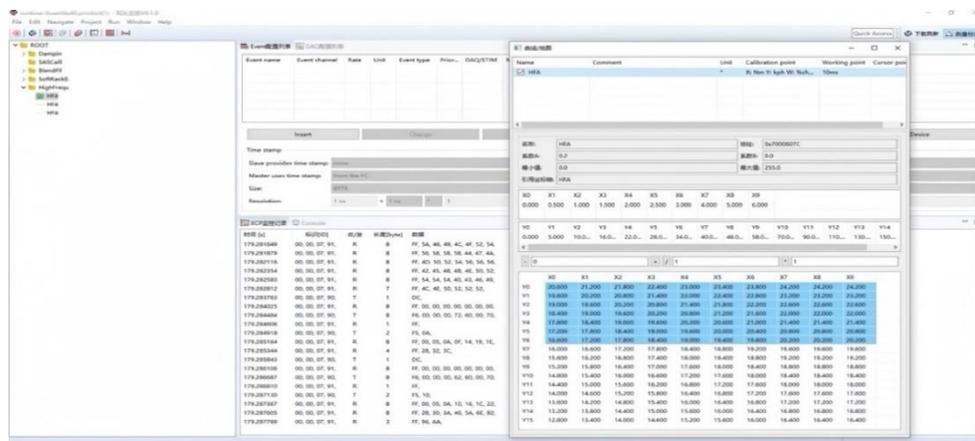
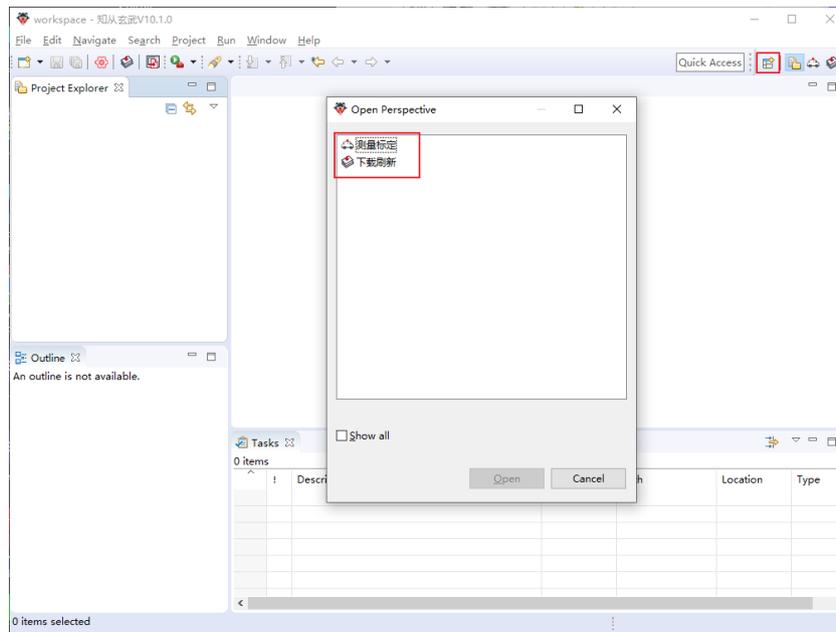


图 5-1 测量标定界面 Measurement Calibration Interface

## 5.2 配置生成 hex 文件 Configure the generation of hex files

点击生成 hex 文件按钮——>点击 Insert 按钮进行配置相关信息——>勾选 Enable

勾选 Enable 是为了使能生成 hex 文件，如果不勾选则不会生成 hex 文件

Click the 'Generate hex file' button ->Click the 'Insert' button to configure relevant information ->Check 'Enable'

Checking Enable is to enable the generation of hex files. If not checked, hex files will not be generated

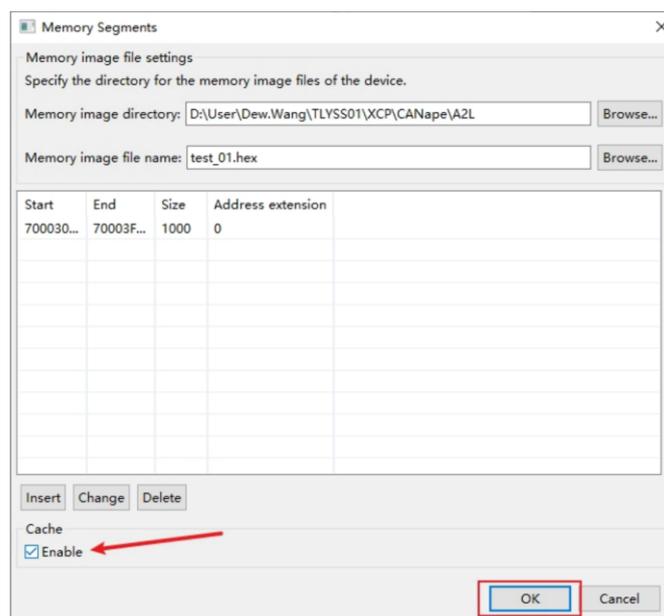
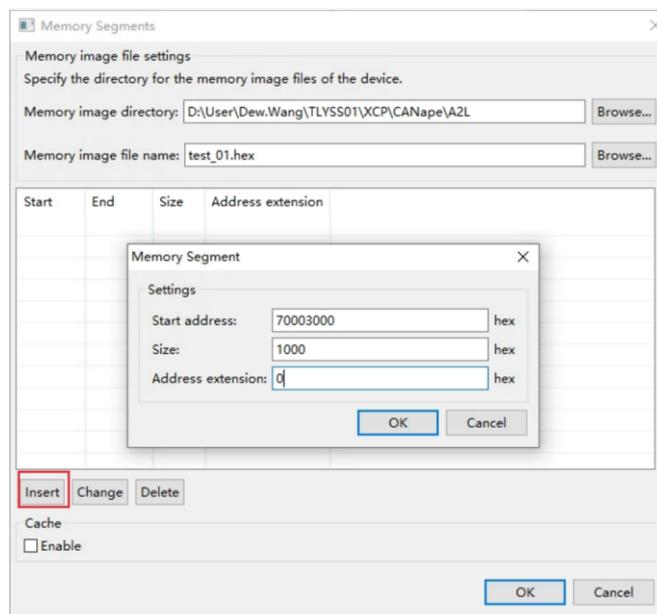


图 5-2 配置生成 hex 文件 Configure the generation of hex files

### 5.3 连接并配置设备 Connect and configure devices

连接设备，让设备通道处于开启且在线状态。

配置好之后左侧界面会显示 A2L 文件。

Connect the device and keep the device channel open and online.

After configuration, the left interface will display the A2L file



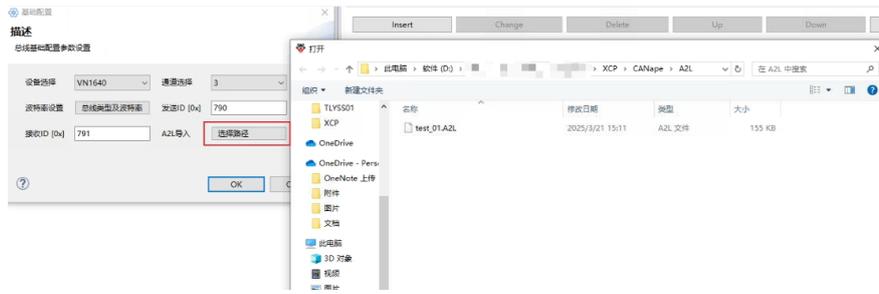


图 5-3-1 连接并配置 Connect and configure

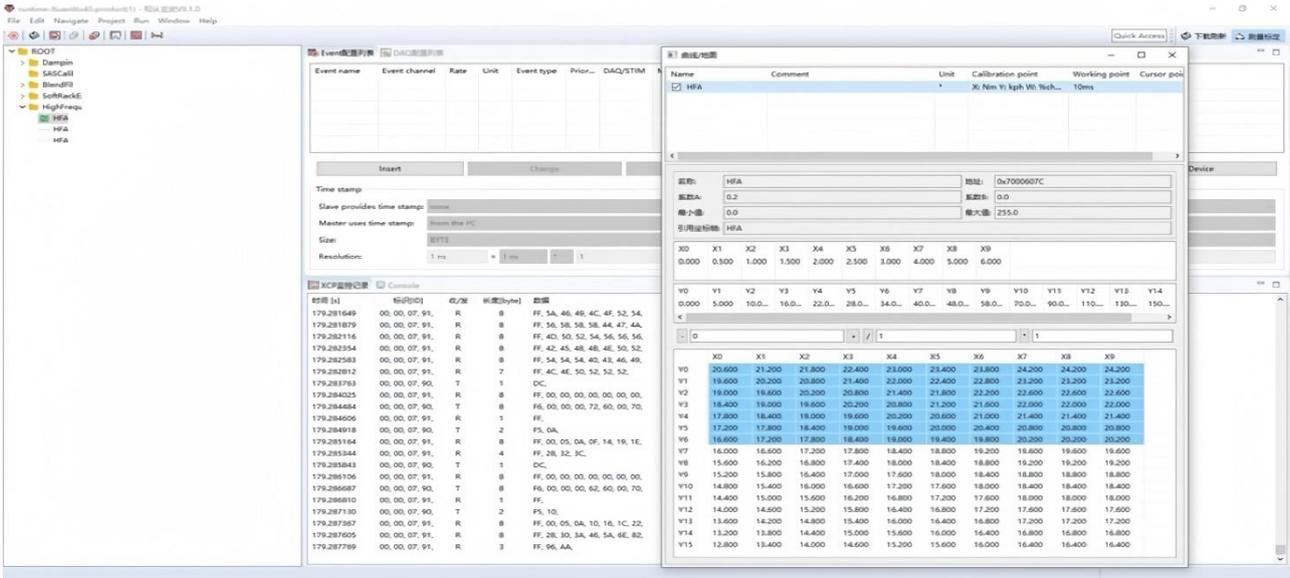


图 5-3-2 配置连接成功后的 A2L 文件界面显示

Display the A2L file interface after successful configuration connection

### 5.4 配置事件列表 Configure event list

选择 Event 配置列表——>点击 Update From Device 按钮。

点击按钮之后会读取 ECU 中的事件信息并更新到界面上

Select the Event configuration list ->click the Update From Device button.

After clicking the button, the event information in the ECU will be read and updated on the interface

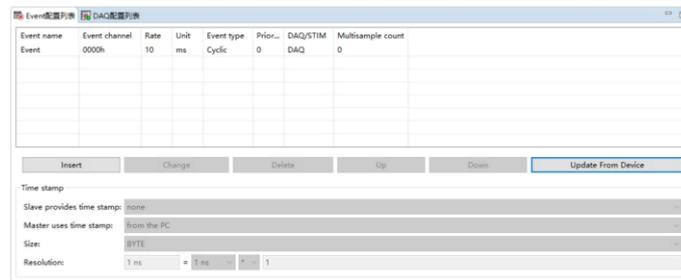


图 5-4 配置事件列表 Configure event list

### 5.5 配置 DAQ 列表 Configure DAQ List

选择 DAQ 配置列表——>点击 Insert 按钮进行配置

Select DAQ configuration list ->Click the Insert button to configure

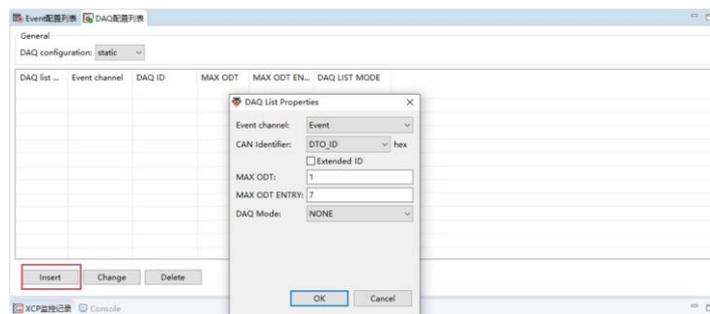


图 5-5 配置 DAQ 列表 Configure DAQ List

### 5.6 测量 measure

测量时可选择不同的测量方式(polling 或者 daq)

Different measurement methods (polling or daq) can be selected during measurement

Name/Type	Phy value	Unit	Comment	Measurement mode	Rate
D	0.0			polling	10ms
D	0.0			polling	10ms
D	0.0			polling	10ms

打开 A2L 文件——>选择所需测量的相关参数添加到测量窗口——>选择测量的方式 (Polling/DAQ)——>点击开始测量按钮

Open A2L file ->Select the relevant parameters to be measured and add them to the measurement window ->Select the measurement method (Polling/DAQ) ->Click the start measurement button

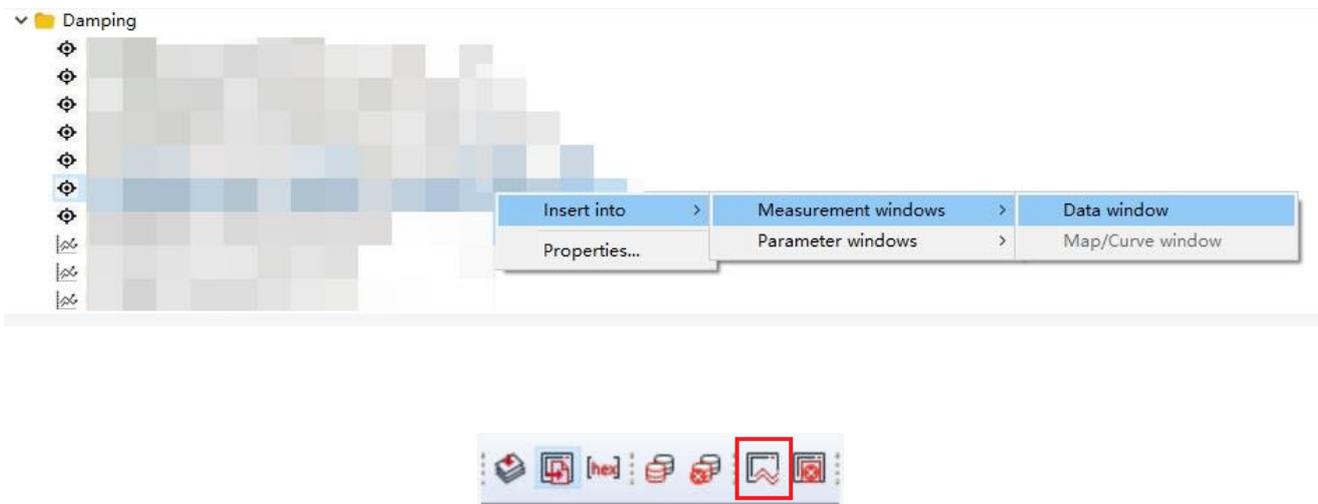


图 5-6-1 测量 measure

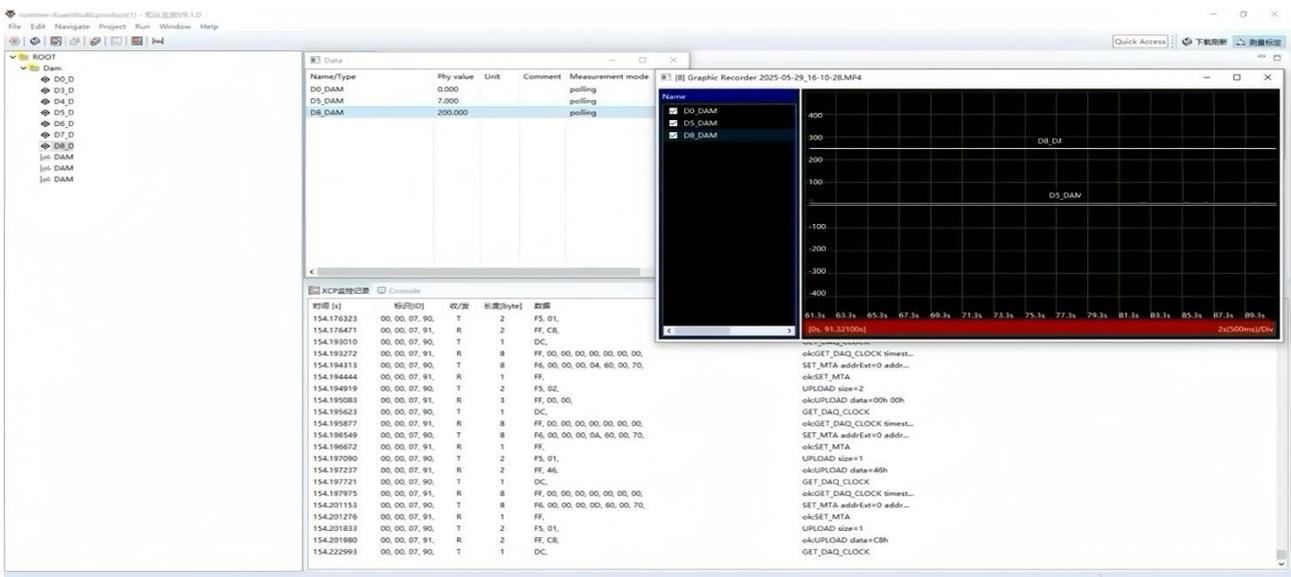


图 5-6-2 开始测量并成功发送接收数据界面

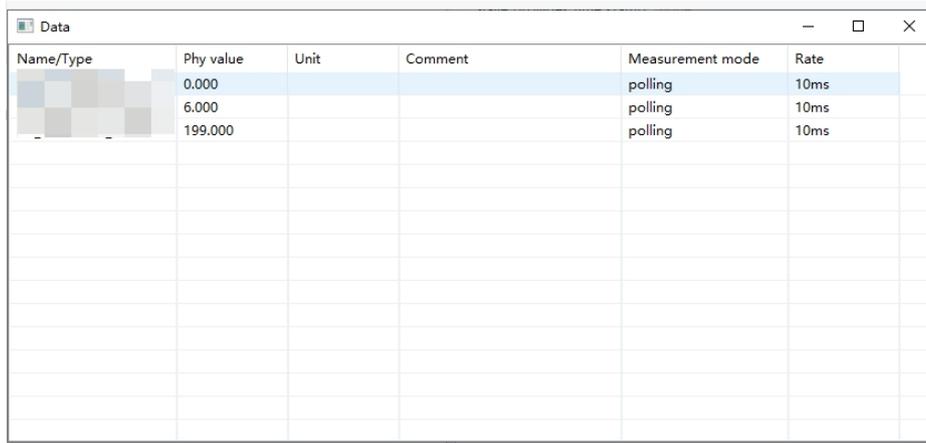
Start measuring and successfully sending and receiving data interface

如需停止测量可以点击停止测量按钮

To stop the measurement, click the stop measurement button



图 5-6-3 停止测量按钮 Stop measurement button



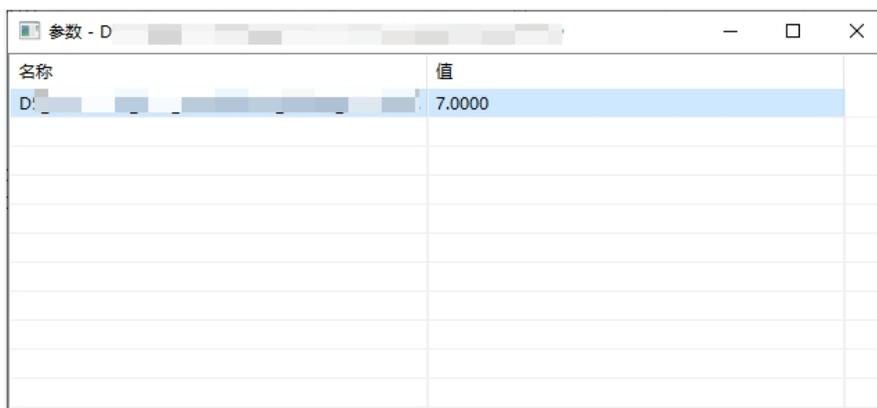
Name/Type	Phy value	Unit	Comment	Measurement mode	Rate
	0.000			polling	10ms
	6.000			polling	10ms
	199.000			polling	10ms

图 5-6-4 测量窗口 measure window

### 5.7 标定 calibration

打开 A2L 文件——>选择所需标定的相关参数添加到标定窗口——>双击进行修改值

Open A2L file ->Select the relevant parameters to be calibrated and add them to the calibration window ->Double click to modify the values



名称	值
D:	7.0000

图 5-7 标定 calibration

对于二维数组，可以批量修改值：

For two-dimensional arrays, the values can be modified in batches:

曲线/地图

Name	Comment	Unit	Calibration point	Working point	Cursor point
+		*	X: Nm Y: kph W: %sch...	10ms	

名称:  地址: 0x7000607C

系数A: 0.2 系数B: 0.0

最小值: 0.0 最大值: 255.0

引用坐标轴:

X0	X1	X2	X3	X4	X5	X6	X7	X8	X9
0.000	0.500	1.000	1.500	2.000	2.500	3.000	4.000	5.000	6.000

Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
0.000	5.000	10.0...	16.0...	22.0...	28.0...	34.0...	40.0...	48.0...	58.0...	70.0...	90.0...	110...	130...	150...

- 0 + / 1 \* 1

	X0	X1	X2	X3	X4	X5	X6	X7	X8	X9
Y0	20.600	21.200	21.800	22.400	23.000	23.400	23.800	24.200	24.200	24.200
Y1	19.600	20.200	20.800	21.400	22.000	22.400	22.800	23.200	23.200	23.200
Y2	19.000	19.600	20.200	20.800	21.400	21.800	22.200	22.600	22.600	22.600
Y3	18.400	19.000	19.600	20.200	20.800	21.200	21.600	22.000	22.000	22.000
Y4	17.800	18.400	19.000	19.600	20.200	20.600	21.000	21.400	21.400	21.400
Y5	17.200	17.800	18.400	19.000	19.600	20.000	20.400	20.800	20.800	20.800
Y6	16.600	17.200	17.800	18.400	19.000	19.400	19.800	20.200	20.200	20.200
Y7	16.000	16.600	17.200	17.800	18.400	18.800	19.200	19.600	19.600	19.600
Y8	15.600	16.200	16.800	17.400	18.000	18.400	18.800	19.200	19.200	19.200
Y9	15.200	15.800	16.400	17.000	17.600	18.000	18.400	18.800	18.800	18.800
Y10	14.800	15.400	16.000	16.600	17.200	17.600	18.000	18.400	18.400	18.400
Y11	14.400	15.000	15.600	16.200	16.800	17.200	17.600	18.000	18.000	18.000
Y12	14.000	14.600	15.200	15.800	16.400	16.800	17.200	17.600	17.600	17.600
Y13	13.600	14.200	14.800	15.400	16.000	16.400	16.800	17.200	17.200	17.200
Y14	13.200	13.800	14.400	15.000	15.600	16.000	16.400	16.800	16.800	16.800
Y15	12.800	13.400	14.000	14.600	15.200	15.600	16.000	16.400	16.400	16.400

## 6 产品特点 PRODUCT FEATURE

### ➤ 操作简易 Easy to operate

- 图形化界面，方便配置

Graphical interface for convenient configuration

- 自动解析 A2L 文件

Automatically parse A2L Files

- 支持 elf 解析，和 A2L 文件同步地址段

Supports elf parsing and synchronizing address ranges with A2L files

### ➤ 使用灵活 Flexible to Use

- 支持 CAN、CAN FD、以太网标定

Supports CAN, CAN FD and Ethernet Calibration

- 支持 XCP 1.1 协议

Supports XCP 1.1 protocol

- 支持多种硬件接口

Supports various hardware interfaces

- 支持多种测量和标定方式

Supports a variety of measuring and Calibration specifications



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